SITE: SUTTON BROOK
BREAK: 11.09
OTHER: 18786

S

0908-3553

MSDS IDENTIFICATION NUMBER	DATE ISSUED	ISSUED BY	EMERGENCY PHONE NUMBER
SA-006	March 1, 1989	Environmental Engineering Department	Ulbrich 203-239-4481 Chemtrec 800-424-9300

TRADE NAME: High performance, heat resistant alloys	**FORMULA:** Alloy composed of varying concentrations of elements listed in Section II.
I. PRODUCT IDENTIFICATION **CHEMICAL NAME:** See Section II for Alloy Designations	**CHEMICAL FAMILY:** Alloy

II. HAZARDOUS CONSTITUENTS

COBALT BASED SUPERALLOYS AND RELATED ALLOYS GROUP VI

L-605 (Haynes 25)[5]; Haynes 188[5]; N 155.

DANGER
INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS IRRITATION MAY OCCUR.

- The cobalt based superalloys and related alloy products identified above may contain in varying concentrations, the following elemental constituents chromium, cobalt, iron, manganese, molybdenum, nickel, silicon and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown) CHROME	NICKEL
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313
Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST
Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown. C	Mn	P	S	Si	Cr	Ni	Co	Fe	W	La	Cu	Mo	Cb + Ta	Other	DENSITY lbs/cu in	(approx.) MELTING PT. degree (F)
L-605 HAYNES 25[5]	R30605	.05/.15	1.0/2.0	.04	.03	.40	19.0/21.0	9.0/11.0	BAL	3.0	14.0/16.0						.330	2425
HAYNES 188[5]	R30188	.05/.15	1.25	.02	.015	.2/.5	20.0/24.0	20.0/24.0	BAL	3.0	13.0/16.0	.02/.12				B.015	.324	2375
N-155	R30155	.08/.16	1.0/2.0	.04	.04	1.0	20.0/22.5	19.0/21.0	18.5/21.0	BAL	2.0/3.0		.50	2.5/3.5	.75/1.25	N.10/.20	.298	2350
CAS Number		7440-44-0	7439-96-5	7723-14-0	7704-34-9	7440-21-3	7740-47-3	7740-02-0	7440-48-4	7439-89-6	7440-33-7	N/L	7440-50-8	7439-98-7	Cb 7440-25-7 Ta 7440-03-1	B 7440-42-8 N 7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Phos (yellow)	As SO_2	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Dust	As FeO Fume As Fe	As Dust	Not Listed	As Dust As Fume	As Soluble Mo As Insoluble Mo	Cb Not Listed As Metal Ta	Not Listed		
(mg/m3) PEL			5(c) 5(c)	0.1	13	15	0.5 1	1 1	0.1	10	5		1 0.1	5 15				
(mg/m3) TLV			5(c) 1	0.1	5	10	0.5(VI) 0.5	1 1	0.1	5			1 0.2	5 10				

0908-3554
TRW-02173
DEPT 230

ACHESON COLLOIDS COMPANY

Date - 6/29/87

Customer Number : 84000 NO-CHARGE SHIPPER NUMBER : 38541

MATERIAL SAFETY DATA SHEET

* REVISION NO. : 001 REVISION DATE : 4/02/86 *

SECTION I - SOURCE AND NOMENCLATURE

Manufacturer's Name
ACHESON COLLOIDS COMPANY

Emergency Telephone No.
313-984-5581

Address
PO Box 288, Port Huron, MI 48060

Chemical Family
Solvent Blend

Trade Name and Synonyms
SB-3

Chemical Name and Synonyms
Solvent Blend

SECTION II - OSHA REGULATED INGREDIENTS

Basic Material	Approximate Wt. %	Exposure Limit
N. Methylpyrrolidone	60.00	200.00 Ppm
Propylene Glycol Methyl Ether Acetate	40.00	100.00 Ppm

SECTION III - PHYSICAL DATA

Boiling Point	N/A	Vapor Pressure	N/A	Vapor Density	N/A
Melting Point	N/A	Evaporation Rate	N/A	Volatile	100.0
Specific Gravity	1.00	Solubility in Water :	Nil		

Appearance/Odor
Clear Fluid, Sharp Odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point 144 F FLAMMABLE (EXPLOSIVE) LIMITS Upper N/A
Lower N/A

Method
Tag Closed Cup

Extinguishing Media
FOAM, CARBON DIOXIDE, DRY CHEMICAL.

Special Fire Fighting Procedures
SELF-CONTAINED BREATHING SUPPLY.

Unusual Fire and Explosion Hazards
KEEP AWAY FROM SPARKS, OPEN FLAMES OR OTHER SOURCES OF IGNITION.

SECTION V - HEALTH HAZARD DATA

Effects of Overexposure

Inhalation
EXCESSIVE INHALATION OF VAPORS OR MISTS CAN CAUSE NASAL AND RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, HEADACHE.

Ingestion
CAN CAUSE GASTROINTESTINAL IRRITATION, NAUSEA, VOMITING AND DIARRHEA.

Eye
MAY CAUSE SEVERE IRRITATION, BURNING SENSATION, BLURRED VISION.

Skin
REPEATED OR PROLONGED CONTACT CAN CAUSE IRRITATION AND DERMATITIS.

Emergency and First Aid Procedures

Inhalation

IF AFFECTED, REMOVE INDIVIDUAL TO FRESH AIR; IF BREATHING IS DIFFICULT, ADMINISTER OXYGEN; IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION AND SEEK MEDICAL ATTENTION IMMEDIATELY.

Ingestion

KEEP INDIVIDUAL CALM AND SEEK MEDICAL ATTENTION IMMEDIATELY.

Eye

FLUSH EYES WITH WATER, LIFTING UPPER AND LOWER LIDS OCCASIONALLY, AND SEEK MEDICAL ATTENTION IMMEDIATELY.

Skin

WASH WITH SOAP AND WATER; REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE.

SECTION VI - REACTIVITY DATA

Conditions Contributing to Instability

STABLE.

Conditions Contributing to Hazardous Polymerization

NONE.

Incompatibility (MATERIALS TO AVOID)

STRONG OXIDIZERS.

Hazardous Decomposition of Products

CO, CO2.

SECTION VII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled

REMOVE ALL SOURCES OF IGNITION AND VENTILATE AREA; APPLY ABSORBENT MATERIAL AND TRANSFER TO CONTAINERS.

Waste Disposal Method

CONSULT WITH FEDERAL, STATE AND LOCAL WASTE REGULATIONS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Ventilation Requirements

PROVIDE SUFFICIENT LOCAL EXHAUST VENTILATION TO MAINTAIN EXPOSURE BELOW TLV(S).

Protective Equipment :

Eye

WEAR CHEMICAL SPLASH GOGGLES.

Glove

WEAR SOLVENT RESISTANT GLOVES.

Respirator

IF THE TLV OF THE PRODUCT IS EXCEEDED, A MECHANICAL OR SELF CONTAINED BREATHING APPARATUS IS ADVISED.

Other

NO SPECIAL EQUIPMENT DEEMED NECESSARY UNDER NORMAL USAGE.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage

AVOID PROLONGED INHALATION OF MISTS OR VAPORS.

These data are offered in good faith as typical values and not as a product specification. No warranty, either expressed or implied, is hereby made. The recommended industrial hygiene and safe handling procedures are believed to be generally applicable. However, each user should review these recommendations in the specific context of the intended use and determine whether they are appropriate.

CASTROL INDUSTRIAL EAST INC.

MATERIAL SAFETY DATA SHEET
Emergency Phone No.: (215) 443-7080
Information Phone No.: (215) 443-7080

FIRE 1
HEALTH 1 0 REACTIVITY
0 SPECIAL

I. MATERIAL IDENTIFICATION

PRODUCT TRADE NAME: SRD A-0882
MANUFACTURER: CASTROL INDUSTRIAL EAST INC.

ADDRESS: 775 LOUIS DRIVE WARMINSTER PA, 18974
MFG. FACILITY ADDRESS:
Preparer: KJN Preparation Date: 01/01/1990

II. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENTS	%	CAS No.	TLV (ACGIH)	PEL (OSHA)
Hydrotreated Heavy Naphthenic Distillates (petroleum)	20-30	64742-52-5	5 mg/M3	5 mg/M3
Hydrotreated Light Naphthenic Distillates (petroleum)	50-70	64742-53-6	5 mg/M3	5 mg/M3
Solvent-Refined Heavy Paraffinic Distillates (petroleum)	0-5	64741-88-4	5 mg/M3	5 mg/M3
Solvent-Refined Light Paraffinic Distillates (petroleum)	0-5	64741-89-5	5 mg/M3	5 mg/M3

III. PHYSICAL PROPERTIES

APPEARANCE & ODOR: Dark brown liquid, characteristic odor
BOILING POINT 'F ('C): NA NA
MELTING POINT 'F ('C): NA NA
SPECIFIC GRAVITY (H2O=1): 0.920
VAPOR PRESSURE: NA
VAPOR DENSITY (AIR=1): NA
EVAPORATION RATE (BUTYL ACETATE=1): NA
%VOLATILES BY VOLUME: 0
SOLUBILITY IN H2O: Insoluble
pH AS IS: NA
pH (DILUTE): NA @ 0 %

IV. FIRE AND EXPLOSION HAZARDS

FLASHPOINT (method used)
NA 'F NA 'C NA
FLAMMABLE LIMITS
LEL NA UEL NA
EXTINGUISHING MEDIA:
Water fog, dry chemical, foam or CO2.
SPECIAL FIRE FIGHTING PROCEDURES:
Wear self contained breathing apparatus when fire fighting in a confined space. Cool fire exposed containers with waterspray to prevent rupture.
UNUSUAL FIRE & EXPLOSION HAZARDS: None
CONTAINER HANDLING: DO NOT CUT OR WELD EMPTY DRUMS UNLESS THOROUGHLY CLEANED.

V. REACTIVITY DATA

STABILITY:
Stable under normal conditions.
CONDITIONS TO AVOID: None
INCOMPATIBILITIES: Strong oxidizing agents
HAZARDOUS DECOMPOSITION: Oxides of carbon and sulfur
HAZARDOUS POLYMERIZATION: Will Not Polymerize

VI. HEALTH HAZARD SUMMARY

ROUTES OF EXPOSURE AND EFFECTS OF OVEREXPOSURE

EYES:
May cause eye irritation.

SKIN ABSORPTION:
No acute effects expected.

SKIN CONTACT:
May cause skin irritation.

INHALATION:
Mists may cause respiratory irritation.

INGESTION:
LD50 not established. Do not ingest.

CHRONIC EFFECTS:
A review of the literature does not show obvious long term hazard.

THRESHOLD LIMIT VALUE: Not Established for this product

CONTAINS KNOWN CARCINOGENS: no NTP: no IARC: no OSHA: no

EMERGENCY AND FIRST AID PROCEDURES

EYES:
Immediately flush eyes with plenty of water. Get medical attention if irritation persists.

SKIN:
Wash skin with soap and water. If irritation occurs, get medical attention. Wash clothing before reuse.

INHALATION:
If respiratory discomfort or irritation occurs, move the person to fresh air. See a doctor if discomfort or irritation continues.

INGESTION:
If swallowed, call a physician immediately. Only induce vomiting at the instructions of a physician. Never give anything by mouth to an unconscious person.

VII. CONTROL MEASURES

RESPIRATORY PROTECTION:
Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the threshold limit value (TLV). If the associated TLV is exceeded, provide NIOSH approved respiratory protection.
GLOVES:
Impervious gloves such as rubber should be used when handling this product.
EYE PROTECTION:
Safety glasses with side shield or chemical goggles.
OTHER:
Eyewash facility. Appropriate clothing to avoid skin contact.

VIII. PRECAUTIONS

CONTAINMENT PROCEDURES:
Recover free liquid. Keep products out of streams and waterways by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses or extensive land areas.
WASTE DISPOSAL PROCEDURES:
Dispose of in accordance with local, state, and federal regulations. Disposal of this material to the land may be banned by federal law (40 CFR 268).
STORAGE AND HANDLING PROCEDURES:
Avoid contact with skin and eyes. Avoid breathing mists. DO NOT take internally. Keep container closed when not in use. Bring product to room temperature before use.
RCRA HAZARDOUS WASTE DESIGNATION:
This product does not fall under current EPA RCRA definitions of hazardous waste.
CERCLA REPORTABLE QUANTITY:
This product does not contain any CERCLA regulated materials.

IX. OTHER HAZARD INFORMATION

Petroleum Oil -- Using the terminology of the International Agency for Research on Cancer (IARC), the oil is classified by the supplier as a 'severely treated naphthenic/paraffinic.' The supplier has stated that the oil does not require a carcinogen label as defined by OSHA 29 CFR 1910.1200. STEL for petroleum oil is 10 mg/M3.

X. ADDITIONAL REGULATORY INFORMATION

OCCUPATIONAL SAFETY and HEALTH ADMINISTRATION (OSHA)
29 CFR 1910.1200 Hazardous Chemical: yes
SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 (SARA)
Section 302, Extremely Hazardous Substance: no
Section 311, Hazardous Chemical: yes
Immediate: yes Delayed: no Fire: no Sudden Release: no Reactive: no
Section 313, Toxic Chemical: no
TOXIC SUBSTANCES CONTROL ACT (TSCA)
This product is a mixture and is NOT listed in the TSCA inventory. The individual ingredients in the product are listed in the TSCA inventory.
DEPARTMENT OF TRANSPORTATION (DOT)
PROPER SHIPPING NAME: PETROLEUM OILS, GREASES & RELATED PROD.
HAZARD CLASS (49 CFR 172.101): NA
HAZARD ID NUMBER: NA

DISCLAIMER

Information presented herein has been compiled from information provided to us by our suppliers and other sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or the use of any product in violation of any patent or in violation of any law or regulation. It is the users' responsibility to determine the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us.

MSDS IDENTIFICATION NUMBER	DATE ISSUED	ISSUED BY	EMERGENCY PHONE NUMBER
SS-001	March 1, 1989	Environmental Engineering Department	Ulbrich 203-239-4481 Chemtrec 800-424-9300

TRADE NAME: High performance, heat resistant alloys	**FORMULA:** Alloy composed of varying concentrations of elements listed in Section II.
I. PRODUCT IDENTIFICATION **CHEMICAL NAME:** See Section II for Alloy Designations	**CHEMICAL FAMILY:** Alloy

II. HAZARDOUS CONSTITUENTS

STAINLESS AND RELATED ALLOYS GROUP I

201; 301; 302, 303; 303SE; 304; 304L; 305; 308; 309; 309S; 309SCB; 310; 310S; 316; 316L; 317; 317L; 321; 330; 347; 384; 405; 409; 410; 414; 416; 416SE; 420; 430; 434; 436; 440A; 442; 446; 18 SR[1]; Carpenter 20 CB3[2]; 18-9LW[1]; 19-9DL[4]; Greek Ascoloy[2].

DANGER
INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS MEMBRANE IRRITATION MAY OCCUR.

- The stainless and related alloy products identified above may contain in varying concentrations, the following elemental constituents aluminum, chromium, copper, iron, manganese, molybdenum, nickel and tungsten. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

	Element or Certain Compounds Evaluated or Both (Identified by Element Shown)	
Determination/Evaluation	CHROME	NICKEL
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313
Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST
Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

Ulbrich Stainless Steels & Special Metals, Inc.

Material Safety Data Sheets

Stainless & Related Alloys Group I Sheet 1

4

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown. C	Mn	Si	Cr	Ni	Mo	Fe	Cb + Ta	Ti	Se	Other	DENSITY lbs/cu in	(approx.) MELTING PT. degree (F)
201	S20100	.15	5.5/7.5	1.0	16.0/18.0	3.5/5.5		BAL				N .25	.280	2550
301	S30100	.15	2.0	1.0	16.0/18.0	6.0/8.0		BAL					.290	2550
302	S30200	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL					.290	2550
303	S30300	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL				S .15	.290	2550
303 SE	S30323	.15	2.0	1.0	17.0/19.0	8.0/10.0		BAL			.15min		.290	2550
304	S30400	.08	2.0	1.0	18.0/20.0	8.0/10.5		BAL					.290	2550
304 L	S30403	.03	2.0	1.0	18.0/20.0	8.0/12.0		BAL					.290	2550
305	S30500	.12	2.0	1.0	17.0/19.0	10.5/13.0		BAL					.290	2550
308	S30800	.08	2.0	1.0	19.0/21.0	10.0/12.0		BAL					.290	2550
309	S30900	.20	2.0	1.0	22.0/24.0	12.0/15.0		BAL					.290	2550
309 S	S30908	.08	2.0	1.0	22.0/24.0	12.0/15.0		BAL					.290	2550
309 SCB	N/L	.08	2.0	.75	22.0/24.0	12.0/16.0		BAL	10XCmin/1.10				.290	2550
310	S31000	.25	2.0	1.5	24.0/26.0	19.0/22.0		BAL					.290	2550
310 S	S31008	.08	2.0	1.5	24.0/26.0	19.0/22.0		BAL					.290	2550
316	S31600	.08	2.0	1.0	16.0/18.0	10.0/14.0	2.0/3.0	BAL					.290	2550
316 L	S31603	.30	2.0	1.0	16.0/18.0	10.0/14.0	2.0/3.0	BAL					.290	2550
317	S31700	.08	2.0	1.0	18.0/20.0	11.0/15.0	3.0/4.0	BAL					.290	2550
317 L	S31703	.30	2.0	1.0	18.0/20.0	11.0/15.0	3.0/4.0	BAL					.290	2550
321	S32100	.08	2.0	1.0	17.0/19.0	9.0/12.0		BAL		Ti 5XC min			.290	2550
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	Cb7440-25-7 Ta7440-03-1	7440-32-6	7782-49-2	S 7446-09-5 N 7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As FeO Fume As Fe	Cb Not Listed As Metal Ta	As TiO_2	As Dust As Fume	As SO_2 Not Listed		
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1 1 1	5 5 15 10	10 5	5	15 10	0.2 0.2 0.2 0.2	13 5		

0908-3562

TRW-02181

MSDS IDENTIFICATION NUMBER	DATE ISSUED	ISSUED BY	EMERGENCY PHONE NUMBER
HM-002	March 1, 1989	Environmental Engineering Department	Ulbrich 203-239-4481 Chemtrec 800-424-9300

TRADE NAME: High performance, heat resistant alloys

FORMULA: Alloy composed of varying concentrations of elements listed in Section II.

I. PRODUCT IDENTIFICATION

CHEMICAL NAME: See Section II for Alloy Designations

CHEMICAL FAMILY: Alloy

II. HAZARDOUS CONSTITUENTS

HIGH MANGANESE ALLOYS GROUP II

Nitronic 32[1]; Nitronic 33[1]; Nitronic 40 (21-6-9)[1]; Nitronic 50[1]; Nitronic 60[1].

DANGER
INHALATION OF DUST OR FUME MAY CAUSE SERIOUS LUNG INJURY. SKIN, EYE AND MUCOUS IRRITATION MAY OCCUR.

- The high manganese alloy products identified above may contain, in varying concentrations, the following elemental constituents: chrome, iron, manganese, molybdenum, nickel, nitrogen and silicon. For specific concentrations of these and other elements present, refer to the Material Safety Data Sheet (MSDS) for this product.
- Inhalation of metal dust or fume generated by the use of these alloys may cause adverse health effects such as reduced lung function, nasal and mucous membrane irritation. Exposure to dust or fume generated by the use of these alloys may also cause eye irritation, skin rash and effects on other organ systems.
- Chrome, nickel and some of their compounds are listed in the 3rd Annual Report on Carcinogens as prepared by the National Toxicology Program (NTP) as well as the International Agency for Research on Cancer (IARC) Monograph Series. The following information is a summary of findings reported to date:

Determination/Evaluation	Element or Certain Compounds Evaluated or Both (Identified by Element Shown) CHROME	NICKEL
Evidence of carcinogenicity to humans:	Sufficient	Limited
Evidence of carcinogenicity to animals:	Sufficient	Sufficient

- Avoid breathing of dust or fume. If the use of this material produces dust or fume, use appropriate ventilation controls, personal protective equipment or both. For additional information refer to the Material Safety Data Sheet (MSDS) for this product.

NOTICE: SECTION 313
Some of the previously listed chemicals are subject to annual reporting of releases into the environment under Section 313 of the Emergency Planning and Community Right-To-Know-Act of 1986. It is the responsibility of the user to verify whether or not his or her facility is in compliance with all Federal and State Environmental regulations.

NOTICE: CALIFORNIA LIST
Our Material Safety Data Sheets (MSDS) have been reviewed for inclusion of any chemicals listed under the Safe Drinking Water and Toxic Enforcement Act of 1986 (California Proposition 65). We at this time do not report any of the "listed" chemicals as constituent components in any alloys currently processed by our company.

ALLOY	UNS No.	CONSTITUENT(S) % Maximum unless otherwise shown. C	Mn	Si	Cr	Ni	Mo	Fe	N	Cb	V	Other	DENSITY lbs/cu in	(approx.) MELTING PT. degree (F)
NITRONIC 32[1]	S24100	.10	12.0	.5	18.0	1.6		BAL	.35				.281	2550
NITRONIC 33[1]	S24000	.06	13.0	.5	18.0	3.0		BAL	.30				.280	2550
NITRONIC 40[1] 21-6-9	S21904	.08	8.0/10.0	1.0	18.0/20.0	5.0/7.0		BAL	.15/.40				.283	2550
NITRONIC 50[1]	S20910	.06	4.0/6.0	1.0	20.5/23.5	11.5/13.5	1.5/3.0	BAL	.2/.4	0.1/0.3	0.1/0.3		.285	2550
NITRONIC 60[1]	S21800	.10	7.0/9.0	3.5/4.5	16.0/18.0	8.0/9.0		BAL					.276	2550
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	7727-37-9	7440-25-7	V 7440-62-2 1313-62-1			
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As FeO Fume As Fe	Not Listed	Not Listed	As Dust V_2O_5 As Fume V_2O_5			
(mg/m3) PEL TLV			5(c) 5(c) 5(c) 1	15 10	0.5 0.5(VI) 1 0.5	1 1 1 1	5 5 15	10 5			.5(c) .5 .1(c) .5			

0908-3563
TRW-02182

Ulbrich Stainless Stee Special Metals, Inc.

Material Safety Data Sheet

Stainless & Related Alloys Group I Sheet 2

ALLOY	UNS No.	CONSTITUENT(S) C	Mn	% Maximum unless otherwise shown. Si	Cr	Ni	Mo	Fe	Cb + Ta	Cu	Ti	Al	W	Se	V	Other	DENSITY lbs/cu in	(approx.) MELTING PT. degree (F)
330	N08330	.08	2.0	0.75/1.5	17.0/20.0	34.0/37.0		BAL									.289	2550
347	S34700	.08	2.0	1.0	17.0/19.0	9.0/13.0		BAL	10 XC min								.290	2550
384	S38400	.08	2.0	1.0	15.0/17.0	17.0/19.0		BAL									.290	2550
405	S40500	.08	1.0	1.0	11.5/14.5			BAL				.10/.30					.280	2700
409	S40900	.08	1.0	1.0	10.5/11.75			BAL			6XCmin/0.75						.276	2600
410	S41000	.15	1.0	1.0	11.5/13.5			BAL									.280	2700
414	S41400	.15	1.0	1.0	11.5/13.5	1.25/2.5		BAL									.280	2700
416	S41600	.15	1.25	1.0	12.0/14.0			BAL								S.15 min	.280	2700
416 SE	S41623	.15	1.25	1.0	12.0/14.0			BAL						0.15 min			.280	2700
420	S42000	over.15	1.0	1.0	12.0/14.0			BAL									.280	2650
430	S43000	.12	1.0	1.0	16.0/18.0			BAL									.280	2600
434	S43400	.12	1.0	1.0	16.0/18.0		.75/1.25	BAL									.280	2600
436	S43600	.12	1.0	1.0	16.0/18.0		.75/1.25	BAL	5XCmin/0.70								.280	2600
440 A	S44002	.60/.75	1.0	1.0	16.0/18.0		0.75	BAL									.280	2500
442	S44200	.20	1.0	1.0	18.0/23.0			BAL									.280	2600
446	S44600	.20	1.50	1.0	23.0/27.0			BAL								N .25	.280	2600
18 SR[1]	N/L	.20	.50	1.0	17.0/19.0	.50		BAL			3.0/6.0	1.50/2.50					.280	2600
CARPENTER 20 CB3[2]	N08020	.06	2.0	1.0	19.0/21.0	32.5/35.0	2.0/3.0	BAL	8XCmin/1.0	3.0/4.0							.292	2600
18-9LW[1]	N/L	.10	2.0	1.0	17.0/19.0	8.0/10.0		BAL		3.0/4.0							.290	2600
19-9DL[4]	K63198	.28/.35	.75/1.5	.3/.8	18.0/21.0	8.0/11.0	1.0/1.75	BAL	.25/.60	.50	.10/.35		1.0/1.75				.286	2600
GREEK ASCOLLOY	F41800	.15/.20	.50	.50	12.0/14.0		.50	BAL					2.5/3.5		1.8/2.2		.286	2700
CAS Number		7440-44-0	7439-96-5	7740-21-3	7740-47-3	7740-02-0	7439-98-7	7439-89-6	Cb7440-25-7 Ta7440-03-1	7440-50-8	7440-32-6	7429-90-5	7440-33-7	7782-49-2	V 7440-62-2 1313-62-1	S 7446-09-5 N 7727-37-9		
Contaminant & Exposure Limits		Not Listed	As Dust As Fume	As Dust	As Soluble Salts As Insoluble Salts	As Metal Ni As Soluble Ni	As Soluble Mo As Insoluble Mo	As FeO Fume As Fe	Cb Not Listed As Metal Ta	As Dust As Fume	As TiO_2	As Dust As Fume	As Dust	As Dust As Fume	As Dust V_2O_5 As Fume V_2O_5	As SO_2 Not Listed		
(mg/m3) PEL			5(c)	5(c) 15	10 0.5	0.5(VI) 1	1 1 5	5 10	10		1 1 15	10	10	5	0.2 0.2	.5(c) .5	13	5
TLV			5(c)	1	1	0.5	1 1 15	10 5	5	0.1	0.2		5		0.2 0.2	.1(c) .5		

0908-3564

TRW-02183

MATERIAL SAFETY DATA SHEET
FOR COATINGS, RESINS, AND RELATED MATERIALS
COMPLIES WITH 290CFR 1910.1200 (THE HARZARD COMMUNICATION STANDARD)

DATE OF PREP:
5/29/86 1

THE GEORGE T. JOHNSON COMPANY
141 MIDDLESEX TURNPIKE
BURLINGTON, MASSACHUSETTS 01803
(617) 272-4900

MANUFACTURER'S NAME: STANDARDIZED SANITATION SYSTEMS, INC.

STREET ADDRESS: 141 Middlesex Turnpike CITY, STATE, ZIP CODE: Burlington, MA 01803

EMERGENCY TELEPHONE NO: 312/541-9000 or 617/273-2020

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: SSS Scotty +

PRODUCT CLASS: Non-butyl Cleaner PRODUCT(S) NUMBER: 30539

SECTION II - HAZARDOUS INGREDIENTS

INGREDIENT	CAS-No.	% WT.	OCCUPATIONAL EXPOSURE LIMITS PEL PPM	TLV	VAPOR PRESSURE mmHG@68°F
Sodium hydroxide	1310-73-2	1	2mg/m3	2mg/m3	NA

NE = NOT ESTABLISHED NA = NOT APPLICABLE NK = NOT KNOWN

SECTION III - PHYSICAL DATA

BOILING RANGE: Above 212°F pH: 13 VAPOR DENSITY: ____HEAVIER X LIGHTER THAN AIR

EVAPORATION RATE: ____FASTER X SLOWER THAN ETHER % VOLATILE BY VOLUME: 90 WEIGHT PER GALLON: 8.7 lbs.

APPEARANCE AND ODOR: Orange liquid with bland odor

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION: OSHA None
DOT: Not regulated FLASH POINT: NA LEL: NA

EXTINGUISHING MEDIA: None required.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Closed containers may explode (due to build-up of steam pressure) when exposed to extreme heat.

SPECIAL FIREFIGHTING PROCEDURES: Water may be used to cool containers to prevent pressure b 'ld-up and possible explosion when exposed to extreme heat.

MAY 18 1989

SECTION V - HEALTH HAZARD DATA

PERMISSIBLE EXPOSURE LEVEL - See Section II

THRESHOLD LIMIT VALUE - See Section II

EFFECTS OF OVEREXPOSURE: Prolonged contact with concentrate can result in moderately severe skin irritation and inflammation. Contact with eyes can result in corneal damage if immediate action is not taken. Ingestion can result in possible damage to the mucous membranes in the mouth, esophagus, and stomach.

CHRONIC EXPOSURE: Intermittent contact may cause inflammation, dryness of skin, and possible dermatitis.

MEDICAL CONDITIONS PRONE TO AGGRAVATION BY EXPOSURE: Dermatitis, open sores, burns, wounds, rashes.

PRIMARY ROUTE(S) OF ENTRY: _X_ DERMAL ____ INHALATION ____ INGESTION

EMERGENCY AND FIRST AID PROCEDURES: SKIN: Wash repeatedly with soap and water. Apply medicated cream. EYES: Flush with water for 15 minutes. If irritation persists, get medical attention. INGESTION: DO NOT INDUCE VOMITING. Give citrus juices, diluted vinegar, large amounts of water or milk. Call a physician immediately and provide above information.

SECTION VI - REACTIVITY DATA

STABILITY: ____ UNSTABLE _X_ STABLE

HAZARDOUS POLYMERIZATION: ____ MAY OCCUR _X_ WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: None

CONDITIONS TO AVOID: None

INCOMPATIBILITY (MATERIALS TO AVOID): Acidic products.

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Contain and remove with inert absorbent rags or sand.

WASTE DISPOSAL METHOD: Dispose in accordance with local, State and Federal regulations. Use licensed waste disposal company.

SECTION VIII - SAFE HANDLING AND USE INFORMATION

RESPIRATORY PROTECTION: None needed unless applied by spraying. Then, use a NIOSH approved respirator.

VENTILATION: None required. Individual may want to open doors or windows.

PROTECTIVE GLOVES: None required, but can be used.
EYE PROTECTION: Safety glasses.

OTHER PROTECTIVE EQUIPMENT: None.

HYGENIC PRACTICES: Wash hands before eating or smoking. Do not consume food or beverage while using this product.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Protect from freezing.

OTHER PRECAUTIONS: None.

The information accumulated herein is believed to be accurate but is not warranted to be, whether originating with manufacturer or not. Recipients are advised to confirm in advance of need that the information is current, applicable and suitable to their circumstances.

TRW-02185
0908-3566

rial Safety Data Sheet for coatings,resins and other industrial ated materials. Complies with Food and Drug Administration Act and complies with 29CFR 1910.1200 The Hazard Communication Standard

Date of Preparation: 02/15/92 **Emergency Phone No:** 1800-662-0023

Manufacturers Name: AMAX Corporation Industrial Products Group
Street Address: 960 S Third Street
City: Louisville **State:** Ky. **Zip:** 40203
Preparer Ident: Sam Donalds **Dept. Code:** 34MSDS
Information Phone Number: 1-800-662-0023

Section 1-Product Identification

Product Name: SafeSolv **Product Code No:** 378
DOT Hazard Class: None
Product Class: water-soluble, heavy-duty, grease and tar remover

Product Description and Uses: Designed with safety and our environment in mind!! A patented formulation designed to replace CFC and VOC containing products used for industrial cleaning and heavy duty degreasing. SafeSolv is environmentally and ecologically safe, and poses no human health hazards. Non-toxic, biodegradeable, and contains no VOC's, no chlorinated hydrocarbons, no phosphates and no caustic materials. Has superior cleaning and degreasing capabilities, and is cost-effective to use.
Used straight, this is a substitute for varsol. No rinse, no residue!

Section 2- Hazardous Ingredients

Ingredient	CAS No.	%by wt.	Occupational Exposure limits PEL PPM	Vapor Pressure @68F
Contains no hazardous components as listed in 29 CFR 1900.1000 or other pertinent sections of OSHA regulations.				

NE=Not Established NA=Not Applicable NK=Not Known

Section 3- Physical Data

Boiling Point: 352F **Vapor density:** 4.69
Evaporation Rate: faster than ether
Specific gravity: 0.84 **Solubility in water:** emulsifies
Appearance: clear, water-white liquid

HMIS Rating Information:
Health: 1 **Flammability:** 1 **Reactivity:** 0 **Personal Protection:** A

Section 4-Fire and Explosion Hazard Data

Flash Point: 169F **Test method:** tag closed cup
Extinguishing Method: foam, carbon dioxide, dry chemical
Unusual Fire and Explosion Hazards: care should be used in enclosed areas or near sources of ignition.
Special Fire Fighting Procedures:
None

Section 5-Health Hazard Data

Threshold Limit Value: not established
Effects of Overexposure:
eyes: moderate irritation, redness, tearing
skin: prolonged exposure may cause irritation
ingestion: gastrointestinal irritation, nausea
Emergency and First Aid Procedures:
eyes: flush eyes and under eyelids with plenty of water for 15 minutes, get medical attention.
skin: wash with water
ingestion: will not induce vomiting, call a doctor or poison control center.

Section 6-Reactivity Data

Stability: ____unstable _XX_stable
Hazardous Polymerization: ____may occur _XX_will not occur
Hazardous Decomposition Products: thermal decomposition may yield carbon monoxide or carbon dioxide.
Conditions To Avoid: None
Incompatibility(Materials to Avoid): strong oxidizing agents

Section 7-Spill or Leak procedures

Steps to be taken if material is released or spilled:
soak up spill with inert absorbent and place in closed container for disposal.
Waste Disposal Method: consult local authorities

Section 8-Safe Handling and Use Information

Respiratory Protection: use with adequate ventilation
Ventilation: local exhaust recommended, mechanical not required

Protective Gloves: rubber **Eye Protection:** goggles
Other Protective Clothing: none
Hygenic Practices: wash throughly after using or before eating.

Section 9-Special Precautions

Precautions to be taken in Handling and Storing:
Store in a cool, dry area, away from heat or open flame. Wash throughly after handling. Keep container tightly closed when not in use.

Other Precautions:
Keep out of reach of children.
For industrial use only.

Notes and Approvals:
Safety Solvent 378 has compound authorization as an approved degreaser for use in Federal inspected plants operating under the USDA and the Meat and Poultry Inspection Programs. Conforms to regulations CFR-176.170 and CFR-176.180.
Ingredients are generally regarded as safe by the Food and Drug Administration.
Government Services Association (GSA) approved for factories dealing with government contracts and installations.
Contains no chemicals known to cause cancer or reproductive toxicity, according to the State of California Proposition 65.
Meets "Right-to-Know law" regulations according to Law 29 CFR 1910.1200

Contains no solvents that are known to be cancer causing.

Members of National Food Processors Association (NFPA)
Members of American Institute of Plant Engineers (AIPE)
Members of Paper Industry Management Association (PIMA)
Members of TAPPI
Members of International Sanitary Supply Association (ISSA)
Meets following military specifications:
Cleaning compound, Heavy Duty Liquid O-C-1824
Cleaning compound, Electrical and electronic components MIL-C-22542A/A5
Carbon removing compound P-C-111D
Carbon removing compound for agitating tank MIL-C-19853B/C
General Motors Delco Products EMC#0264 Vendor #2245730
Ford Motor Corporation Tox# 047010 Vendor# A2VNE
Kimberly Clark Corporation Item# 794724

Guarantee, disclaimer and limitation of liability:
AMAX Industrial Products division warrants its materials to be of good quality and, at its option, within one year from date of sale it will replace materials proven to be defective or refund the purchase price thereof, and such replacement or refund shall be the limit of AMAX Industrial Products division total liability. Except for the foregoing, all warranties, expressed or implied, including merchantability and fitness for a particular product, are excluded. AMAX Industrial Products division shall not be liable for any consequential, incidental, or special damages arising directly or indirectly from the use or misuse of the product.

AMAX
INDUSTRIAL PRODUCTS DIVISION
Serving America's Paper Mills, Factories, and Mines Since 1959!

800-662-0023

To.....Victor Rossi

Here is the information you requested on our *SafeSolv 378* heavy-duty degreaser and carbon remover.

This is a newly formulated degreaser. *SafeSolv 378* is the solution to the new EPA and RCRA directives. It is concentrated for easy storage and dilutes completely with water for equipment washdowns. Safe, clean and not harmful to the environment, *SafeSolv 378* is your one-step approach for a multitude of tasks.

Algaecide
Aluminum Brightener
Aluminum Hood Degreaser
Asbestos Removal
Carbon Stripper
Chemical Resistant Sealer
Concrete Floor Cleaner
Cutting Oil
Dryer Frame Cleaner
Epoxy Paint
Fertilizer
Floor Wax
Gear Case Cleaner
Citrus Based Cleaners
Graffiti Stripper
Hand Cleaner
Hot Melt Glue Stripper
Ice Melt
Kerosene Substitute
Lubricant
Pitch and Resin Stripper
Rust Remover
Safety Solvent
Sanitizer
Street and Highway Paint
Waterproof Concrete Patch
Weed Killer

Special surfactants and penetrating agents loosen deposits for easy flushing with water to leave surfaces sparkling clean and free of residue. Works especially well for removing hardened grease, oil, tar, pitch, asphalt, even burnt cutting and grinding fluids.
This will remove tire marks and grease deposits from pump bases and concrete floors.

SafeSolv 378 will clean trucks, compressors, heat exchangers, hydraulic units, machine shop equipment, dies, turbines, valves, engine blocks, and metal castings and housings.
Remove heavy, burnt oil and thick grease from punch presses, sound enclosures, control panels, floors, bearings, sumps, catwalks, hand rails, steel piping and gear boxes. This is the answer to hazardous solvents in parts tanks!

Let us help you decide.....you will find no better or safer product for industrial cleaning than *SafeSolv 378*.
Call 1-800-662-0023, and myself or my staff will find a solution to your problem.

Finally, an effective cleaner that is environmentally safe and user friendly.

Sincerely,

Glenn R Hille
Chemical Engineer

P.S. This will also remove rust and pigment stains from concrete floors.

Corporate Headquarters: 960 South Third Street • Louisville, Kentucky 40203 / 13333 Bell-Red Road • Bellevue, Washington 98009
Chicago, IL / Louisville, KY / New York, NY / Norwalk, CT / San Carlos, CA / South Plainfield, NJ / Tampa, FL / Montreal, PQ / Dallas, TX

TRW-02190

This product is our most powerful, water-soluble carbon remover and machinery degreaser. It effectively removes heavy grease accumulations, oils, lubricants, plasticol, pigment stains, adhesive, carbon, ink, wax, dirt, tar, asphalt, creosote, mold, mildew, rust stains, rubber tire marks and many other industrial contaminants

This product is non-flammable, biodegradable, contains no harsh fumes and leaves no filmy residue if rinsed thoroughly. Because of its concentration, this compound may be used in areas where petroleum solvents are normally used. This will remove heavy grease and oil from parts and equipment – even tar and asphalt – without harming machine paints and decals.

Use it to clean and degrease concrete or masonry easily. This emulsifiable formula assures fast penetration of embedded rust, oil and tire mark deposits – flush with a hose to wash away emulsified dirt and grease.

Safe for stainless steel and aluminum. This is a non-hazardous substitute for alcohol, toluene, stoddard solvent and mineral spirits. Contains no chlorinated solvents or petroleum hydrocarbons. No butyl. Biodegradable. Phosphate free. USDA Authorized.

AFE SOLV 378 is the environmentally safe answer leaning presses, heavy machinery, engines, arts, construction equipment, aircraft and oil-

ITS:

Safe Solv 378

CLEAN AND ALL NATURAL
POWERFUL MULTI-PURPOSE
CLEANER AND DEGREASER
NON-CAUSTIC – NON-TOXIC

Biodegradable

Contains No Petroleum Solvents

TOLL FREE HOT LINE: 800-662-0023

Member Of:

Machine Shop: Use in dip tank, manually, steam or pressure wash to remove grease, carbon, smoke mark, pitch, tar and ink. Safe for all rubber and plastic surfaces. Will not harm machine paint or decals. Clean hydraulic equipment, machinery, frames, mechanisms, bearings, tools, dies, enclosures, pumps, valves and engines. Wipe down shafts and lathes. Clean metal parts to lengthen machinery life and reduce downtime between overhauls. Perfect for rebuild work.

All ingredients of this product conform to Federal regulations, under the guidelines of the Food and Drug Administration Acts, CFR-176.170 and CFR-176.180

Authorized by the U.S. Department of Agriculture for use in federally inspected meat packaging and poultry plants.

CAUTION: May be harmful if swallowed. Keep away from heat or open flame. Use with adequate ventilation. Avoid prolonged contact with skin.

First Aid:

EXTERNAL: Flush with water.

INTERNAL: Do not induce vomiting. Call a physician immediately.

EYES: Flush eyes and under eyelids with water for at least 15 minutes. If irritation persists, obtain medical attention.

KEEP OUT OF REACH OF CHILDREN

0908-3571

TECHNICAL DATA BULLETIN
rial Products 300 Heyburn Building • Louisville, Kentucky 40202 1-800-662-0023

SafeSolv 378 Degreaser/Machinery Cleaner

Description:

Instant-action heavy duty degreaser is specially formulated to tackle the toughest industrial cleaning tasks. Dissolves and emulsifies grease and carbon immediately....even hardened deposits on concrete floors. Cuts through accumulated sludge on machinery, presses, road and mining equipment, engines and conveyors. Cleans concrete floors and exhaust hoods. Use in steam or pressure gun, parts tank or manual.

Environmental Benefits:

Biodegradeability- Completely Biodegradeable
Non-Toxic Passed LC-50, LD-50 Testing
Enhances performance of biological treatment systems
Does not overburden recieving waters with nutrients
Produces no short or long-term negative effects to ecological systems.

Safety Advantages:

Non-irritating to skin
Special ventilation not required
No special personal protective gear necessary
Available in easy to handle containers

Poses no known health hazards:

Contains no known carcinogens
Produces no toxic vapors
Respiratory protection not required
Contains no solvents or ozone-depleting substances
Contains no harsh, abrasive, or reactive constituents
No damaging effects on acrylic, plastic, rubber or metallic surfaces
No damaging effect on painted or unpainted surfaces

Accreditations:

U. S. EPA Accepted, according to NCP Product Schedule
USDA Accepted
FDA Accepted
Non-regulated under D.O.T.D. Hazardous Classification System
N.A.C.E. Acceptance
U.S. Patent Approval

Member Of:

MAX TECHNICAL DATA BULLETIN

Industrial Products 300 Heyburn Building • Louisville, Kentucky 40202 1-800-662-0023

SafeSolv 378 is a biologically safe, environmentally compatible machinery and parts degreaser, designed for industrial equipment cleaning and production applications.
This is non-toxic, non-hazardous and biodegradeable. **SafeSolv 378** will effectively dissolve grease, oil, coal dust, carbon, fly ash, adhesives and other industrial contaminants.
Now you don't have to sacrifice cleaning performance to avoid hazardous waste problems!!

10-1 Best Results

SafeSolv 378 dilution ratios:

BUILDING MAINTENANCE	
Floors and walls	30-1
Carpet Spotting	5-1
Fiberglass	20-1
Concrete	10-1
Tile	20-1
Lighting Fixtures	20-1
Wax removal	10-1
Chillers	20-1
Parking Lot cleaning	20-1

MANUFACTURING	
Greasy Equipment	20-1
Fork Lifts	20-1
Steam Cleaners	30-1
High pressure sprayers	30-1
Sonic tanks	10-1
Parts tanks	20-1
Bucket and brush	20-1
Presses/Engines	20-1
Heavy equipment	20-1

AUTOMOTIVE	
Engine degreasing	20-1
Exterior wash	40-1
Wheels and rims	20-1
Tractors	20-1

KITCHENS/GALLEYS	
Food equipment	20-1
Stoves/ovens	20-1
Vents/filters	20-1
Tile flooring	30-1

MARINE	
Arresting gear area	30-1
Bulkheads	20-1
Bilges	20-1
Cargo containers	30-1
Cranes	30-1
Drilling rigs	20-1

AIRCRAFT	
Exterior paint	30-1
Landing gear	20-1
Interior area	20-1
Carpets	20-1
Filters	20-1
Ground vehicles	20-1
Cargo holds	20-1

Regulatory Information:
DOT Proper Shipping Name: Cleaning Compound DOT Class: None DOT ID Number: None
SARA/Title III-CERCLA List of Hazardous Substances and Reportable Quantities (40CFR 304.4): This product **does not contain** an ingredient listed as a hazardous ingredient for Emergency Release Notification under Section 304.

SARA Title III-list of Toxic Chemicals subject to Release Reporting (Community Right to Know) (40CFR 372): This product **does not contain** an ingredient listed as a toxic chemical for Annual Release Reporting Requirements under Section 313.

Member Of:

CONCRETE REPAIR PRODUCTS • 1-800-662-0023

5 uraCure Concrete Sealer

Abrasion resistant. Hi-Gloss. Stops chemical attack!!

SERVICES:
R895 DuraCure Concrete Sealer is designed for use in areas exposed to harsh chemicals and other corrosiv environments. Commonly used as a lining for tanks, acid pits, sumps, trenches, concrete floors and other severe exposure areas.

Single system air curing... No Mixing!
This is a single package product and does not require the addition of a catalyst to cure. It cures by the action of the moisture in the air.

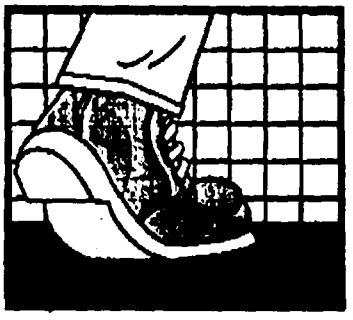
Reduces maintenance costs!
Easy to keep clean. Provides complete protection against oil and chemical spills.

Benefits:
High performance. Water, chemical, and abrasion resistant coating designed for metal, concrete, masonry and wood surfaces.

- Resists contact immersion in fresh and salt water up to 125F
- Resists heavy foot and vehicle traffic.
- May be applied over aged previous coatings.
- Available colors - Lt. Gray, Dk. Gray, Beige, Tile Red
- Heat resistant up to 300F.
- Withstands frequent, harsh scrubbing.
- Specially recommended for use in apartment buildings, food processing plants, and in the chemical, cement, fertilizer, mining, petroleum and pulp and paper industries.
- Exceeds OSHA Requirements for hazardous waste storage areas

Available Sizes: - 55gl. drum, 35gl. drum

GripTite 2010



Permanent slip-proof coating. Chemical resistant.

SERVICES:
GripTite 2010 is an epoxy compound with silica carbide granuales for skid-proofing walkways, ramps, loading docks and stairs where slippery conditions exist. This will bond to wet, damp, or dry surfaces of concrete, brick, wood, steel, aluminum and tile. Brush, trowel or roll this coating on. Requires no acid etching.

Totally resistant to water, bleach, chlorine, sulphuric acid, alkalis, oil, gasoline and caustic chemicals. Perfect for use on the bleach plant floors, around paper machine areas and chemical processing plants.

Durable
Five times more durable than adhesive strips, never becomes a tripping hazard. Grit bites directly into shoes to provide a firm footing even under 2" of oil or slime build-up. Stands up to heavy vehicle and pedestrian traffic.

Simple Application
All components are in one package. Just mix and apply. No acid etching required. Quick and easy application.

Minimum Downtime
Floor can be put back into service after 5 hours. No harsh odor. Downtime is kept to a minimum.

Easy Maintenance
Its continuous film provides a durable surface to minimize and reduce cleaning costs. Ends concrete dusting. No cracks or seams to catch paper dust, grease or other contaminants. Just rinse clean and air dry!

Available Sizes: - 55gl. drum, 10.5gl. kit

IndustraPatch1010 CR

Permanent concrete patch. Stops chemical attack.

Exceeds OSHA requirements for hazardous waste storage areas.

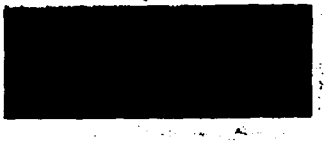
SERVICES:
An excellent concrete repair compound that is economical to use, durable enough for long lasting repairs and is easy to mix and apply. IndustraPatch 1010 will form a permanent bond to new or old concrete, brick, masonry, metal or wood surfaces. Has the consistency of wet concrete and can be easily poured or trowled to thicknesses of 1/8" or more. Typical working life is 45 minutes. Functional cure in 4 hours, complete cure in 7 hours.

For Severe Industrial areas.
A 2-part concrete patch designed for use in areas exposed to harsh chemicals and other corrosive environments. Commonly used as a liner for acid pits, tanks, pump bases, sumps, chemical trenches and other severe exposure areas. Excellent material for filling deep ruts, anchor bolt holes, cracks, expansion joints and exposed aggregate areas.

Use inside or out!
Designed for both interior and exterior use.

High Compression Strength!
Used as a heavy duty floor resurfacer, this will provide outstanding resistance to heavy foot and vehicle traffic. Perfect for ramps, traffic lanes and loading dock areas.
Chemical Resistant!
Totally resistant to bleach, chlorine, acid, alkalis, water, chlorinated and ketone solvents, cutting oils, fuel oil and de-icers.
Safe For Employees!
Complies with VOC Architectural Maintenance regulations. USDA and FDA registered. Can be mixed in small batches as necessary. Easy to clean. Dries to a completely non-porous, chemical resistant surface. This is the best and easy-to-use flooring compound for patching, repairing, rebuilding and protecting concrete.

Available Sizes: - 55gl. drum, 35gl. drum, 10gl. kits.

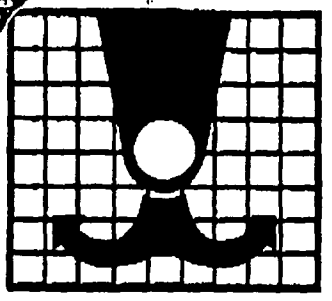


WINTER SPECIALTIES

PRODUCTS DIVISION

Call Toll Free • 1-800-662-0023

Melting Compound (Pellets)



Non-Corrosive. Safe for Paint

APPLICATIONS:

For use wherever ice is a problem, such as walkways, steps, ramps, driveways. Safe for concrete and aluminum, asphalt, brick or wood.

Heat generating pellets that will melt 3" of solid ice immediately. Thrown down before a snowstorm, this will stop the accumulation of ice and snow. Keep surfaces clear, clean and slipproof.

Leaves no white residue to track onto carpet, tile or concrete.

No concrete spalling or flaking.

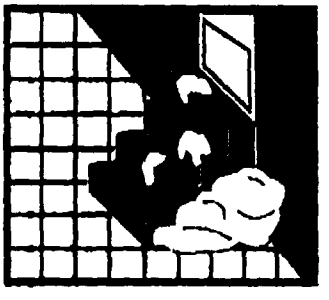
Will not strip paint. Safe for grass, trees and shrubbery.

This will prevent railroad switches and electronic equipment from freezing and siezing in frigid weather.

This ice melting compound is superior to rock salt due to the fact that the activity remains constant even at -20° below zero.

U.S.D.A. Approved

R371 Liquid Ice Melt



Safe for concrete and grass.

APPLICATIONS:

For use whenever ice is a problem, such as walks, driveways, steps, intersections, loading docks, bridges, ramps, etc.

Material should be sprayed or sprinkled on surface to be treated.

This product lowers the freezing point of water and penetrates to help dissolve ice and snow.

This liquid does not generate heat, is non-corrosive and leaves no white residue.

No Concrete Spalling.

Will not harm concrete or asphalt. Safe for painted surfaces. Also used to prevent freezing and caking of wood chips, sand or cinders, and it helps the thawing and traction qualities of the sand or cinders.

Sewage plants and paper mills find that this product is excellent, since it generates no heat or chemical reaction

U.S.D.A. Approved

Meets Military Specifications:
Anti-icing/de-icing/defrosting fluid
MIL-A-8243D
De-icer/Anti-icer fluid (for runways & taxiways)
MIL-D-83411A/USA7

Lip22 Liquid Ice Preventer

Prevent rubber belts from freezing.

APPLICATIONS:

This product is not an ice melter but a preventative, applied prior to a storm. Especially effective on ramps, bridges and in preventing ice from freezing on railroad tracks. Lip22 reduces freezing damage to concrete, by diminishing the amount of melted ice and snow water entering into the concrete.

Leaves a thin film which acts as a penetrant demoisterant and has water displacing properties, to remove moisture. Prevents switches from freezing on railroad tracks. Prevents coal, bark and wood chips from sticking to dump boxes, silo shutes, bins and railroad-cars.

Stops freezing on steel vibratory troughs and metal grating. Stops rubber belts from freezing and cracking.

Thaw wood piles. To release frozen wood and chip piles, spray Lip22 at base of pile before use.

Non-corrosive, non-toxic and leaves no white residue. Harmless to concrete, metal, rubber, wood or aluminum. Safe for painted surfaces. Use up to two weeks before a storm. Increases safety of traffic and pedestrians.

U.S.D.A. Approved

Meets Military Specifications:
Anti-icing/de-icing/defrosting fluid
MIL-A-8243D
De-icer/Anti-icer fluid (for runways & taxiways)
MIL-D-83411A/USA7

R394 Snow Plow Wax

Excellent for load beds of dump trucks for complete dumping

APPLICATIONS:

For snow plows and dump trucks, spray for complete coverage.

This product increases the efficiency of snow removal equipment. Plates the blade of snow plows with a polymeric coating that reduces friction of the snow or slush by reducing the power needed to move a greater volume of snow and ice. Prevents piling.

Prevents rust and corrosion on dump trucks and front end loaders.

At the end of the winter season, an application will serve to protect the idle equipment from the effects of summer weather.

Stops ice build up on chip unloading systems. Woodyards and coal mines find that this is an excellent product to prevent wood or coal from sticking to metal or rubber.

U.S.D.A. Approved

AMAZON

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EQUIPTMENT

- Air Guns
- Carburetors Parts Washers
- Dispensers (Various Types)
- Drum Cradles
- Drum Pumps
- Foggers
- Grease Dispensing Units (Various Types)
- Grease Guns
- Parts Washers
- Proportioners
- Soak Tanks
- Sprayers
- Spreaders
- Weed Killer Sprayers
- Welding Torches

TRUCK AND AUTOMOTIVE

- Aluminum Brightener
- Battery Cleaner
- Car Wash
- Carburetor Cleaner
- Degreasers
- Fuel and Oil Additives
- Parts Cleaners
- Tar Removers
- Truck Wash
- Upholstery Cleaner
- Whitewall Cleaners
- Windshield Wash

HAND CLEANERS

- Aerosol
- Creams (can)
- Gritty Hand Soap
- Liquid (Institutional & Industrial)
- Protective Hand Cream
- Tubes
- Waterless
- Instant Hand Sanitizer

GROUND PRODUCTS

- Aquatic Weed Killer
- Fertilizers
- Insecticides
- Liquid Edger
- Non-Selective Weed Killer
- Selective Weed Killers
- Soil Binder
- Soil Conditioners
- Soil Sterilant
- Weed & Brush Killers

PATCHING PRODUCTS

- Adhesives
- Aqua Patch
- Asphalt Patch
- Concrete Patch
- Copper Stick
- Roof Patch
- Steel Stick
- Wood Patch

FLOOR CARE

- Concrete Sealers
- Dust Mop Treatments
- Floor Finishes
- Floor Sealers
- Gym Finish
- Waxes
- Wax Strippers

WATER TREATMENT

- Algaecides
- Anti-Foam Agents
- Boiler Treatments
- Cooling Tower Treatments
- Descalers
- Rust Inhibitors

DISINFECTANTS & DEODORANTS

- Air Fresheners
- Air Sanitizers & Disinfectants
- Carpet Deodorant
- Fungicides
- Germicides
- Odor Masking
- Vomit Control

INSECTICIDES

- Fire Ant
- Fogging
- Insect Repellent
- Mosquito & Fly
- Mouse & Rat Bait
- Residual Concentrate
- Turf & Grounds
- Wasp & Bee
- Water Base & Oil

OIL FIELD

- Absorbants
- Anti-Seize
- Cutting Oil
- Dri-Lube
- EPA Compliance Products
- High Temp Lube
- Rust Preventatives
- Rust Strippers
- Teflon Tape

WELDING PRODUCTS

- Electrodes
- Brazing Alloys
- Solders

ELECTRICAL DEPARTMENT

- Coatings
- Cold Galvanizing
- Contact Cleaner
- Cutting Oil
- Degreasers
- Dry Lubrication
- Moisture Dispenser
- Safety Solvents
- Thread Sealer

CLEANERS

- All Purpose Concentrates
- Bowl Cleaners
- Carpet Shampoo
- Computer Kits
- Concrete Cleaner
- Contact Cleaner
- Degreasers
- Derusting Compound (Hot & Cold)
- Drain Openers
- Germicidal Cleaners
- Glass Cleaner
- Food Plant Cleaners
- Laundry Powder
- Sanitizers
- Spot & Stain Removers
- Stainless Cleaners
- Steam Cleaners
- Tile & Grout Cleaners

MUNICIPALS

- Asphalt Sealer
- Crack Filler
- Enzymes (Dry & Liquid)
- Fire Fighting Products
- Health Dept. Products
- Liquid Flocculants
- Odor Control Products
- Para Blocks
- Refuse Control Products
- Sewage Treatments
- Sewer Pipe Cleaners
- Street Marking Paint
- Wetting & Dusting Control

INDUSTRIAL SUPPLIES

- Absorbant Pads
- Absorbant Soxs
- Barrier Tape
- Bloode Tablets
- Drop Lights
- Emergency Spill Kits
- First Aid Kits
- Hacksaw Frames & Blades
- Instant Adhesive
- Nylon Ties
- Toughskin Light Bulbs
- Safety Glo Signs & Tape

HEAVY EQUIPMENT DEPT.

- Aerosol Lubricant
- Battery Maintenance
- Bearing & Gear Lube
- Belt Conditioner
- Carb Cleaner
- Chain & Cable Lube
- Chassis Lubricant
- Degreaser
- De-Icer
- Fuel Conditioner
- Starting Fluid
- Steam Cleaning Compound

LUBRICANTS

- All Purpose Grease
- Anti-Seize
- Belt Dressing
- Chain & Cable
- Compressor Oil
- Coolants
- Cutting Oil
- Dry Lubricant
- Fifth Wheel Lube
- Food Grade Grease
- Fuel Oil Additives
- Gear Oil
- Hydraulic Oil
- Open Gear
- Penetrants
- Silicone
- Torque Fluid
- Transmission Fluid
- Turbine Oil
- Wire Rope Dressing

INDUSTRIAL PRODUCTS

- Aluminum Brightener
- Anti-Rust Products
- Anti-Skid Compound
- Anti-Static Products
- Coil Cleaner (Acid & Non-Acid)
- Coolants
- Degreasing Solvents
- Demoisturizing Compound
- Epoxy Floor Patch
- Hot Vat
- Masonry Cleaner
- Moisture Displacement
- Paint Strippers
- Parts Cleaners
- Protective Coatings
- Rig Wash
- Rust Strippers
- Safety Solvents
- Scale Removers
- Silicone Spray
- Snow & Ice Compounds
- Stainless Steel Coating
- Street Patching Compound
- Tar Removers

AEROSOLS

- Anti Static
- Coatings
- Degreasers
- Deodorants
- Disinfectants
- First Aid
- Insecticides
- Lubricants
- Polishes
- Solvents
- Specialties
- Weed Killer
- Welders Non-Splatter

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Ask Dick to Comment

st FAX Transmission

11/19/92

FAX Number: 617 494-5536

Deliver to: Victor Rossi

Department: ENGINEERING

Special Instructions: MSDS SHEETS ENCLOSED

Number of Sheets: 11

From: Engineering Department

Telephone: 1-800-662-0023

Engineer: Glenn Hill

- Algaecide
- Aluminum Brightener
- Aluminum Hood Degreaser
- Asbestos Removal
- Carbon Stripper
- Chemical Resistant Sealer
- Concrete Floor Cleaner
- Cutting Oil
- Dryer Frame Cleaner
- Epoxy Paint
- Fertilizer
- Floor Wax
- Gear Case Cleaner
- Citrus Based Cleaners
- Graffiti Stripper
- Hand Cleaner
- Hot Melt Glue Stripper
- Ice Melt
- Kerosene Substitute
- Lubricant
- Pitch and Resin Stripper
- Rust Remover
- Safety Solvent
- Sanitizer
- Street and Highway Paint
- Waterproof Concrete Patch
- Weed Killer

TRW-02196

Corporate Headquarters: 960 South Third Street • Louisville, Kentucky 40203 / 13333 Bell-Red Road • Bellevue, Washington 98009
Chicago, IL / Louisville, KY / Bellevue, WA / San Carlos, CA / South Plainfield, NJ / Tampa, FL / Montreal, PQ / Dallas, TX

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

DATE:
January 8, 1986

Technical Services
Annette Snelson

SECTION I

MANUFACTURER'S NAME: SafeTec, Ltd.	EMERGENCY TELEPHONE NO.: (804) 355-1111
ADDRESS (Number, Street, City, State, and ZIP Code): P. O. Box 1092, Glen Allen, Virginia 23060	
CHEMICAL NAME AND SYNONYMS: Metalworking fluid	TRADE NAME AND SYNONYMS: SAFETAP
CHEMICAL FAMILY:	FORMULA: Proprietary mixtures

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS	0		BASE METAL	0	
CATALYST	0		ALLOYS	0	
VEHICLE	0		METALLIC COATINGS	0	
SOLVENTS	0		FILLER METAL PLUS COATING OR CORE FLUX	0	
ADDITIVES	0		OTHERS	0	
OTHERS	0				

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
SAFETAP does not contain any ingredient set forth by the Occupational Safety and Health Administration, or by the Environmental Protection Agency on their list of hazardous chemicals.		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	221°	SPECIFIC GRAVITY (H_2O=1)	1.0363
VAPOR PRESSURE (mm Hg.)	3.7mm/Hg	PERCENT, VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (_____ =1)	N/A
SOLUBILITY IN WATER	Total		
APPEARANCE AND ODOR	Light yellow, very slight chemical odor.		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): None	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA: Water, Co2, dry powder			
SPECIAL FIRE FIGHTING PROCEDURES: None			
UNUSUAL FIRE AND EXPLOSION HAZARDS: None			

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PAGE (1)

(Continued on reverse side)

Rec'd from Fetch Hdw 4/14/87
Safetap tapping fluid St 016

TRW-02197

0908-3578

SECTION V · HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: None established.

EFFECTS OF OVEREXPOSURE: None

EMERGENCY AND FIRST AID PROCEDURES

Wash eyes with water. Wash skin with soap and water. Soaked clothing should be changed. See a physician should individual so desire as a precautionary measure.

SECTION VI · REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*: Strong acids and bases

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII · SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Small amounts, flush with water. Large amounts should be absorbed with suitable material and disposed of in accordance with local, state, and federal laws.

WASTE DISPOSAL METHOD

Material is biodegradeable.

SECTION VIII · SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*

VENTILATION			
	LOCAL EXHAUST	Normal	SPECIAL
	MECHANICAL *(General)*	Normal	OTHER

PROTECTIVE GLOVES: Can use rubber, if desired.

EYE PROTECTION: Goggles

OTHER PROTECTIVE EQUIPMENT

SECTION IX · SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Avoid freezing or high temperature extremes.

OTHER PRECAUTIONS

Disclaimer: The data, descriptions, recommendations and statements made in this literature, as well as information on labels are set forth only as guidelines. All products should be tested to ascertain suitability to users applications. Because the products may be used in a variety of applications where Fluids Research Inc. has no control or knowledge, Fluids Research Inc. makes no authorizes to be made any implied or expressed warranty or representation with regard to any of the products dealing with use, performance, fitness, fitness for any particular purpose, protection suitability for use on any surface, or merchantability of items produced, whether used alone or in combination with other products from other manufacturers. Fluids Research Inc. assumes no liability, or incidental consequential or direct damage of any kind regardless of cause, including negligence. Furthermore Fluids Research Inc. has no control over the disposal of these products after their useful life and assumes no liability for any damages in any form from improper or unlawful disposal of any of these products, including negligence.

SHIPPING ORDER

FROM:

FHC FITCHBURG HARDWARE CO. INC.
AND LEOMINSTER INDUSTRIAL SUPPLY CO.
ELECTRONIC TOOL SPECIALISTS
692 NORTH MAIN STREET • LEOMINSTER, MASS. 01453

(617) 534-4956 • 617) 534-3324
MASS. WATTS 800 - 348-6887

CUST. NO. [illegible]

OUR ORDER NO. [illegible]

OUR ORDER NO. [illegible]

BILL TO:
ADVANCE TOOL & DIE
38 MONARCH ST
PO BOX 2
LEOMINSTER [illegible]

SHIP TO:
[illegible]

CUSTOMER P.O. NO. [illegible]

CUSTOMER P.O. NO. [illegible]

OUR ORDER NO.	SALESMAN	ORDER DATE	TAKER	CUSTOMER P.O. NO.	DATE SHIPPED
1017482-0001-01	120	04/02/87	155	[illegible]	04/02/87

INSTRUCTIONS: WILL CALL 4/1-B-T32136 PAGE NO. I 1

QUANTITY ORDERED	QUANTITY SHIPPED		DESCRIPTION		EXTENSION
12	12		SAFE ST016 SAFETAP TAPPING FLUID 16 OZ NO HAZARDOUS VAPORS SAFE TM EA		

return 6
4/14/87

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APR 14 1987

R [illegible]

CODE EXPLANATION
* - SALES TAX APPLICABLE
B - BALANCE BACK ORDERED
C - CONSIDER COMPLETE
D - DIRECT SHIPMENT
F - FACTOR MIN. SHIPMENT
P - PICKED

THE ABSENCE OF A CODE LETTER MEANS THE ITEM HAS SHIPPED COMPLETE

DATE SHIPPED	SHIPPED VIA	TRANS.	ZONE	PPD
4/14	W.C		WEIGHT	COL
SIGNATURE				

SUB-TOTAL
SALES TAX
SHIPPING CHARGES
TOTAL

ALL RETURNS MUST REFERENCE OUR RM #. UNAUTHORIZED RETURNS WILL NOT BE ACCEPTED.

FORM 125 200K 8/83

PACKING LIST

0908-3580

TRW-02199

CASTROL INDUSTRIAL INC.

MATERIAL SAFETY DATA SHEET
Emergency Phone No.: (708) 241-4000
Information Phone No.: (708) 241-4000

FIRE 1
HEALTH 2 0 REACTIVITY
0 SPECIAL

I. MATERIAL IDENTIFICATION

PRODUCT TRADE NAME: SAFETY-FILM** 614 (formerly called "Jon Cote 614")
MANUFACTURER: CASTROL INDUSTRIAL INC.

ADDRESS: 1001 WEST 31ST STREET DOWNERS GROVE IL, 60515-1280
MFG. FACILITY ADDRESS:
Preparer: D. Bell Preparation Date: 08/30/1993

II. HAZARDOUS INGREDIENTS

MATERIAL OR COMPONENTS	%	CAS No.	TLV (ACGIH)	PEL (OSHA)
Fatty acids, tall-oil, compd. with morpholine	5-10	68002-77-78		

Contains no other ingredients now known to be hazardous as defined by OSHA 29 CFR 1910.1000 (subpart z) and OSHA CFR 29 1910.1200.

III. PHYSICAL PROPERTIES

APPEARANCE & ODOR: Opaque tan emulsion; mild odor
BOILING POINT °F (°C): 212 99.99
MELTING POINT °F (°C): NA
SPECIFIC GRAVITY (H2O=1): 1.0
VAPOR PRESSURE: NA
VAPOR DENSITY (AIR=1): NA
EVAPORATION RATE (BUTYL ACETATE=1): <1
%VOLATILES BY VOLUME: 70-85
VOC: 000.00 g/L 00.000 lbs/gallon
SOLUBILITY IN H2O: miscible
pH AS IS: 8.9-9.3
pH (DILUTE): NA @ 0 %

VOC not yet determined for this product.

IV. FIRE AND EXPLOSION HAZARDS

FLASHPOINT (method used)
None °F None °C NA
FLAMMABLE LIMITS
LEL NA UEL NA
EXTINGUISHING MEDIA:
Water, dry chemical, CO2, or "alcohol" foam.

SPECIAL FIRE FIGHTING PROCEDURES:
Wear self contained breathing apparatus when fire fighting in a confined space. Cool fire exposed containers with waterspray to prevent rupture.

UNUSUAL FIRE & EXPLOSION HAZARDS:
None known.

CONTAINER HANDLING: DO NOT CUT OR WELD EMPTY DRUMS UNLESS THOROUGHLY CLEANED.

MSDS NUMBER: 5506.1 REVISED: 08/30/1993
** Registered in the U.S. Patent & Trademark Office

V. REACTIVITY DATA

STABILITY: Stable- normal conditions
CONDITIONS TO AVOID: None known.
INCOMPATIBILITIES: Strong oxidizing agents
HAZARDOUS DECOMPOSITION: Potential combustion products are oxides of carbon and nitrogen.
HAZARDOUS POLYMERIZATION: Will Not Polymerize

VI. HEALTH HAZARD SUMMARY

ROUTES OF EXPOSURE AND EFFECTS OF OVEREXPOSURE

EYES:
Concentrate will cause eye irritation.

SKIN ABSORPTION:
No acute effects expected.

SKIN CONTACT:
Concentrate may cause skin irritation.

INHALATION:
Mists of the concentrate and dilutions may cause respiratory irritation.

INGESTION:
Concentrate is not expected to be toxic. LD50 (rat) is greater than 5.0 g/kg.

CHRONIC EFFECTS:
Repeated overexposure may result in delayed kidney and liver damage.

THRESHOLD LIMIT VALUE: Not established. See section II

CONTAINS KNOWN CARCINOGENS: no NTP: no IARC: no OSHA: no

EMERGENCY AND FIRST AID PROCEDURES

EYES:
Immediately flush eyes with plenty of water. Get medical attention if irritation persists.

SKIN:
Wash skin with soap and water. If irritation occurs, get medical attention. Wash clothing before reuse.

INHALATION:
If respiratory discomfort or irritation occurs, move the person to fresh air. See a doctor if discomfort or irritation continues.

INGESTION:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.

VII. CONTROL MEASURES

RESPIRATORY PROTECTION:
Good industrial hygiene practices recommend that engineering controls be used to reduce environmental concentrations to the threshold limit value (TLV) or permissible exposure limit (PEL). If any associated TLV or PEL is exceeded, provide NIOSH approved respiratory protection.

GLOVES:
Impervious gloves such as rubber should be used when handling this product.

EYE PROTECTION:
Safety glasses with side shield or chemical goggles.

OTHER:
Eyewash facility. Appropriate clothing to avoid skin contact.

VIII. PRECAUTIONS

CONTAINMENT PROCEDURES:
Absorb spill with inert material (e.g., dry sand or earth), then place in a chemical waste container. Flush residual spill with water. For large spills, dike for later disposal.

WASTE DISPOSAL PROCEDURES:
Dispose of in accordance with local, state and federal regulations. Disposal of this material to the land may be banned by federal law (40 CFR 268).

STORAGE AND HANDLING PROCEDURES:
DO NOT ADD NITRITES TO THIS FLUID. Avoid contact with eyes. Avoid breathing mists. Do not take internally. Keep container closed when not in use. Bring product to room temperature before use.

RCRA HAZARDOUS WASTE DESIGNATION:
This product does not fall under current EPA RCRA definitions of hazardous waste.

CERCLA REPORTABLE QUANTITY:
This product does not contain any CERCLA regulated materials.

IX. OTHER HAZARD INFORMATION

PETROLEUM OIL: STEL = 10 mg/M3. Using terminology of the International Agency for Research on Cancer (IARC), the petroleum distillates listed in Section II are classified by the supplier as severely processed. Not all those listed in Section II may be present. The supplier has stated that these distillates do not require a carcinogen label as defined by OSHA 29 CFR 1910.1200.

X. ADDITIONAL REGULATORY INFORMATION

OCCUPATIONAL SAFETY and HEALTH ADMINISTRATION (OSHA)
29 CFR 1910.1200 Hazardous Chemical: yes
SUPERFUND AMENDMENT AND REAUTHORIZATION ACT OF 1986 (SARA)
Section 302, Extremely Hazardous Substance: no
Section 311, Hazardous Chemical: yes
Immediate: yes Delayed: yes Fire: no Sudden Release: no Reactive: no
Section 313, Toxic Chemical: no
TOXIC SUBSTANCES CONTROL ACT (TSCA)
This product is a mixture and is NOT listed in the TSCA Inventory. The individual ingredients in the product are listed in the TSCA Inventory.

DEPARTMENT OF TRANSPORTATION (DOT)
PROPER SHIPPING NAME : not regulated
HAZARD CLASS (49 CFR 172.101): not applicable
HAZARD ID NUMBER: not applicable
FREIGHT CLASS
NMFC 50234, COMPOUNDS, IRON OR STEEL, RUST PREVENTING OR REMOVING, O/T PETROLEUM

DISCLAIMER

Information presented herein has been compiled from information provided to us by our suppliers and other sources considered to be dependable and is accurate and reliable to the best of our knowledge and belief but is not guaranteed to be so. Nothing herein is to be construed as recommending any practice or the use of any product in violation of any patent or in violation of any law or regulation. It is the users' responsibility to determine the suitability of any material for a specific purpose and to adopt such safety precautions as may be necessary. We make no warranty as to the results to be obtained in using any material and since conditions of use are not under our control, we must necessarily disclaim all liability with respect to the use of any material supplied by us.

Castrol Industrial *Product Information*

SAFETY-FILM® 614

(FORMERLY CALLED JON-COTE #614)

PROTECTIVE COATING

SAFETY-FILM® 614 is a unique water-base wax emulsion which is used as a dual purpose dry film lubricant and corrosion preventive. **SAFETY-FILM® 614** also enhances the appearance of most surfaces.

SAFETY-FILM® 614 is recommended for use as a corrosion preventive and dry film lubricant for use on artillery shell casings, small arms ammunition clips, and other weather proofing military applications. **SAFETY-FILM® 614** meets military specification MIL-W-3888-C. **SAFETY-FILM® 614** is also an excellent corrosion preventive and dry film lubricant for steel strapping and is a good piano stringing lubricant.

SAFETY-FILM® 614 is used as a torque reduction and corrosion resistant lubricant on various fasteners. In addition, **SAFETY-FILM® 614** is used as a dry film lubricant in installation of various rivets.

This product is recommended for use as a corrosion preventive and decorative coating on cast iron, and over treated surfaces such as phosphated, Bonderized and anodized surfaces. Provides additional protection over all types of plating including cadmium and zinc.

The dry film lubricating and release characteristics of **SAFETY-FILM® 614** make it an ideal mold release for gold leaf and a good joint lubricant for umbrella-type television antennas.

In addition, **SAFETY-FILM® 614** can be used as a dressing on rubber, plastic and leather. **SAFETY-FILM® 614** can also be used to provide surface protection and enhance the appearance of interior wood paneling.

B509111
530 9101

KEY PERFORMANCE BENEFITS

- Excellent corrosion control (meets Mil-W-3888-C)
- Superior dry film lubrication
- Enhances appearance of most surfaces
- Effective on a wide variety of substrates
- Provides medium gloss dry film (buffable)
- Non-flammable
- Easy to apply
- Easily diluted and mixed
- Excellent coverage
- Easy to remove

0908-3585 TRW-02204

Headquarters
1001 West 31st Street
Downers Grove IL 60515
(708) 241 4000

Eastern Sales Operation
775 Louis Drive
Warminster PA 18974
(215) 443 5220

Midwest Sales Operation
149 Grant Street
North Aurora IL 60542
(708) 892 8881

Western Sales Operation
5511 District Boulevard
Los Angeles CA 90040
(213) 771 7000

Automotive Industry Operation
28023 Center Oaks Court
Wixom MI 48393
(313) 344 9111

Canadian Sales Operation
2149 Winston Park Drive
Oakville Ontario L6H 5R1
(416) 829 2300

Castrol Mexico/ALGC
Norte 45 No. 812 02300
Industrial Vallejo Mexico, D.F.
(5) 587 6866

Castrol Industrial

APPLICATION

To achieve effective adhesion, apply SAFETY-FILM® 614 to surfaces completely free of oils, greases, acids, soaps and other foreign materials. The presence of water, unless excessive, will not interfere with adhesion or film forming characteristics. Parts must be dried before stacking.

SAFETY-FILM® 614 is a low viscosity liquid, and is applied by any method or technique to the particular application – flow coat, roll coater, mechanical wipe, immersion or spray.

Whenever a spray technique is selected for application of SAFETY-FILM® 614, a well-atomized spray is recommended. Application should utilize repeated strokes over the spray pattern to ensure a thin, even coat.

Care must be taken to avoid spraying a dry or partially dry pattern, since a dry spray will dull the final gloss. The ideal spray gun is one which combines a comparatively high capacity air cap with a low capacity nozzle, with the result that a large volume of air mixed with a relatively small volume of material. Internal and external air mix spray techniques are satisfactory for SAFETY-FILM® 614 application as is airless spray. In all cases, the atomization air pressure should be kept high – from 65-75 pounds. Avoid inhalation of product in spray application.

RECOMMENDED DILUTIONS

Working dilutions of SAFETY-FILM® 614 should be determined by the end user. SAFETY-FILM® 614 can be diluted with tap water; however, if the local water is very hard, dilute with deionized water. For maximum protection and durability, use full strength.

DRYING

SAFETY-FILM® 614 dries tack-free under ambient conditions in approximately 20 minutes. Drying can be accelerated by application of heated air and increased air velocity. Drying time can also be accelerated by heating parts prior to application of coating.

REMOVABILITY

The dry film of SAFETY-FILM® 614 can be removed with chlorinated solvent vapor, degreaser solvents or alkaline cleaners such as COME CLEAN 900. Complete and efficient removal is a function of cleaner concentration, operating temperatures and contact/agitation time.

Use of SAFETY-FILM® 614 for unstated applications should be determined by the end user prior to actual production use.

TEST DATA

ASTM-D-2247-68 HUMIDITY CABINET 100% - 100°F	Cold Roll Steel Hrs.	Test Panels Iron Phosphate Hrs.	Zinc Phosphate Hrs.
Dilutions (Water:Product)			
0:1	48	80	80
1:4	40	72	72
1:2	32	48	48

ASTM-B-117-73 SALT FOG - 5% SALT 100% - 100°F	Cold Roll Steel Hrs.	Test Panels Iron Phosphate Hrs.	Zinc Phosphate Hrs.
Dilutions (Water:Product)			
0:1	2	4	15
1:4	1	2	6
1:2	--	2	5

Material Safety Data Sheets are available for all Castrol industrial products and must be consulted for appropriate information regarding storage, safe handling, and disposability. All reasonable care has been taken to ensure that the information contained in this publication is accurate as of the date of printing. However, such information may, nevertheless, be affected by changes in the blend formulation occurring subsequent to the date of printing.

071393/al
SAFETY-FILM® 814

Product Information

SAFETY-FILM® 615

PROTECTIVE COATING

dry film lubricant & corrosion preventive and lubrication for the reduction of drag on the corrugator

Application

DILUTION
Working dilutions of SAFETY-FILM® 615 should be determined by the end user. SAFETY-FILM® 615 polyethylene wax emulsion can be diluted with tap water; however, if local water is very hard, dilute SAFETY-FILM® 615 with deionized water. For maximum film thickness and durability, use at full strength.

DRYING
SAFETY-FILM® 615 dries tack-free under ambient conditions in approximately 20 minutes. Drying can be accelerated by application of heated air and increased air velocity. Drying time can also be accelerated by heating parts prior to application of coating.

REMOVABILITY
The dry film of SAFETY-FILM® 615 can be removed with chlorinated solvent vapor, degreaser solvents, or alkaline cleaners, such as COME-CLEAN 900. Complete and efficient removal is a function of cleaner concentration, operating temperature and contact/agitation time.

Use of SAFETY-FILM® 615 for unstated applications should be determined by the end user prior to actual production use.

Test Data

ASTM-D-2247-68 HUMIDITY CABINET 100%-100°F.	Test Panels		
	Cold Roll Steel Hrs.	Iron Phosphate Hrs.	Zinc Phosphate Hrs.
Dilutions (Water: Product)			
0:1	8	32	40
1:4	24	40	48
1:2	40	48	72

ASTM-B-117-73 SALT FOG-5% SALT 100%-100°F.	Test Panels		
	Cold Roll Steel Hrs.	Iron Phosphate Hrs.	Zinc Phosphate Hrs.
Dilutions (Water: Product)			
0:1	–	1	2
1:4	–	1.5	2.5
1:2	–	1.5	2.5

Castrol Industrial Inc.

775 Louis Drive
Warminster, PA 18974
(215) 443-5220

28023 Center Oaks Ct.
Wixom, MI 48393
(313) 344-9111

630 W. Washington Blvd.
Chicago, IL 60661
(312) 454-1000

5511 District Blvd.
Los Angeles, CA 90040
(213) 771-7000

Typical Properties

Appearance of concentrate	Light brown milky emulsion
Appearance of film	Dry, colorless gloss
pH	10.0
Viscosity (cps @ 77°F.)	15
% Solids	25
Melting Point (°F.)	Greater than 220
Density (lbs/gal; kg/l)	8.2; 0.98
Flash Point	None
Stability Range (with good agitation; °F)	40-180
Coverage (sq. ft./gal.)	1,000 - 2,000
Film Thickness (in.)	Less than 0.0005

Description & Recommended Uses

SAFETY-FILM® 615 is a clear polyethylene, high melting point wax emulsion concentrated in water with unusually good heat stability for use in hot production dipping operations. SAFETY-FILM® 615 also provides good dry film lubricity through a wide temperature range.

SAFETY-FILM® 615 wax emulsion was specifically formulated for coating steel strapping where the thermal stability of the emulsion is critical, and the dried wax coating must not soften at elevated curing temperatures.

SAFETY-FILM® 615 is also used as a coating on fasteners for lubricity and torque reduction. SAFETY-FILM® 615 has good gloss and good adhesion to both rigid and flexible surfaces. Its resistance to high humidity gives excellent corrosion resistance to metal parts during indoor storage.

SAFETY-FILM® 615 is used as a lubricant for reducing drag during the manufacture of white linerboard and other boards which cause excessive drag to the processing equipment. (See inside page)

Benefits

- High melt point provides good heat stability
- Excellent dry film lubrication
- Clear and colorless
- Non-flammable
- Easy to apply
- Easily diluted and mixed
- Excellent coverage
- Easy to remove

Application

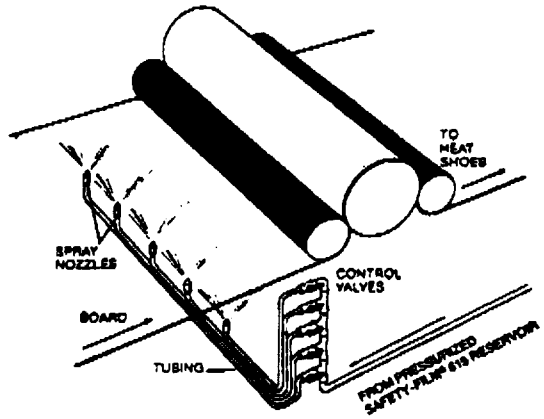
To achieve effective adhesion, apply SAFETY-FILM® 615 to surfaces completely free of oils, greases, acids, soaps and other foreign materials. The presence of water, unless excessive, will not interfere with adhesion or film forming characteristics. Parts must be dried before stacking.

SAFETY-FILM® 615 is a low viscosity liquid, and is applied by any method or technique adapted to the particular application – flow coat, roll coater, mechanical wipe, immersion or spray.

Whenever a spray technique is selected for application of SAFETY-FILM® 615 wax emulsion, a well-atomized spray is recommended. Application should utilize repeated strokes over the spray pattern to secure a thin, even coat. Care must be taken to avoid spraying a dry or partially dry pattern, since a dry spray will dull the final gloss. The ideal spray gun is one which combines a comparatively high capacity air cap with a low capacity nozzle, with the result that a large volume of air is mixed with a relatively small volume of material. Internal and external air mix spray techniques are satisfactory for SAFETY-FILM® 615 application as is airless spray. In all cases, the atomization air pressure should be kept high – from 65 to 75 pounds. Avoid inhalation of product in spray application.

(Continued)

Typical Processing Set-Up



Here's how corrugated manufacturers are using SAFETY-FILM® 615 on their present equipment to reduce drag. Five spray nozzles are located approximately 12" below the board just before the heat shoes. A control value for each nozzle adjusts spray for optimum coverage. SAFETY-FILM® 615 diluted one-part to three parts water, is fed to the system from a pressurized reservoir at 15 to 20 psi.

Application

SAFETY-FILM® 615 reduces the drag significantly in the manufacturing of WHITE linerboard (Bleached Kraft) or any board that causes excessive drag on the corrugator. This can be measured by the decrease in amperage used to run the corrugator equipment.

APPLICATION

Any good spray equipment usually requires five spray heads for complete coverage of board. Fantip nozzles work the best. A low pressure of 15-20 lbs. is all that is necessary.

For an automatic operation, the spray equipment can be connected to the amperage meter. By using a solenoid switch, the wax spray will be turned off and on, depending on the amperage meter reading.

Spray guns are installed on the floor before the double backer, which precedes the hot shoe. Normally this is about 12 inches below the board.

DILUTION

Working dilutions of SAFETY-FILM® 615 should be determined by the end user. We recommend a starting dilution of 1 part SAFETY-FILM® 615 to 3 parts water. If local water is very hard, dilute with deionized water.

Normally, lubrication is only necessary on white linerboard, but SAFETY-FILM® 615 can be used on any board, paper of warping situation that causes drag.

Benefits

- Excellent lubricant - reduces drag dramatically
- No effect on printing or coatings
- Improves the bond on the double backer
- Easier to use and a better lubricant than moly-disulfied or soap flakes
- Clear and colorless

(OVER)

Storage	Do not freeze this product. Store between 40°-100°F.
Handling	Toxicity tests have been run in accordance with techniques specified in the Regulations for the Enforcement of the Federal Hazardous Substances Act (16 CFR 1500). This material is not classified as toxic by oral or dermal administration. We believe SAFETY-FILM® 615 has a low degree of hazard when used as intended. For complete information on health and safety hazards, request a copy of Chem-Trend's Material Safety Data Sheet.
Packaging	SAFETY-FILM® 615 is available in 5-gallon pails, 55-gallon drums and bulk quantities.

Foremost consideration is given to environmental and worker safety in the formulation of all CHEM-TREND products.

Data may vary slightly due to minor formulation changes.

For further information on special applications or other Chem-Trend products, write or call your Chem-Trend distributor or representative.

Material Safety Data Sheet for coatings,resins and other industrial related materials. Complies with Food and Drug Administration Act and complies with 29CFR 1910.1200 The Hazard Communication Standard

---

Date of Preparation: 11/22/88 **Emergency Phone No:** 1800-662-0023

Manufacturers Name: AMAX Corporation Industrial Products Group
Corporate Street Address: 300 Heyburn Building
City: Louisville **State:** Ky. **Zip:** 40202
Emergency and Information Phone Number: 1-800-662-0023
Preparers Ident: Sam Donalds **Dept. Code:** 3436

Section 1-Product Identification

Product Name: Safety First **Product Code No:** R625
DOT Hazard Class: Non-flammable, Non-Hazardous
Product Class: all-natural, multi-purpose degreaser/carbon remover

Product Description and Uses: A industrial grade cleaner/degreaser that is non-toxic, non-caustic and biodegradeable, made with all natural ingredients from the citrus industry. Water soluble. Will not strip paint. Safe for rubber parts. Safe for skin contact. Requires no special ventilation. This is the safe alternative to kerosene and chlorinated solvents. Leaves no film or residue on parts.
Will strip grease, rust, carbon, cosmoline, ink, light tar, polymer compounds, cutting fluids, starch, latex, lube oils and food residue.

Section 2- Ingredients

Ingredient	CAS No.	%by wt.	Occupational Exposure limits PEL PPM	Vapor Pressure @68F
Contains no hazardous compounds.				
Natural Terpene				
Non-ionic surfactants				

NE=Not Established NA=Not Applicable NK=Not Known

Section 3- Physical Data

Boiling Point: 180F **Specific gravity:** 1.01
Evaporation Rate (water=1): less than 1.0
Percent Volatile by Volume: none **Solublity in water:** soluble
Appearance and Odor: clear, light orange liquid, citrus fragrance
pH: 9.0

Section 4-Fire and Explosion Hazard Data

Flammability Classification: Non flammable
DOT: Non Hazardous **Flash point:** none
LEL:
Extinguishing Method: None
Unusual Fire and Explosion Hazards: None

Special Fire Fighting Procedures: None

Section 5-Health Hazard Data

Threshold Limit Value: Not Established
Effects of Overexposure:
Eyes: mild irritation, redness
Skin: prolonged contact may cause mild irritation
Ingestion: mild gastrointestinal irritation, nausea, diarrhea
Inhalation: mild irritation
Emergency and First Aid Procedures:
Eyes: Flush eyes with plenty of water for at least 15 minutes. If irritation persists, obtain medical attention.
Skin: wash with soap and water
Inhalation: remove person to fresh air
Ingestion: Call a doctor. Give person several glasses of water and induce vomiting. Do not eat while using this or any cleaning liquid.

Section 6-Reactivity Data

Stability:___unstable _xx_stable
Hazardous Polymerization: ___may occur _xx_will not occur
Hazardous Decomposition Products:
None
Conditions To Avoid:
None
Incompatibility(Materials to Avoid):
None

Section 7-Spill or Leak procedures

Steps to be taken if material is released or spilled: Soak up material with absorbent or flush with water.

Waste Disposal Method: Biodegradeable. Dispose according to local regulations.

Section 8-Safe Handling and Use Information

Respiratory Protection: None, use adequate ventilation.

Ventilation: None required

Protective Gloves: rubber

Eye Protection: goggles

Other Protective Clothing:
rubber aprons

Hygenic Practices:
None

Section 9-Special Precautions

Precautions to be taken in Handling and Storing: Store in cool, dry place.

Other Precautions: Keep away from children
For industrial use only.
Do not eat while using this or any cleaning liquid.

The information accumulated herein is believed to be true and accurate. Recipients are advised to confirm in advance of need that the information is current,applicable and suitable to their specific needs. AMAX Industrial Products div. makes no warranty, express or implied, and disclaims all liability for the accuracy, completeness and reliablity of any information contained herein.

Notes and Approvals:

Safety First has compound authorization as an approved degreaser for use in Federal inspected plants operating under the USDA and the Meat and Poultry Inspection Programs.

Ingredients are generally regarded as safe by the Food and Drug Administration.

Government Services Association (GSA) for factories dealing with government contracts and installations.

Contains no chemicals known to cause cancer or reproductive toxicity, according to the State of California Proposition 65.

Contains no solvents that are known to be cancer causing.

Members of National Food Processors Association (NFPA)

Members of American Institute of Plant Engineers (AIPE)

Members of Paper Industry Management Association (PIMA)

Members of TAPPI

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

HMIS H/F/R=0/0/0

NFPA 0 0 0

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

(C)

SECTION I

Date of Issue: 8-19-86

MANUFACTURER'S NAME: Rochester Midland	EMERGENCY TELEPHONE NO.: 716-266-2283
ADDRESS (Number, Street, City, State, and ZIP Code): 333 Hollenbeck Street, Rochester, NY 14621	
CHEMICAL NAME AND SYNONYMS: None	TRADE NAME AND SYNONYMS: Sanor Chem Line "X" Series
CHEMICAL FAMILY: Deodorizer	FORMULA: Mixture

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATI" FLUX		
ADDITIVES			OTHERS		
OTHERS					

NOT APPLICABLE

NOT APPLICABLE

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Isopropyl alcohol (67-63-0)	<10	400ppm
Methyl alcohol (67-56-0) * ACGIH-TWA (skin)	3	200ppm*
Balance of ingredients nonhazardous. Carcinogens: none under IARC,NTP,OSHA.		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	212	SPECIFIC GRAVITY (H_2O=1)	0.989
VAPOR PRESSURE (mm Hg.)	as water	PERCENT, VOLATILE BY VOLUME (%)	96
VAPOR DENSITY (AIR=1)	as water	EVAPORATION RATE (_____ =1)	as water
SOLUBILITY IN WATER	complete		

APPEARANCE AND ODOR: Clear liquid, pleasant fragrance as labeled.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): 110-128°F TCC	FLAMMABLE LIMITS: None	Lel: NA	Uel: NA

EXTINGUISHING MEDIA: As for surrounding fire

SPECIAL FIRE FIGHTING PROCEDURES: None

UNUSUAL FIRE AND EXPLOSION HAZARDS: None

(Continued on reverse side)

X3453B

Form # MSDS 165B

0908-3596

TRW-02215

SECTION V · HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE: See Section II	Chronic effects: none in normal use.

EFFECTS OF OVEREXPOSURE/routes of exposure
Eyes: irritation. Skin: none. Inhalation: none.

Ingestion: possible nausea, vomiting.

EMERGENCY AND FIRST AID PROCEDURES
Eyes: flush with water. Ingestion: drink several glasses of water and induce vomiting.

Medical conditions aggravated by exposure: none known.

SECTION VI · REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	None

INCOMPATABILITY (*Materials to avoid*): None

HAZARDOUS DECOMPOSITION PRODUCTS: None

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	None

SECTION VII · SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Small spills: flush with water. Large spills: dike to contain, reclaim all possible, flush remainder with water.

WASTE DISPOSAL METHOD
Dispose of as any detergent in accordance with Federal, State and local regulations.

SECTION VIII · SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (*Specify type*): None required

VENTILATION				
None required	LOCAL EXHAUST	NA	SPECIAL	NA
	MECHANICAL (*General*)	NA	OTHER	NA

PROTECTIVE GLOVES	EYE PROTECTION
None required	None required

OTHER PROTECTIVE EQUIPMENT: None required

SECTION IX · SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Store in cool, dry area.

OTHER PRECAUTIONS: None

This information was compiled from current, reliable sources and is believed to be correct. As data and/or regulations change, and conditions of use and handling are beyond our control, no warranty, expressed or implied, is made as to completeness or continuing accuracy of this information.

X3453B

[redacted]

68101 & 87814

Selenium Oxide

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: [redacted]DE

CHEMICAL NATURE: METAL OXIDE

% ACTIVITY: 99+%

I. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	NOT APPLICABLE	FREEZE POINT	340-350 subl.
SPECIFIC GRAVITY	3.95	VAPOR PRESSURE AT 20°C.	1 mm at 157°C
VAPOR DENSITY	NOT APPLICABLE	SOLUBILITY IN H_2O	SOLUBLE
PER CENT VOLATILES BY WEIGHT	NOT VOLATILE	IONIC NATURE	
APPEARANCE AND ODOR	WHITE CRYSTALS, MAY HAVE RED TINGE		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
SELENIUM OXIDE	99+%	200 $\mu g(Se)/m^3$

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	NOT FLAMMABLE	AUTOIGNITION TEMPERATURE			
FLAMMABLE LIMITS IN AIR, % by volume	NOT FLAMMABLE	LOWER		UPPER	

EXTINGUISHING MEDIA	NOT APPLICABLE
SPECIAL FIRE FIGHTING PROCEDURES	NOT APPLICABLE
UNUSUAL FIRE AND XPLOSION HAZARDS	TOXIC AND IRRITATING FUMES OF DELENIUM OXIDE MAY BE PRESENT.

3/79

Alfa Division, Ventron Corporation, 152 Andover St., Danvers, MA 01923
[redacted] TELEX 94 0378 (ALFA DARS)

TRW-02217

0908-3598

BY US CONCERNING THE HAZARDS OR RECOMMENDED USE OF THE CHEMICALS.

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	200 $\mu g(Se)/meter^3$
EFFECTS OF OVEREXPOSURE	DERMATITIS ON SKIN, BURNING OF EYES, HEADACHE, AND IRRITATION OF NOSE AND THROAT WHEN EXPOSED TO FUMES.
EMERGENCY AND FIRST AID PROCEDURES	WASH AFFECTED AREA INCLUDING EYES VERY THOROUGHLY AND SEEK MEDICAL ATTENTION.

V. REACTIVITY DATA

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	
	X		
INCOMPATIBILITY (materials to avoid)		NO	
HAZARDOUS DECOMPOSITION PRODUCTS		NO	
HAZARDOUS POLYMERIZATION			
May Occur	Will not Occur	CONDITIONS TO AVOID	
	X		

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	SWEEP UP THOROUGHLY, FLUSH RESIDUE WITH COPIOUS AMOUNTS OF WATER.
WASTE DISPOSAL METHOD	CHEMICAL WASTE LANDFILL

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		NIOSH-APPROVED RESPIRATOR		
VENTILATION	LOCAL EXHAUST		SPECIAL	
	MECHANICAL	HOOD	OTHER	
PROTECTIVE GLOVES		RUBBER	EYE PROTECTION	SAFETY GOGGLES
OTHER PROTECTIVE EQUIPMENT		LAB COAT		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	TOXIC
OTHER HANDLING AND STORAGE CONDITIONS	

MATERIAL SAFETY DATA SHEET

Shell

97367 (4-85)

MSDS NUMBER ▶ 71,220-4

24 HOUR EMERGENCY ASSISTANCE	GENERAL MSDS ASSISTANCE
SHELL: 713-473-9461 CHEMTREC: 800-424-9300	SHELL: 713-241-4819

ACUTE HEALTH *	FIRE	REACTIVITY	HAZARD RATING ▶
1	1	0	LEAST - 0 SLIGHT - 1 MODERATE - 2 HIGH - 3 EXTREME - 4

*For acute and chronic health effects refer to the discussion in Section III

BE SAFE
READ OUR PRODUCT SAFETY INFORMATION ... AND PASS IT ON
(PRODUCT LIABILITY LAW REQUIRES IT)

SECTION I	NAME
PRODUCT ▶	SHELL ROTELLA(R) T OIL 10W
CHEMICAL NAME ▶	MIXTURE (SEE SECTION II-A)
CHEMICAL FAMILY ▶	PETROLEUM HYDROCARBON; HEAVY DUTY MOTOR OIL
SHELL CODE ▶	54101

SECTION II-A PRODUCT/INGREDIENT

NO.	COMPOSITION	CAS NUMBER	PERCENT
P	GULF SUPER DUTY 10W	MIXTURE	100
1	SOLVENT REFINED, HYDROTREATED HEAVY PARAFFINIC DISTILLATE	64742-54-7	20-85
2	SOLVENT REFINED, HYDROTREATED RESIDUAL OIL	64742-57-0	20-85
3	ADDITIVE PKG. CONTAINING CALCIUM PHENATE AND ZDDP	MIXTURE	<15
4	MINOR ADDITIVES	MIXTURE	<1

SECTION II-B ACUTE TOXICITY DATA

NO.	ACUTE ORAL LD50	ACUTE DERMAL LD50	ACUTE INHALATION LC50
P	NOT AVAILABLE		

BASED UPON DATA AVAILABLE TO SHELL, COMPONENT 4 IN THIS PRODUCT IS NOT HAZARDOUS UNDER OSHA HAZARD COMMUNICATION (29 CFR 1910.1200).

SECTION III HEALTH INFORMATION

THE HEALTH EFFECTS NOTED BELOW ARE CONSISTENT WITH REQUIREMENTS UNDER THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200).

EYE CONTACT
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN MINIMALLY IRRITATING TO THE EYES.

SKIN CONTACT
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN MILDLY IRRITATING TO THE SKIN. PROLONGED AND REPEATED CONTACT MAY RESULT IN VARIOUS SKIN DISORDERS SUCH AS DERMATITIS, FOLLICULITIS OR OIL ACNE.

INHALATION
INHALATION OF VAPOR (GENERATED AT HIGH TEMPERATURES ONLY) OR OIL MIST FROM THIS PRODUCT MAY RESULT IN MILD IRRITATION OF THE UPPER RESPIRATORY TRACT.

INGESTION
LUBRICATING OILS ARE GENERALLY CONSIDERED NO MORE THAN SLIGHTLY TOXIC IF SWALLOWED.

SIGNS AND SYMPTOMS
IRRITATION AS NOTED ABOVE.

AGGRAVATED MEDICAL CONDITIONS
PREEXISTING SKIN AND RESPIRATORY DISORDERS MAY BE AGGRAVATED BY EXPOSURE TO THIS PRODUCT.

OTHER HEALTH EFFECTS
THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER HAS DETERMINED THERE IS SUFFICIENT EVIDENCE FOR THE CARCINOGENICITY IN EXPERIMENTAL ANIMALS OF USED MOTOR OILS. HANDLING PROCEDURES AND SAFETY PRECAUTIONS IN THE MSDS SHOULD BE FOLLOWED TO MINIMIZE EMPLOYEE'S EXPOSURE TO THE USED PRODUCT.

SEE SECTION VI FOR ADDITIONAL HEALTH INFORMATION.

SECTION IV OCCUPATIONAL EXPOSURE LIMITS

	OSHA		ACGIH		OTHER
NO.	PEL/TWA	PEL/CEILING	TLV/TWA	TLV/STEL	
P	5 MG/M3*	NONE	5 MG/M3*	10 MG/M3*	NONE

*OIL MIST, MINERAL

SECTION V EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION.

SKIN CONTACT
REMOVE CONTAMINATED CLOTHING AND WIPE EXCESS OFF. WASH WITH SOAP AND WATER OR A WATERLESS HAND CLEANER FOLLOWED BY SOAP AND WATER. IF IRRITATION OCCURS, GET MEDICAL ATTENTION.

INHALATION
REMOVE VICTIM TO FRESH AIR AND PROVIDE OXYGEN IF BREATHING IS DIFFICULT. GET MEDICAL ATTENTION.

INGESTION
DO NOT INDUCE VOMITING. IN GENERAL NO TREATMENT IS NECESSARY UNLESS LARGE QUANTITIES OF PRODUCT ARE INGESTED. HOWEVER, GET MEDICAL ATTENTION.

NOTE TO PHYSICIAN
IN GENERAL, EMESIS INDUCTION IS UNNECESSARY IN HIGH VISCOSITY, LOW VOLATILITY PRODUCTS, I.E., MOST OILS AND GREASES.

SECTION VI SUPPLEMENTAL HEALTH INFORMATION

SUPPLIER OF COMPONENT 3 REPORTS THAT CERTAIN CALCIUM PHENATES AND ZINC DITHIOPHOSPHATES (ZDDP), "...WHEN APPLIED TO THE SKIN OF MALE RABBITS OVER A PERIOD OF TIME, ADVERSELY AFFECTED SPERMATOGENIC ACTIVITY."

SECTION VII PHYSICAL DATA

BOILING POINT: NOT AVAILABLE (DEG F)	SPECIFIC GRAVITY: 0.8838 (H2O=1)	VAPOR PRESSURE: NOT AVAILABLE (MM HG)

MELTING POINT: -35 (POUR POINT) (DEG F)

SOLUBILITY: (IN WATER) NEGLIGIBLE

VAPOR DENSITY: (AIR=1) NOT AVAILABLE

EVAPORATION RATE (N-BUTYL ACETATE = 1): NOT AVAILABLE

VIS, CS (40 DEG C) :35

APPEARANCE AND ODOR: DARK RED LIQUID. SLIGHT HYDROCARBON ODOR.

SECTION VIII FIRE AND EXPLOSION HAZARDS

FLASH POINT AND METHOD:
375 DEG F (PMCC)

FLAMMABLE LIMITS /% VOLUME IN AIR
LOWER: N/AV UPPER: N/AV

EXTINGUISHING MEDIA
USE WATER FOG, FOAM, DRY CHEMICAL OR CO2. DO NOT USE A DIRECT STREAM OF WATER. PRODUCT WILL FLOAT AND CAN BE REIGNITED ON SURFACE OF WATER.

SPECIAL FIRE FIGHTING PROCEDURES AND PRECAUTIONS
MATERIAL WILL NOT BURN UNLESS PREHEATED. DO NOT ENTER CONFINED FIRE-SPACE WITHOUT FULL BUNKER GEAR (HELMET WITH FACE SHIELD, BUNKER COATS, GLOVES AND RUBBER BOOTS), INCLUDING A POSITIVE-PRESSURE NIOSH-APPROVED SELF-CONTAINED BREATHING APPARATUS. COOL FIRE EXPOSED CONTAINERS WITH WATER.

SECTION IX REACTIVITY

STABILITY: STABLE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS AND MATERIALS TO AVOID:
AVOID HEAT, OPEN FLAMES AND OXIDIZING MATERIALS.

HAZARDOUS DECOMPOSITION PRODUCTS
THERMAL DECOMPOSITION PRODUCTS ARE HIGHLY DEPENDENT ON THE COMBUSTION CONDITIONS. A COMPLEX MIXTURE OF AIRBORNE SOLID, LIQUID, PARTICULATES AND GASES WILL EVOLVE WHEN THIS MATERIAL UNDERGOES PYROLYSIS OR COMBUSTION. CARBON MONOXIDE AND OTHER UNIDENTIFIED ORGANIC COMPOUNDS MAY BE FORMED UPON COMBUSTION.

SECTION X EMPLOYEE PROTECTION

RESPIRATORY PROTECTION
IF EXPOSURE MAY OR DOES EXCEED OCCUPATIONAL EXPOSURE LIMITS (SECTION IV) USE A NIOSH-APPROVED RESPIRATOR TO PREVENT OVEREXPOSURE. IN ACCORD WITH 29 CFR 1910.134 USE EITHER AN ATMOSPHERE-SUPPLYING RESPIRATOR OR AN AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS AND PARTICULATES.

PROTECTIVE CLOTHING
WEAR CHEMICAL RESISTANT GLOVES AND OTHER PROTECTIVE CLOTHING AS REQUIRED TO MINIMIZE SKIN CONTACT. WEAR SAFETY GOGGLES TO AVOID EYE CONTACT. TEST DATA FROM PUBLISHED LITERATURE AND/OR GLOVE AND CLOTHING MANUFACTURERS INDICATE THE BEST PROTECTION IS PROVIDED BY NITRILE GLOVES.

SECTION XI ENVIRONMENTAL PROTECTION

SPILL OR LEAK PROCEDURES
MAY BURN ALTHOUGH NOT READILY IGNITABLE. USE CAUTIOUS JUDGMENT WHEN CLEANING UP LARGE SPILLS. *** LARGE SPILLS *** WEAR RESPIRATOR AND PROTECTIVE CLOTHING AS APPROPRIATE. SHUT OFF SOURCE OF LEAK IF SAFE TO DO SO. DIKE AND CONTAIN. REMOVE WITH VACUUM TRUCKS OR PUMP TO STORAGE SALVAGE VESSELS. SOAK UP RESIDUE WITH AN ABSORBENT SUCH AS CLAY, SAND, OR OTHER SUITABLE MATERIALS; DISPOSE OF PROPERLY. FLUSH AREA WITH WATER TO REMOVE TRACE RESIDUE. *** SMALL SPILLS *** TAKE UP WITH AN ABSORBENT MATERIAL AND DISPOSE OF PROPERLY.

WASTE DISPOSAL
PLACE IN AN APPROPRIATE DISPOSAL FACILITY IN COMPLIANCE WITH LOCAL REGULATIONS.

ENVIRONMENTAL HAZARDS
THIS PRODUCT IS CLASSIFIED AS AN OIL UNDER SECTION 311 OF THE CLEAN WATER ACT. SPILLS ENTERING (A) SURFACE WATERS OR (B) ANY WATER COURSES OR SEWERS ENTERING/LEADING TO SURFACE WATERS THAT CAUSE A SHEEN MUST BE REPORTED TO THE NATIONAL RESPONSE CENTER, 800-424-8602.

SECTION XII SPECIAL PRECAUTIONS

MINIMIZE SKIN CONTACT. WASH WITH SOAP AND WATER BEFORE EATING, DRINKING, SMOKING OR USING TOILET FACILITIES. LAUNDER CONTAMINATED CLOTHING BEFORE REUSE. PROPERLY DISPOSE OF CONTAMINATED LEATHER ARTICLES, INCLUDING SHOES, THAT CANNOT BE DECONTAMINATED.

STORE IN A COOL, DRY PLACE WITH ADEQUATE VENTILATION. KEEP AWAY FROM OPEN FLAMES AND HIGH TEMPERATURES.

SECTION XIII TRANSPORTATION REQUIREMENTS

DEPARTMENT OF TRANSPORTATION CLASSIFICATION: NOT HAZARDOUS BY D.O.T. REGULATIONS

SECTION XIV OTHER REGULATORY CONTROLS

THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE EPA/TSCA INVENTORY OF CHEMICAL SUBSTANCES.

THE INFORMATION CONTAINED HEREIN IS BASED ON THE DATA AVAILABLE TO US AND IS BELIEVED TO BE CORRECT. HOWEVER, SHELL MAKES NO WARRANTY, EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF. SHELL ASSUMES NO RESPONSIBILITY FOR INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN.

DATE PREPARED: MAY 06, 1988

JOHN P. SEPESI

BE SAFE

READ OUR PRODUCT SAFETY INFORMATION ...AND PASS IT ON (PRODUCT LIABILITY LAW REQUIRES IT)

SHELL OIL COMPANY
PRODUCT SAFETY AND COMPLIANCE
P. O. BOX 4320
HOUSTON, TX 77210

U. S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME: Shipley Company Inc.	EMERGENCY TELEPHONE NO.: (617) 969-5500
ADDRESS (Number, Street, City, State, and ZIP Code): 2300 Washington Street, Newton, Massachusetts 02162	
CHEMICAL NAME AND SYNONYMS: n.a.	TRADE NAME AND SYNONYMS: Shipley CATALYST 9F
CHEMICAL FAMILY: n.a.	FORMULA: Proprietary

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS n.a.			BASE METAL n.a.		
CATALYST n.a.			ALLOYS n.a.		
VEHICLE n.a.			METALLIC COATINGS n.a.		
SOLVENTS n.a.			FILLER METAL PLUS COATING OR CORE FLUX n.a.		
ADDITIVES n.a.			OTHERS n.a.		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
Hydrochloric Acid	15	5 ppm
Stannous Chloride	10	2 mg/M^3

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	>212	SPECIFIC GRAVITY (H_2O=1)	~1.2
VAPOR PRESSURE (mm Hg.)	n.a.	PERCENT VOLATILE BY VOLUME (%) Water based solution	n.a.
VAPOR DENSITY (AIR=1)	n.a.	EVAPORATION RATE (_____=1)	n.a.
SOLUBILITY IN WATER	Complete		

APPEARANCE AND ODOR: Dark brown liquid with hydrochloric acid odor

SECTION IV FIRE AND EXPLOSION HAZARD DATA

			Lel	Uel
FLASH POINT (Method used): Non-flammable		FLAMMABLE LIMITS	n.a.	n.a.

EXTINGUISHING MEDIA: Water, CO_2, Dry chemical

SPECIAL FIRE FIGHTING PROCEDURES: Check for presence of chloride fumes

UNUSUAL FIRE AND EXPLOSION HAZARDS: Can react to produce toxic and corrosive chloride fumes

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	5 ppm - based on hydrochloric acid
EFFECTS OF OVEREXPOSURE	As for hydrochloric acid

EMERGENCY AND FIRST AID PROCEDURES

Swallowing: Contact physician immediately; Eye Contact: Flush with copious amounts of water - contact physician; Skin Contact: Flush with copious amounts of water; Inhalation: Move to fresh air.

SECTION VI REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	Storage near oxidizing agents and alkaline materials

INCOMPATABILITY *(Materials to avoid)* Oxidizing agents and alkaline materials

HAZARDOUS DECOMPOSITION PRODUCTS Chloride fumes - neutralization produces heat

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	None

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Flush area with cold water.

WASTE DISPOSAL METHOD

Contact Shipley Product Services Department

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)* n.a.

VENTILATION			
	LOCAL EXHAUST	Recommended	SPECIAL
	MECHANICAL *(General)*		OTHER

PROTECTIVE GLOVES	Yes	EYE PROTECTION	Yes

OTHER PROTECTIVE EQUIPMENT Suitable protective clothing

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Treat as a solution of stannous chloride and hydrochloric acid. Store in dry area at 50-90F. Do not store in direct sunlight. Keep sealed when not in use.

OTHER PRECAUTIONS

Buckeye®

the davies-young company
2700 Wagner Place, Maryland Heights, Missouri 63043

N.F.P.A.
HAZARD RATING:
4 = EXTREME
3 = HIGH
2 = MODERATE
1 = SLIGHT
0 = INSIGNIFICANT

HEALTH	1
FIRE	1
REACTIVITY	0

Material Safety Data

Emergency Telephone: 314/291-1900 (8 a.m. - 5 p.m.) 314/768-1959 (5 p.m. - 8 a.m. - Medical Emergency Only)

SECTION I - IDENTIFICATION

PRODUCT NAME	DATE PREPARED
ShopMaster	June 22, 1988
CHEMICAL FAMILY	**CODE**
Heavy Duty Cleaner - Degreaser	5770

DEPARTMENT OF TRANSPORTATION		
	HAZARD CLASSIFICATION	None
	SHIPPING NAME	Cleaning compound, liquid

SECTION II - HAZARDOUS INGREDIENTS

% BY WEIGHT	MATERIAL	C.A.S. NUMBER
	None	

SECTION III - PHYSICAL DATA

BOILING POINT °F	212°	SPECIFIC GRAVITY (H_2O = 1)	1.04
VAPOR PRESSURE	Not Determined	% VOLATILE BY WEIGHT	85%
VAPOR DENSITY	Not Determined	EVAPORATION RATE (WATER = 1)	1.0
SOLUBILITY IN WATER	Infinite	pH (Concentrate) (1:10 Dilution)	13.1 12.2
APPEARANCE AND ODOR	Yellow liquid with lemon-like odor		

SECTION IV - FIRE AND EXPLOSION DATA

FLASH POINT (METHOD USED)	COC - 177°F TAG C.C. 120°F	FLAMMABLE LIMITS	UPPER	N/A
			LOWER	N/A

EXTINGUISHING MEDIA ☒ CO_2 ☒ FOAM ☒ DRY CHEMICAL ☒ WATER ☐ OTHER _____

SPECIAL FIREFIGHTING PROCEDURES: None

UNUSUAL FIRE AND EXPLOSION HAZARDS: Although product has a flash point, it will not sustain a flame up to and including the boiling point

TRW-02225

0908-3606

Disclaimer of Liability
As the conditions or methods of use are beyond our control, we do not assume any responsibility and expressly disclaim any liability for any use of the material. Information contained herein is believed to be true and accurate but all statements or suggestions are made without any warranty, express or implied, regarding accuracy of the information, the hazards connected with the use of the material or the results to be obtained from the use thereof.

SECTION V - HEALTH HAZARD DATA

Code 5770

EFFECTS OF OVEREXPOSURE

THRESHOLD LIMIT VALUE	Not Established
EYE CONTACT	May cause burns - irritation
SKIN CONTACT	Skin irritation - defatting
INHALATION	May cause headache, dizziness
INGESTION	Nausea

EMERGENCY AND FIRST AID PROCEDURES

Flush eyes or skin with large amounts of water. If irritation persists see physician. If swallowed, drink fruit juice, dilute vinegar, salad oil. Follow with milk. Call physician.

SECTION VI - REACTIVITY DATA

STABILITY	STABLE	X	CONDITIONS TO AVOID	N/A
	UNSTABLE			
INCOMPATIBILITY				Avoid mixing with bleach.
HAZARDOUS COMPOSITION PRODUCTS				N/A
HAZARDOUS POLYMERIZATION	WILL OCCUR		CONDITIONS TO AVOID	
	WILL NOT OCCUR	X		

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Pick up with mops, rinse area with water then mop up. Rinse with clean water.
WASTE DISPOSAL METHOD	Adjust the pH with dilute acid. Mix with water and sewer or dispose of in sanitary landfill.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	Not required.		
VENTILATION	Normal room ventilation.		
PROTECTIVE GLOVES	Rubber Gloves	EYE PROTECTION	Safety Glasses
OTHER PROTECTIVE EQUIPMENT	Not required		

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS IN HANDLING AND STORAGE AND OTHER CAUTIONS

Store away from open flame, sparks and heat.

KEEP OUT OF REACH OF CHILDREN

PREPARED BY: D. N. Van Eenam

TECHNIC INC.
POST OFFICE BOX 965 PROVIDENCE, R I 02901 (401) 781-6100
3265 N RIDGE AVE ARLINGTON HTS, ILL 60005 (312) 262-2662
1170 HAWK CIRCLE ANAHEIM CAL 92807 (714) 632-0200
1216 LUKE STREET IRVING TEXAS 75061 (214) 252-6595
TECHNIC PRECIOUS METALS (UK) LTD
TECHNIC M & D IND HONG KONG
CANADA EUROPE

Copy Denis Sarsuk 8/3/84

MATERIAL SAFETY DATA SHEET

Form similar to O.S.H.A - 20

SECTION I

MANUFACTURER'S NAME [redacted]	EMERGENCY TELEPHONE NO. [redacted]00
ADDRESS (NUMBER, STREET, CITY, STATE, AND ZIP CODE) One Spectacle Street, Cranston, Rhode Island 02910	
CHEMICAL NAME AND SYNONYMS Silver Anodes	TRADE NAME AND SYNONYMS [redacted]S
CHEMICAL FAMILY Silver Metal	FORMULA Ag

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (UNITS)	ALLOYS AND METALLIC COATINGS	%	TLV (UNITS)
PIGMENTS	NONE		BASE METAL	NONE	
CATALYST	"	"	ALLOYS	"	"
VEHICLE	"	"	METALLIC COATINGS	"	"
SOLVENTS	"	"			
ADDITIVES	"	"	OTHERS	"	"
OTHERS	"	"	FILLER METAL PLUS COATING OR CORE FLUX	"	"

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (UNITS)
N. A.		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	N. A.	SPECIFIC GRAVITY ( )	N. A.
VAPOR PRESSURE (MM HG.)	N. A.	PERCENT VOLATILE BY VOLUME (%)	N. A.
VAPOR DENSITY (AIR=1)	N. A.	EVAPORATION RATE (_____=)	N. A.
SOLUBILITY IN WATER	N. A.	PH	
APPEARANCE AND ODOR	White silver; no odor		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) None	FLAMMABLE LIMITS	LEI	UEI
EXTINGUISHING MEDIA Water			
SPECIAL FIRE FIGHTING PROCEDURES None			
UNUSUAL FIRE AND EXPLOSION HAZARDS None			

0908-3608

TRW-02227

The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
None

EFFECTS OF OVEREXPOSURE
None

EMERGENCY AND FIRST AID PROCEDURES
None

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	None

INCOMPATABILITY (MATERIALS TO AVOID)
None

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	None

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

None

WASTE DISPOSAL METHOD

None

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)
None

VENTILATION	LOCAL EXHAUST	SPECIAL
	MECHANICAL (GENERAL)	OTHER

PROTECTIVE GLOVES	None	EYE PROTECTION	None

OTHER PROTECTIVE EQUIPMENT
None

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
None

OTHER PRECAUTIONS

DATE: April, 1984 DIVISION: _____ 0908-3609

SIGNATURE: _____

TRW-02228

Olin

EMERGENCY PHONE (203) 356-2345
Olin Corporation, 120 Long Ridge Road
Stamford, Conn. 06904

FLAMMABILITY 0 · REACTIVITY 0 · HEALTH 2 · SPECIAL
HAZARD RATING

MATERIAL SAFETY DATA

SECTION I – IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Silver [redacted] Copper, 13 ounce		
CHEMICAL FAMILY	FORMULA	TRADE NAME
Copper		Alloy 114
DESCRIPTION		CAS NO.
Metal		

SECTION II – NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE	
Avoid breathing dust or fumes. Do not take internally.	
CORROSIVE ACTION ON MATERIALS (Metals, Plastic, Rubber, Etc.)	
PROTECTIVE EQUIPMENT	VENTILATION REQUIREMENTS
Eyes (Dust) Goggles Gloves Other	As required to keep airborne concentrations below TLV.

SECTION III – HAZARDOUS INGREDIENTS

BASIC MATERIAL	APPROX. %	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper		Dust 1.0 mg/m^3 Fume 0.1 mg/m^3			Gastro-intestinal

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable				
EXTINGUISHING MEDIA				
Not Applicable				
SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES				
Not Applicable				

SECTION V – HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	Copper, dust 1 mg/m^3, Fume 0.2 mg/m^3 (ACGIH 1983)
SYMPTOMS OF OVER EXPOSURE	Dust and fume, sneezing, congestion, metallic taste, gastro-intestinal distress, chills, fever
EMERGENCY FIRST-AID PROCEDURES	
SKIN	Flush thoroughly with water.
EYES	Flush with water for 15 minutes, call a physician.
INGESTION	Drink water, induce vomiting by sticking finger down throat, call a physician.
INHALATION	Remove victim to fresh air, call a physician.

Chemical Alloy 114 CAS No.

TRW-02229

0908-3610

CHEMICAL NAME Alloy 114

SECTION VI – TOXICOLOGY (Product)

ACUTE ORAL LD 50 TD_{LO} Copper 120 mg kg (human)	CARCINOGENIC Not known to be carcinogenic MUTAGENIC Not known to be mutagenic
ACUTE DERMAL LD 50	EYE IRRITATION Dust is irritant
ACUTE INHALATION LC 50	PRIMARY SKIN IRRITATION Dust is irritating

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume

EFFECTS OF ACUTE EXPOSURE
Congestion, gastro-intestinal distress, chills, fever, dermatitis

EFFECTS OF CHRONIC EXPOSURE
May cause liver, kidney or spleen damage, anemia, dermatitis

SECTION VII – SPILL OR LEAKAGE PROCEDURES (Control Procedures)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dust or fume - Wear NIOSH/MSHA approved dust and fume respirator. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134). Shovel or sweep up and place in an approved DOT container and seal. Wash all contaminated clothing before reuse.

WASTE DISPOSAL METHOD
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII – REACTIVITY DATA

STABLE X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR
		WILL NOT OCCUR X

CONDITIONS TO AVOID

INCOMPATABILITY (Materials To Avoid) Dust and fume - acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS Copper fume

SECTION IX – PHYSICAL DATA

MELTING POINT 1949°F	VAPOR PRESSURE	VOLATILES
BOILING POINT	SOLUBILITY IN WATER Insoluble	EVAPORATION RATE
SPECIFIC GRAVITY (H_2O = 1)	pH	VAPOR DENSITY (Air = 1)
DENSITY .322 pounds/m^3		

INFORMATION FURNISHED BY: A. L. Gaudreau (203) 789-5434 DATE September 4, 1984

Department of Environmental Hygiene and Toxicology
Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
EMERGENCY PHONE (203) 356 - 2345

TRW-02230

0908-3611

Olin

EMERGENCY PHONE (203) 356-2345
Olin Corporation, 120 Long Ridge Road
Stamford, Conn. 06904

FLAMMABILITY 0 · REACTIVITY 0 · HEALTH 3 · SPECIAL
HAZARD RATING

MATERIAL SAFETY DATA

SECTION I – IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Silver Re[redacted] Copper 16 oz		
CHEMICAL FAMILY	FORMULA	TRADE NAME
Copper		Alloy 129
DESCRIPTION		CAS NO.
Metal		

SECTION II – NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Avoid breathing dust or fumes. Do not take internally.

CORROSIVE ACTION ON MATERIALS (Metals, Plastic, Rubber, Etc.)

PROTECTIVE EQUIPMENT		VENTILATION REQUIREMENTS
Eyes	Dust and fume - Goggles	Local exhaust or general ventilation required as dictated by airborne concentrations.
Gloves	Dust and fume - Impervious	
Other	Dust and fume - Coveralls and Impervious Boots	

SECTION III – HAZARDOUS INGREDIENTS

BASIC MATERIAL	APPROX. %	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper		Dust 1 mg/m^3 Fume 0.1 mg/m^3			Gastro-intestinal
Arsenic	.012	0.01 mg/m^3	7.8 g/kg (human)		Gastro-intestinal, cancer
Antimony	.003	0.5 mg/m^3	LD_{LO} 15 mg/kg (rat)		Rash, mucous membrane irritation, pnemoconiosis

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable				

EXTINGUISHING MEDIA
Not Applicable

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES Use NIOSH/MSHA approved self-contained breathing apparatus where this material is involved in a fire.

SECTION V – HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
None established.

SYMPTOMS OF OVER EXPOSURE Dust and fume - sneezing, congestion, metallic taste, gastro-intestinal distress, fever, chills.

EMERGENCY FIRST-AID PROCEDURES

SKIN	Flush thoroughly with water.
EYES	Flush with water for 15 minutes, call a physician.
INGESTION	Drink water, induce vomiting by sticking finger down throat, call a physician.
INHALATION	Remove victim to fresh air, call a physician.

Chemical Alloy 129 CAS No.

TRW-02231

0908-3612

CHEMICAL NAME Alloy 129

SECTION VI – TOXICOLOGY (Product)

ACUTE ORAL LD 50	CARCINOGENIC May be carcinogenic
ACUTE ORAL TD_{LO} Copper 120 mg/kg (human)	MUTAGENIC May be mutagenic
ACUTE DERMAL LD 50	EYE IRRITATION Dust is irritant
ACUTE INHALATION LC 50	PRIMARY SKIN IRRITATION Dust is irritant

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume.

EFFECTS OF ACUTE EXPOSURE
Congestion, gastro-intestinal distress, chills, fever, dermatitis

EFFECTS OF CHRONIC EXPOSURE
May cause liver, kidney or spleen damage, anemia, dermatitis

SECTION VII – SPILL OR LEAKAGE PROCEDURES (Control Procedures)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dust or fume - Wear NIOSH/MSHA approved dust and fume respirator. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134). Shovel or sweep up and place in an approved DOT container and seal. Wash all contaminated clothing before reuse.

WASTE DISPOSAL METHOD
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII – REACTIVITY DATA

STABLE X UNSTABLE AT ___ °C ___ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR
		WILL NOT OCCUR X

CONDITIONS TO AVOID

INCOMPATABILITY (Materials To Avoid) Dust and fume acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS Arsine, stibnine, copper fume

SECTION IX – PHYSICAL DATA

MELTING POINT	1949	VAPOR PRESSURE	VOLATILES
BOILING POINT		SOLUBILITY IN WATER	EVAPORATION RATE
SPECIFIC GRAVITY (H_2O = 1)		pH	VAPOR DENSITY (Air = 1)
DENSITY	.321		

INFORMATION FURNISHED BY: A. L. Gaudreau (203) 789-5434 DATE September 4, 1984

Department of Environmental Hygiene and Toxicology
Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
EMERGENCY PHONE (203) 356 - 2345

TRW-02232

0908-3613

Olin MATERIAL SAFETY DATA

OCEAN® Network
EMERGENCY PHONE 1-800-OLIN-911

SECTION I - IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Silver Bearing Copper, 25 ounce		
CHEMICAL FAMILY	FORMULA	TRADE NAME
Copper	Mixture	Alloy 116
DESCRIPTION		CAS NO.
Red orange metallic solid		Not assigned/mixture

SECTION II - NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Precautions needed for abrasive, melting or other operations generating a dust or fume. Do not get dust or fume in eyes, on skin or on clothing. Do not take internally. Wash hands with soap and water before eating or smoking. Avoid breathing dust or fumes.

PROTECTIVE EQUIPMENT		VENTILATION REQUIREMENTS
Eyes	Dust - goggles	As required to keep airborne concentrations of copper dust below TLV.
Gloves	Impervious (if necessary)	
Other	NIOSH/MSHA approved high efficiency particulate respirator if excessive dusting/fumes occurs	

SECTION III - HAZARDOUS INGREDIENTS

BASIC MATERIAL	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper	Dust 1 mg/m^3	TD_{LO} 120 ug/kg (human)	No data	Inhalation - metal fume fever, respiratory tract irritation

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable	Non-combustible solid		N/A	N/A

EXTINGUISHING MEDIA

Use extinguishing media suitable for surrounding material.

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES Use NIOSH/MSHA approved positive pressure self-contained breathing apparatus when any material is involved in a fire.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

Copper dust 1 mg/m^3, fume 0.2 mg/m^3 (ACGIH 1985-86)

SYMPTOMS OF OVER EXPOSURE

Dust and fume - sneezing, congestion, metallic taste, nausea, chills, fever

EMERGENCY FIRST-AID PROCEDURES

SKIN	Dust or fume: Wash with soap and water before eating or smoking. If an irritation develops, call a physician.
EYES	Dust or fume: Flush with water for 15 minutes, call a physician.
INGESTION	Dust: Not a likely route of exposure. If ingested, call a physician.
INHALATION	Dust or fume: Remove victim to fresh air, call a physician

Chemical

CAS No.

TRW-02233

0908-3614

CHEMICAL NAME Alloy 116

SECTION VI - TOXICOLOGY (Product)

ACUTE ORAL LD 50		CARCINOGENICITY	Not known to be carcinogenic
ACUTE ORAL TD_{LO}	Copper 120 ug/kg (human)	MUTAGENICITY	Not known to be mutagenic
ACUTE DERMAL LD 50	No data	EYE IRRITATION	Dust is irritating
		PRIMARY SKIN IRRITATION	Dust may be irritating
ACUTE INHALATION LC 50	No data		

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume

EFFECTS OF ACUTE EXPOSURE Dust or fume: Skin, eye and mucous membrane irritation, metal fume fever, respiratory tract irritation.

EFFECTS OF CHRONIC EXPOSURE None expected at industrial use levels. Chronic overexposure may cause liver and kidney effects.

SECTION VII - SPILL AND LEAKAGE PROCEDURES (Control Procedures)

ACTION FOR MATERIAL RELEASE OR SPILL

Dust or Fume: Wear NIOSH/MSHA approved high efficiency particulate respirator. Follow OSHA regulations for respirator use (See 29 CFR 1910.134). Wear goggles, coveralls, impervious gloves and boots. Shovel or sweep up and place in an appropriate container. Wash all contaminated clothing before reuse.

In the event of a large spill, use the emergency telephone number shown on the front of this sheet.

TRANSPORTATION EMERGENCY, CONTACT CHEMTREC 800-424-9300

WASTE DISPOSAL METHOD

Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII - SHIPPING DATA

D.O.T. CLASS Not regulated

SECTION IX - REACTIVITY DATA

STABLE	X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR
			WILL NOT OCCUR X

CONDITIONS TO AVOID Presence of carbon monoxide dring melting

INCOMPATIBILITY (Material to Avoid) dust and fume - acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS copper fume

SECTION X - PHYSICAL DATA

MELTING POINT	1949°F	VAPOR PRESSURE	N.A.	VOLATILES	N.A.
BOILING POINT	No data	SOLUBILITY IN WATER	Insoluble	EVAPORATION RATE	N.A.
SPECIFIC GRAVITY (H_2O = 1)	*	pH	N.A.	VAPOR DENSITY (Air = 1)	N.A.
*DENSITY .322 lbs/in^3					

INFORMATION FURNISHED BY: Environmental Hygiene and Toxicology (203) 789-5436

DATE March 21, 1986

TRW-02234

Department of Environmental Hygiene and Toxicology
(203) 789-5436

Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
OCEAN® Network
EMERGENCY PHONE 1-

1065

0908-3615

Olin

FLAMMABILITY 0 | REACTIVITY 0 | HEALTH 2 | SPECIAL | HAZARD RATING

MATERIAL SAFETY DATA

EMERGENCY PHONE (203) 356-2345

Olin Corporation, 120 Long Ridge Road
Stamford, Conn. 06904

SECTION I – IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Silver Bearing Low Oxygen Copper		
CHEMICAL FAMILY: Copper	FORMULA:	TRADE NAME: Alloy 1093
DESCRIPTION: Metal		CAS NO.

SECTION II – NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Avoid breathing dust or fumes. Do not take internally.

CORROSIVE ACTION ON MATERIALS (Metals, Plastic, Rubber, Etc.)

PROTECTIVE EQUIPMENT	VENTILATION REQUIREMENTS
Eyes (Dust) goggles Gloves Other	As required to keep airborne concentrations below TLV for copper dust.

SECTION III – HAZARDOUS INGREDIENTS

BASIC MATERIAL	APPROX. %	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper		Dust 1 mg/m^3 Fume 0.1 mg/m^3			Gastro-intestinal

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable				

EXTINGUISHING MEDIA
Not Applicable

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES
Not Applicable

SECTION V – HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Copper, Dust 1 mg/m^3, Fume 0.2 mg/m^3 (ACGIH 1983)

SYMPTOMS OF OVER EXPOSURE
Dust and fume - sneezing, congestion, metallic taste, nausea, chills, fever

EMERGENCY FIRST-AID PROCEDURES

SKIN	Flush thoroughly with water.
EYES	Flush with water for 15 minutes, call a physician.
INGESTION	Drink water, induce vomiting, call a physician.
INHALATION	Remove victim to fresh air, call a physician.

Chemical Alloy 1093

CAS No.

TRW-02235

0908-3616

CHEMICAL NAME Alloy 1062

SECTION VI – TOXICOLOGY (Product)

ACUTE ORAL LD 50	CARCINOGENIC Not known to be carcinogenic
ACUTE ORAL TD_{LO} Copper 120 mg/kg human	MUTAGENIC Not known to be mutagenic
ACUTE DERMAL LD 50	EYE IRRITATION Dust is irritating
	PRIMARY SKIN IRRITATION Dust is irritant
ACUTE INHALATION LC 50	

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume

EFFECTS OF ACUTE EXPOSURE
Congestion, gastro-intestinal distress, chills, fever

EFFECTS OF CHRONIC EXPOSURE
May cause liver, kidney or spleen damage, anemia

SECTION VII – SPILL OR LEAKAGE PROCEDURES (Control Procedures)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dust or Fume - Wear NIOSH/MSHA approved dust and fume respirator. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134). Shovel or sweep up and place in an approved DOT container and seal. Wash all contaminated clothing before reuse.

WASTE DISPOSAL METHOD
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII – REACTIVITY DATA

STABLE X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR
		WILL NOT OCCUR X

CONDITIONS TO AVOID

INCOMPATABILITY (Material To Avoid) (dust and fume) acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS copper fume

SECTION IX – PHYSICAL DATA

MELTING POINT 1949°F	VAPOR PRESSURE	VOLATILES
BOILING POINT	SOLUBILITY IN WATER Insol	EVAPORATION RATE
SPECIFIC GRAVITY (H_2O =1) 8.9	pH	VAPOR DENSITY (Air = 1)

INFORMATION FURNISHED BY: A. L. Gaudreau (203) 789-5434 DATE March 28, 1983 (Rev. No. 2, June 27, 1984)

Department of Environmental Hygiene and Toxicology
Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
EMERGENCY PHONE (203) 356 - 2345

TRW-02236

0908-3617

FLAMMABILITY 0 | REACTIVITY 0 | HEALTH 2 | SPECIAL | HAZARD RATING

Olin

MATERIAL SAFETY DATA

EMERGENCY PHONE (203) 356-2345

Olin Corporation, 120 Long Ridge Road
Stamford, Conn. 06904

SECTION I – IDENTIFICATION

COMMON SYNONYMS: Silver Bearing Low Oxygen Copper		
CHEMICAL FAMILY: Copper	FORMULA	TRADE NAME: Alloy 1094
DESCRIPTION: Metal		CAS NO.

SECTION II – NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE
Avoid breathing dust or fumes. Do not take internally.

CORROSIVE ACTION ON MATERIALS (Metals, Plastic, Rubber, Etc.)

PROTECTIVE EQUIPMENT	VENTILATION REQUIREMENTS
Eyes (Dust) goggles Gloves Other	As required to keep airborne concentrations below TLV for copper dust.

SECTION III – HAZARDOUS INGREDIENTS

BASIC MATERIAL	APPROX. %	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper		Dust 1 mg/m^3 Fume 0.1 mg/m^3			Gastro-intestinal

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable				

EXTINGUISHING MEDIA
Not Applicable

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES
Not Applicable

SECTION V – HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Copper, Dust 1 mg/m^3, Fume 0.2 mg/m^3 (ACGIH 1983)

SYMPTOMS OF OVER EXPOSURE
Dust and fume - sneezing, congestion, metallic taste, nausea, chills, fever

EMERGENCY FIRST-AID PROCEDURES

SKIN	Flush thoroughly with water.
EYES	Flush with water for 15 minutes, call a physician.
INGESTION	Drink water, induce vomiting, call a physician.
INHALATION	Remove victim to fresh air, call a physician.

Chemical Alloy 1094

CAS No.

TRW-02237

0908-3618

CHEMICAL NAME Alloy 1094

SECTION VI – TOXICOLOGY (Product)

ACUTE ORAL LD 50	CARCINOGENIC: Not known to be carcinogenic
ACUTE ORAL TD_{LO} Copper 120 mg/kg human	MUTAGENIC: Not known to be mutagenic
ACUTE DERMAL LD 50	EYE IRRITATION: Dust is irritating
ACUTE INHALATION LC 50	PRIMARY SKIN IRRITATION: Dust is irritant

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume

EFFECTS OF ACUTE EXPOSURE
Congestion, gastro-intestinal distress, chills, fever

EFFECTS OF CHRONIC EXPOSURE
May cause liver, kidney or spleen damage, anemia

SECTION VII – SPILL OR LEAKAGE PROCEDURES (Control Procedures)

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Dust or Fume - Wear NIOSH/MSHA approved dust and fume respirator. Follow OSHA regulations for respirator use. (See 29 CFR 1910.134). Shovel or sweep up and place in an approved DOT container and seal. Wash all contaminated clothing before reuse.

WASTE DISPOSAL METHOD
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII – REACTIVITY DATA

STABLE X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR
		WILL NOT OCCUR X

CONDITIONS TO AVOID

INCOMPATABILITY (Material To Avoid) (dust and fume) acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS copper fume

SECTION IX – PHYSICAL DATA

MELTING POINT 1949°F	VAPOR PRESSURE	VOLATILES
BOILING POINT	SOLUBILITY IN WATER Insol	EVAPORATION RATE
SPECIFIC GRAVITY (H_2O = 1) 8.9	pH	VAPOR DENSITY (Air = 1)

INFORMATION FURNISHED BY: A. L. Gaudreau (203) 789-5434 DATE March 28, 1983 (Rev. No. 2, June 27, 1984)

Department of Environmental Hygiene and Toxicology
Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
EMERGENCY PHONE (203) 356 - 2345

TRW-02238

0908-3619

TMC 002
11/84

MATERIAL SAFETY DATA SHEET

SECTION I

PRODUCT NAME OR NUMBER (as it appears on label) Silver Dorrizone 715-BP-5	GM COMMON CODE
MANUFACTURER'S NAME Magni Industries, Inc.	EMERGENCY TELEPHONE NO. (313)843-7855
ADDRESS (Number, Street, City, State and Zip Code) 2771 Hammond, Detroit, MI 48209	MANUFACTURER'S D-U-N-S NO 09-541-3050
HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) By Product after Coating	
ADDITIONAL HAZARD CLASSES (as applicable)	
CHEMICAL FAMILY Powder	FORMULA

SECTION II — INGREDIENTS
(list all ingredients)

CAS REGISTRY NO.	%W	%V	CHEMICAL NAME(S)	Listed as a Carcinog in NTP, IARC or OSH 1910(z) (specify)
7440-66-6			Zinc Dust	n/a
7429-90-5			Aluminum	n/a
261.20 - Subpart C Characteristics of Hazardous Waste- Federal Register				
261.22 - Corrosivity				
a.) Corrosion Test				Non-Corrosive
261.23 - Reactivity				Non-Reactive

SECTION III — PHYSICAL DATA

BOILING POINT ___ °F ___ °C N/A	SPECIFIC GRAVITY (H,O = 1)	n/a	
VAPOR PRESSURE @ n/a °F ___ °C ☐ mm Hg ☐ psi	PERCENT VOLATILE BY VOLUME (%)	n/a	PERCENT SOLID BY WEIGHT (%) n
VAPOR DENSITY (AIR = 1) Heavier than air	EVAPORATION RATE (= 1)	n/a	
SOLUBILITY IN WATER Insoluble	pH =	n/a	
APPEARANCE AND ODOR Solid/Gray Powder		IS MATERIAL GAS PASTE LIQUID POWDER (SOLID)	

SECTION IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT ___ °F ___ °C method used n/a	FLAMMABLE LIMITS	LEL n/a	UEL n/a
EXTINGUISHING MEDIA Dry Chemical			
SPECIAL FIRE FIGHTING PROCEDURES n/a			
UNUSUAL FIRE AND EXPLOSION HAZARDS n/a			

TRW-02239

0908-3620

SECTION V-HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE — Conditions to Avoid	THRESHOLD LIMIT VALUE ☐ PERMISSIBLE EXPOSURE LIMIT ☐ n/a OTHER LIMIT ☐
Eye contact may cause severe irritation and redness. Skin contact can cause moderate irritation.	
PRIMARY ROUTES OF ENTRY Inhalation ☐ Skin Contact ☒ Other (specify)	
EMERGENCY AND FIRST AID PROCEDURES Inhalation and eye contact get medical attention. Skin contact wash thoroughly with soap and water.	

SECTION VI-REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Water
INCOMPATIBILITY (materials to avoid) n/a			
HAZARDOUS DECOMPOSITION PRODUCTS: n/a			
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII-SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Clean up by sweeping or vacuuming.	
WASTE DISPOSAL METHOD Dispose in accordance with local, state, and Federal regulations.	
CERCLA (Superfund) REPORTABLE QUANTITY (in lbs) 500 lbs.	
RCRA HAZARDOUS WASTE NO. (40 CFR 261.33)	
VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water) n/a	
☐ Theoretical _____ lb/gal	☐ Analytical _____ lb/gal

SECTION VIII-SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type) NIOSH approved respiratory is necessary.		
VENTILATION	LOCAL EXHAUST (Specify Rate)	SPECIAL
	MECHANICAL (General) (Specify Rate) X	OTHER
PROTECTIVE GLOVES (specify type) Rubber or cloth gloves	EYE PROTECTION (specify type) Goggles or side shie	
OTHER PROTECTIVE EQUIPMENT Eye wash or safety showers should be available.		

SECTION IX-SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
OTHER PRECAUTIONS Consider dust as a "Nuisance Dust". Adequate ventilation should be provided.

Seller agrees not to assert any claim (other than a claim for a patent infringement) against General Motors Corporation for any use or disclosure of any technical data or information disclosed in connection with this questionnaire.

PLEASE COMPLETE QUESTIONNAIRE AND RETURN TO:	Name (print) Paul Badyrka
	Signature Paul Badyrka
	Title Tech Service
	Date 11-[illegible]

TRW-02240

0908-3621

SECTION I - GENERAL INFORMATION

Trade Name: Silver Glo 33
Product No.: 90005

Manufacturer: LeaRonal, Inc.
Address: 272 Buffalo Avenue
Freeport, N.Y. 11520

Emergency Number: CHEMTREC (800) 424-9300
(24 hours, day or night)
Product Information: (516) 868-8800

HMIS/NFPA HAZARD RATINGS:
Health: 3
Flammability: 0
Reactivity: 0
Personal Protection: C
(See Sec. XI for meaning)

Chemical Family: Cyanide, dilute solution
End Use: Silver plating
Description: Aqueous solution of inorganic compounds

SECTION II - HAZARDOUS INGREDIENTS

CHEMICAL OR COMMON NAME	CAS REG.NO.	PERCENT	EXPOSURE LIMITS
Cyanides as potassium cyanide	151-50-8	Trace	skin TLV 5 mg(CN)m3

NOTE: TLV's and/or PEL's are reported as 8-hr TWA values, unless otherwise indicated. "Skin" notation refers to the potential contribution to the overall exposure by the cutaneous route, including mucous membranes, eye and direct contact. Remaining ingredients are regarded to be non-hazardous under Ref. (1) and are not listed in Ref. (6).

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point @ 1 atm.: Approx. 212 deg F
Evaporation Rate: Slower than n-butyl acetate
Vapor Density: Heavier than air
Specific Gravity @ 20 C: 1.00
Percent volatiles: Less than 99 %
Solubility in Water: Miscible in all proportions
Acidity/alkalinity: Moderately alkaline, pH = 8.0 - 11.0
Appearance and Odor: Clear, colorless liquid. Virtually odorless.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flammability Class: N/a. Will not burn.
Flash Point: N/a
Flammability Limits: N/a
Extinguishing Media: Water spray, alcohol foam or dry chemical.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus and full turn-out gear. Do not use carbon dioxide to minimize evolution of hydrogen cyanide gas. Do not scatter spilled material with more water than needed for fire control. Dike fire control water for later disposal.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May emit small amounts of toxic and irritating gases upon thermal decomposition at flame temperatures.

SECTION V - REACTIVITY DATA

STABILITY: Stable.
CONDITIONS TO AVOID: None.
INCOMPATIBLE MATERIALS: Strong acids, strong oxidizers.

*** MSDS continued on next page ***

SECTION V - REACTIVITY DATA (continued)

HAZARDOUS DECOMPOSITION PRODUCTS: Small amounts of hydrogen cyanide gas.

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VI - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY/EXPOSURE: Eyes, skin absorption, inhalation.

HEALTH HAZARDS - EFFECTS OF OVEREXPOSURE:

EYES: May cause eye irritation.

SKIN: A short single exposure may cause skin irritation. Repeated exposure may result in cyanide skin absorption.

INHALATION: If mists are inhaled, may cause irritation of respiratory tract and mucous membranes.

INGESTION: Industrial chemicals are never to be taken internally. May cause mouth, throat and gastrointestinal tract irritation. Toxic effects may be similar to those of the alkaline cyanides: nausea, headache, dizziness, vomiting and weakness. High levels may lead to rapid respiration, unconsciousness, convulsions and fatality.

EFFECTS OF CHRONIC OVEREXPOSURE: Unknown to the best of our knowledge.

CARCINOGENICITY STATUS: None of the ingredients in this product is listed as a carcinogen pr suspected carcinogen by OSHA, NTP or IARC.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Due to its irritating properties, this product may aggravate preexisting skin diseases.

FIRST AID PROCEDURES FOR:

EYE CONTACT: Flush eyes with copious water for at least 15 minutes, ensuring thorough rinsing under eyelids. If irritation occurs or persists, seek prompt medical attention.

SKIN CONTACT: Remove contaminated clothing and wash skin with soap and water. If signs of irritation are evident, seek immediate medical attention. Wash clothing before reuse.

INHALATION: Remove victim to fresh air. If victim experiences continued breathing difficulties, administer oxygen until medical assistance can be rendered. If breathing stops, give artificial respiration and seek medical attention immediately.

INGESTION: If victim is conscious, give at least 2 glasses of water or milk to dilute in stomach. Induce vomiting by sticking finger down throat. Seek immediate medical attention.

SECTION VII - EXPOSURE CONTROL MEASURES

RESPIRATORY PROTECTION: Use a NIOSH-approved self-contained respirator under severe mist conditions. Otherwise, not normally required.

VENTILATION: Local ventilation recommended for plating operations.

PROTECTIVE GLOVES: Rubber, neoprene or PVC-coated.

EYE PROTECTION: Safety goggles or face shield.

*** MSDS continued on next page ***

SECTION VII - EXPOSURE CONTROL MEASURES (continued)

OTHER PROTECTIVE EQUIPMENT: Use of apron or coveralls and rubber/neoprene boots is also recommended.

EMERGENCY EQUIPMENT: Safety showers, eye wash, oxygen supply, cyanide poisoning and first and kits must be readily accessible at locations where this product is used.

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Wear safety equipment. Contain spill and absorb with inert material (sand, dust or diatomite). Sweep or shovel as much as possible into polyethylene container and isolate until material can be disposed of. Avoid rinsing spill areas directly into sewer. Rinse spill areas with copious water to waste treatment system.

WASTE DISPOSAL METHODS:

Dispose of in accordance with applicable local, state and federal regulations. Cyanides are dangerous to environment and should be detoxified by oxidation or alkaline chlorination prior to being released. Consult authorities to ascertain proper disposal procedures.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

This product contains low levels of cyanides. May be toxic or fatal if swallowed or upon prolonged contact with skin. Store in a cool, dry area, away from incompatible materials (See Section V). Protect from physical damage. Avoid breathing vapors or mists and contact with eyes and skin at all times. Always wear safety equipment when handling. Keep containers closed when not using.

OTHER PRECAUTIONS:

For industrial use only. Industrial chemicals are never to be taken internally. Use in a manner or application different than that described here or in the product's technical literature may result in a potential hazard to the user and result in serious injury!

****
* *
* NOTE: The data contained in this Material Safety Data Sheet apply only *
* to the product itself, not to the solutions in which it is used. *
* The user is urged to refer to the product's technical literature *
* to identify the solution's basic ingredients and to assess their *
* occupational hazards accordingly. *
* *
****

SECTION X - OTHER REGULATORY REQUIREMENTS

DEPARTMENT OF TRANSPORTATION (CFR 172.101)

PROPER SHIPPING NAME: Poison B liquid, n.o.s. UN 2810
HAZARD CLASS: POISON
DOT LABEL(S): POISON DOT PLACARD: POISON

TOXIC SUBSTANCES CONTROL ACT (TSCA): The chemical ingredients in this product are listed on the TSCA Inventory.

*** MSDS continued on next page ***

SECTION X - OTHER REGULATORY REQUIREMENTS (continued)

CALIFORNIA PROPOSITION 65: This product is not known to contain chemicals listed as being known to the State of California to cause cancer or birth defects or other reproductive harm, under the California Safe Drinking Water & Toxic Enforcement Act of 1986 (Proposition 65).

MASSACHUSETTS TOXIC SUBSTANCE LIST: This product does not contain ingredients listed on the Massachusetts Toxic Substance List (Ref. 6) besides the substances listed on the HAZARDOUS INGREDIENTS Section.

SECTION XI - DOCUMENTARY INFORMATION

EFFECTIVE DATE: 8/12/88 APPROVAL: (on file)
SUPERSEDES: 1/26/87

REFERENCES:
(1) 29 CFR 1910.1200, 29 CFR 1910.1000 (Subpart Z).
(2) TLV's And Biological Exposure Indeces for 1987-1988, ACGIH.
(3) IARC Monographs.
(4) Registry of Toxic Effects of Chemical Substances (RTECS), 1981-1982. NIOSH, June 1983.
RTECS, 1983-1985 Supplement to the 1981-1982 ed., NIOSH, November 1985.
(5) National Toxicology Program (NTP) Annual Report on Carcinogens.
(6) 105 CMR 670.000 3/31/86 - Massachusetts Toxic Substance List.
(7) Raw Material Safety Data Sheets.

HMIS HAZARD RATING:
4 = Severe hazard
3 = Serious hazard
2 = Moderate hazard
1 = Slight hazard
0 = Insignificant hazard

"*" on HEALTH indicates Chronic hazard

ABBREVIATIONS: > = greater than, < = less than, N/a = not applicable
ca. or ~ = approximately.

The information and recommendations contained herein are based upon data believed to be correct and are presented to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200). However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein or to the results to be obtained from their use thereof. Seller assumes no responsibility for injury to buyer or to third persons or for any damage to any property and buyer assumes all such risks.

*** End of MSDS ***

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MATERIAL SAFETY DATA SHEET

Page: 01
Date Printed: 04-13-1989

Identity: Silver Glo TY

SECTION I - GENERAL INFORMATION

Trade Name: Silver Glo TY
Product No.: 90003

Manufacturer: LeaRonal, Inc.
Address: 272 Buffalo Avenue
Freeport, N.Y. 11520

Emergency Number: CHEMTREC (800-424-9300)
(24 hours, day or night)
Product Information: (516) 868-8800

HMIS/NFPA HAZARD RATINGS:

Health:	1
Flammability:	0
Reactivity:	0
Personal Protection:	C

(See Sec. XI for meaning)

Chemical Family: Surfactant
End Use: Silver plating
Description: Aqueous solution of surfactants

SECTION II - HAZARDOUS INGREDIENTS

None according to the criteria of the OSHA Hazard Communication Standard [Ref. (1)].

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point @ 1 atm.:	Approx. 212 deg F
Evaporation Rate:	Slower than n-butyl acetate
Vapor Density:	Heavier than air
Specific Gravity @ 20 C:	Approx. 1.013
Percent volatiles:	Approx. 74 % by volume
Solubility in Water:	Miscible in all proportions
Acidity/alkalinity:	Slightly alkaline, pH = 7.5 - 8.0
Appearance and Odor:	Clear, colorless liquid. Virtually odorless.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flammability Class:	N/a, will not burn.
Flash Point:	N/a
Flammability Limits:	N/a
Extinguishing Media:	Water spray, alcohol foam, carbon dioxide, dry chemical.

SPECIAL FIRE FIGHTING PROCEDURES: Wear self-contained breathing apparatus and full turn-out gear.

UNUSUAL FIRE AND EXPLOSION HAZARDS: May emit toxic and irritating gases upon thermal decomposition at flame temperatures.

SECTION V - REACTIVITY DATA

Stability:	Stable
Conditions to Avoid:	Exposure to heat.
Incompatible Materials:	Strong oxidizing and reducing agents.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide.

HAZARDOUS POLYMERIZATION: Will not occur.
CONDITIONS TO AVOID HAZARDOUS POLYMERIZATION: None.

*** MSDS continued on next page ***

SECTION VI - HEALTH HAZARD DATA

PRIMARY ROUTES OF ENTRY/EXPOSURE: Eyes.

HEALTH HAZARDS - EFFECTS OF OVEREXPOSURE:

Eyes: As with any detergent, may cause mild, transient irritation.

Skin: As with any detergent, may cause mild transient irritation upon prolonged or widespread contact in individuals with hypersensitive skins.

Inhalation: No adverse effects expected from available information.

Ingestion: Industrial chemicals are never to be taken internally. As with any detergent, may cause gastrointestinal distress with nausea and vomiting.

EFFECTS OF CHRONIC OVEREXPOSURE: No adverse effects expected from available information.

CARCINOGENICITY REVIEW: This product is not considered to be a carcinogen according to criteria in Appendix A of the OSHA Hazard Communication Standard [Ref. (1)].

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Unknown to the best of our knowledge.

FIRST AID PROCEDURES FOR:

Eye Contact: Flush eyes with copious water for at least 15 minutes. If signs of irritation are evident, seek medical attention.

Skin Contact: Remove contaminated clothing and wash skin with soap and water. If signs of irritation are evident, seek medical attention.

Inhalation: Remove victim to fresh air. If victim experiences continued breathing difficulties, administer oxygen until medical assistance can be rendered. If breathing stops, give artificial respiration and seek medical attention immediately.

Ingestion: Give at least 2 glasses of water or milk to dilute and induce vomiting, unless victim is unconscious. Seek immediate medical advise and/or attention.

SECTION VII - EXPOSURE CONTROL MEASURES

RESPIRATORY PROTECTION: Use a NIOSH-approved cartridge respirator under severe mist conditions. Otherwise, not required.

Ventilation: Local ventilation for plating operations.
Protective Gloves: Rubber, neoprene or PVC-coated.
Eye Protection: Safety goggles.

OTHER PROTECTIVE EQUIPMENT: Use of apron or coveralls and rubber/neoprene boots is also recommended.

EMERGENCY EQUIPMENT: Safety showers, eye wash, oxygen supply and first aid kits must be readily accessible in areas where this product is used.

SECTION VIII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Wear safety equipment. Contain spill and absorb with inert material (sand, clay or diatomite). Sweep/shovel as much as possible into

*** MSDS continued on next page ***

SECTION VIII - SPILL OR LEAK PROCEDURES (continued)

polyethylene container and isolate until material can be disposed of. Rinse spill areas with copious water into waste treatment system.

WASTE DISPOSAL METHODS:

Dispose of in accordance with applicable local, state and federal regulations. Consult authorities to ascertain proper disposal procedures.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING:

As a norm of good industrial hygiene, avoid breathing vapors or mists and contact with eyes and skin. Always wear safety equipment when using.

Store in a cool, dry area, away from incompatible materials and from heat sources. Protect from physical damage.

OTHER PRECAUTIONS:

For industrial use only. Industrial chemicals are never to be taken internally. Use in a manner or application different than that described here or in the product's technical literature may result in a potential hazard to the user and result in serious injury!

NOTE: The data contained in this Material Safety Data Sheet apply only to the product itself, not to the solutions in which it is used. The user is urged to refer to the product's technical literature to identify the solution's basic ingredients and to assess their occupational hazards accordingly.

SECTION X - OTHER REGULATORY REQUIREMENTS

DEPARTMENT OF TRANSPORTATION (CFR 172.101)

PROPER SHIPPING NAME: None. Not regulated as a hazardous material.
HAZARD CLASS: None
DOT LABEL(S): Not required DOT PLACARD(S): Not required

TOXIC SUBSTANCES CONTROL ACT (TSCA): The chemical ingredients in this product are listed on the TSCA Inventory.

MASSACHUSETTS TOXIC SUBSTANCE LIST: This product does not contain ingredients listed on the Massachusetts Toxic Substance List (Ref. 6) besides the substances listed on the HAZARDOUS INGREDIENTS Section.

CALIFORNIA PROPOSITION 65: This product is not known to contain chemicals listed as being known to the State of California to cause cancer or birth defects or other reproductive harm, under the California Safe Drinking Water & Toxic Enforcement Act of 1986 (Proposition 65).

SECTION XI - DOCUMENTARY INFORMATION

EFFECTIVE DATE: 11/07/88 APPROVAL: (on file)
SUPERSEDES: 1/26/87

*** MSDS continued on next page ***

SECTION XI - DOCUMENTARY INFORMATION (continued)

REFERENCES:
(1) 29 CFR 1910.1200, 29 CFR 1910.1000 (Subpart Z).
(2) TLV's And Biological Exposure Indeces for 1987-1988, ACGIH.
(3) IARC Monographs.
(4) Registry of Toxic Effects of Chemical Substances (RTECS), 1981-1982. NIOSH, June 1983.
RTECS, 1983-1985 Supplement to the 1981-1982 ed., NIOSH, November 1985.
(5) National Toxicology Program (NTP) Annual Report on Carcinogens.
(6) 105 CMR 670.000 3/31/86 - Massachusetts Toxic Substance List.
(7) Raw Material Safety Data Sheets.

HMIS HAZARD RATING:
4 = Severe hazard
3 = Serious hazard
2 = Moderate hazard
1 = Slight hazard
0 = Insignificant hazard

"*" on HEALTH indicates Chronic hazard

ABBREVIATIONS: > = greater than, < = less than, N/a = not applicable
ca. or ~ = approximately.

The information and recommendations contained herein are based upon data believed to be correct and are presented to comply with the OSHA Hazard Communication Standard (29 CFR 1910.1200). However, no guarantee or warranty of any kind expressed or implied is made with respect to the information contained herein or to the results to be obtained from their use thereof. Seller assumes no responsibility for injury to buyer or to third persons or for any damage to any property and buyer assumes all such risks.

*** End of MSDS ***

BETZ LABORATORIES, INC
4636 SOMERTON ROAD, TREVOSE, PA. 19047
BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 1-800-877-1940

REAGENT . SILVER NITRATE * CODE 207 EFFECTIVE DATE 02-16-91
MASS REG.# PRINTED: 01-31-92
REVISIONS TO SECTIONS: -;EDIT:APPENDIX

REAGENT APPLICATION : FIELD TEST REAGENT

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC REAGENT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION. FOR MASSACHUSETTS, THE PERCENT OF HAZARDOUS INGREDIENT IN THE FORMULATION IS INDICATED BELOW.

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY OSHA REGULATIONS.

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: AS IS (APPROX.) 5.3	ODOR: NONE
FL.PT.(DEG.F): >200 SETA(CC)	SP.GR.(70F)OR DENSITY: 1.0
VAPOR PRESSURE(mmHG): ND	VAPOR DENSITY(AIR=1): ND
VISC cps70F: ND	%SOLUBILITY(WATER): 100
EVAP.RATE: <1 ETHER=1	APPEARANCE: COLORLESS
PHYSICAL STATE: LIQUID	FREEZE POINT(DEG.F): ND

-----SECTION 3----------REACTIVITY DATA----------

STABLE. BETZ TANK CLEAN-OUT CATEGORY 'A'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

REAGENT SILVER NITRATE

-----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE
SLIGHTLY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS ***
SLIGHTLY IRRITATING TO THE EYES

ACUTE RESPIRATORY EFFECTS ***
MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***
NO EVIDENCE OF POTENTIAL CHRONIC EFFECTS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
MAY CAUSE EYE,SKIN,AND/OR RESPIRATORY TRACT IRRITATION.

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DILUTE CONTENTS OF STOMACH.INDUCE VOMITING BY ONE OF THE STANDARD METHODS.IMMEDIATELY CONTACT A PHYSICIAN

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
GENERAL-VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL,OR ANY CONTAMINATED SOIL,SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.
SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
GENERAL-WATER CONTAMINATED WITH THIS REAGENT MAY BE SENT TO A SANITARY SEWER,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
REAGENT(AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).PROPER FIRE EXTINGUISHING MEDIA:
DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

REAGENT: SILVER NITRATE

-----SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT REAGENT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP CONTAINER CLOSED WHEN NOT IN USE.

DO NOT FREEZE.IF FROZEN,THAW AND MIX COMPLETELY PRIOR TO USE

HANDLING INSTRUCTIONS***

NORMAL CHEMICAL HANDLING

****

THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD

****

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD/UN#/ER GUIDE# IS: NOT APPLICABLE

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: NONE

...SARA SECTION 312 HAZARD CLASS: PRODUCT IS NONHAZARDOUS UNDER SECTION 311/312

NFPA/HMIS : HEALTH - 1 ; FIRE - 0 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - B

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: [redacted]
COMMON SYNONYMS: N/A
CHEMICAL FAMILY: VOLUMETRIC SOLUTIONS AND CONCENTRATES
FORMULA: AGNO3 IN H2O
FORMULA WT.: 169.87
CAS NO.: 7761-88-8
NIOSH/RTECS NO.: VW4725000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 5630

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

WARNING

CAUSES IRRITATION. HARMFUL IF SWALLOWED OR INHALED.
AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING DUST. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

CONTINUED ON PAGE: 2

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: ETHYL ACETATE
COMMON SYNONYMS: ACETIC ACID ETHYL ESTER; ETHYL ETHANOATE; ETHYL ACETIC ESTER
CHEMICAL FAMILY: ESTERS
FORMULA: CH3COOC2H5
FORMULA WT.: 88.11
CAS NO.: 141-78-6
NIOSH/RTECS NO.: AH5425000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 9282,9281,5541,9284,9279,9260,9280

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	4	EXTREME (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

U.S. PRECAUTIONARY LABELING

DANGER

EXTREMELY FLAMMABLE. CAUSES IRRITATION. HARMFUL IF SWALLOWED OR INHALED. KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

INTERNATIONAL LABELING

HIGHLY FLAMMABLE.

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SILVER NITRATE	7761-88-8	1-2	N/E	N/E
WATER	7732-18-5	98-99	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: N/A

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: N/A
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: 98
(21 C)

N/A

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. ODORLESS.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINQUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.

TOXIC GASES PRODUCED
OXIDES OF NITROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 0.01 MG/M3

TLV IS FOR SILVER, SOLUBLE COMPOUNDS, AS AG.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 0.01 MG/M3

PEL IS FOR SILVER, METAL, AND SOLUBLE COMPOUNDS, AS AG.

TOXICITY OF COMPONENTS

ORAL MOUSE LD50 FOR SILVER NITRATE	50	MG/KG
INTRAPERITONEAL MOUSE LD50 FOR SILVER NITRATE	22	MG/KG
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: IRRITATION OF UPPER RESPIRATORY TRACT

SKIN CONTACT: IRRITATION

EYE CONTACT: IRRITATION

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: IRRITATION AND BURNS TO MOUTH AND STOMACH

CHRONIC EFFECTS: NONE IDENTIFIED

TARGET ORGANS
NASAL SEPTUM, EYES, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, SKIN CONTACT, EYE CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. INDUCE VOMITING.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: NO FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EXTREMELY HAZARDOUS SUBSTANCE: NO
CERCLA HAZARDOUS SUBSTANCE: YES CONTAINS SILVER NITRATE (RQ = 1 LB)
TOXIC CHEMICALS: YES CONTAINS SILVER OR SILVER COMPOUNDS
GENERIC CLASS: C15
TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, LIGHT

INCOMPATIBLES: ORGANIC MATERIALS, COMBUSTIBLE MATERIALS, STRONG REDUCING AGENTS, STRONG BASES, ALKALIES, HALIDES

DECOMPOSITION PRODUCTS: OXIDES OF NITROGEN

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D011 (EP TOXIC WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

CONTINUED ON PAGE: 6

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT (CONTINUED)

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA# STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA. STORE IN LIGHT-RESISTANT CONTAINERS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: SILVER NITRATE
HAZARD CLASS: ORM-E
UN/NA: NA9188 REPORTABLE QUANTITY: 1 LBS.
LABELS: NONE
REGULATORY REFERENCES: 49CFR 172.101; 173.500; 173.510

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
MARINE POLLUTANTS: NO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

U.S. CUSTOMS HARMONIZATION NUMBER: 28432100002

CONTINUED ON PAGE: 7

==========

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

Nickel Sulphate

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1367

MATERIAL SAFETY DATA SHEET CAT 45240

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME CE Chemicals Inc.	EMERGENCY TELEPHONE NO. (201)-636-4300
ADDRESS (Number, Street, City, State, and ZIP Code) Arbor Street, Sewaren, N.J. 07077	
CHEMICAL NAME AND SYNONYMS Nickel Sulfate	TRADE NAME AND SYNONYMS Single Nickel Salt
CHEMICAL FAMILY	FORMULA $NiSO_4 \cdot 6H_2O$

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS Nickel	22.3				

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	2.07
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (_____ =1)	
SOLUBILITY IN WATER at 50	131g/100g	water	
APPEARANCE AND ODOR Green Crystals			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

J. J. COSTELLO
JUN 1 1976
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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE

EMERGENCY AND FIRST AID PROCEDURES Wash well with water then use soap & water.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY *(Materials to avoid)*

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Sweep up solid- spilled solutions to be washed with water.

WASTE DISPOSAL METHOD Lime will precipitate from a solution an insoluble solid which can be filtered and placed in a safe area. Meeting local, state and federal requirements.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)* Respirators

VENTILATION		
	LOCAL EXHAUST Remove dust	SPECIAL
	MECHANICAL *(General)*	OTHER

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves	Monogaggles

OTHER PROTECTIVE EQUIPMENT Rubber Gloves

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Store in clean dry area. Do not spill on floor etc.

OTHER PRECAUTIONS

TRW-02261

PHILIP[illegible] CHEMICALS, INC.
[illegible]. BOX N
[illegible] S. #02343

Form OSHA-20

0908-3642

REC'D H & H MAR 1 1982

Allied Chemical

PRODUCT SAFETY DATA SHEET

CHEMICALS COMPANY

Home & French

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	☒ C.A.S. NO. ☐ ALLIED PRODUCT CODE #
Soda Ash	497-19-8

CHEMICAL NAME
Sodium Carbonate

FORMULA	MOLECULAR WEIGHT
Na_2CO_3	105.99

COMPANY/PLANT ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)
Chemicals Company
P. O. Box 1139R
Morristown, N.J. 07960

CONTACT	PHONE NUMBER	ISSUED DATE	REVISED DATE
Director - Technical Service	(315) 487-4900	June 12, 1980	

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER
(201) 455-2000

Skin: Wash with plenty of water.
Eyes: Flush with plenty of water for at least 15 minutes and get medical attention.
Ingestion: Drink large quantity of water to dilute the material. Do not induce vomiting.
Get medical attention for irritation, ingestion or discomfort from inhalation.

C. HAZARDS INFORMATION

FIRE AND EXPLOSION

FLASH POINT °C	AUTO IGNITION TEMPERATURE °C	FLAMMABLE LIMITS IN AIR (% BY VOL.)
Not Flammable ☐ OPEN CUP ☐ CLOSED CUP	NA - Not Applicable	LOWER NA UPPER NA

UNUSUAL FIRE AND EXPLOSION HAZARDS

HEALTH

INHALATION
Inhalation of product dust may irritate nose, throat and lungs.

INGESTION
Although low in toxicity, ingestion can be harmful - consult a physician.
May irritate mouth, esophagus, stomach, etc.

SKIN
May cause skin irritation from prolonged contact.

EYES
May irritate or burn eyes.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J) No TLV established BIOLOGICAL

UNUSUAL CHRONIC TOXICITY

D. PRECAUTIONS/PROCEDURES

VENTILATION

Ventilation should maintain dust levels consistent with generally accepted industrial hygiene and housekeeping practices. Packaging and unloading areas and open processing equipment should be equipped with mechanical exhaust systems.

NORMAL HANDLING

When dissolving, add to water cautiously and with stirring; solutions can get hot.

STORAGE

Store in a cool, dry area away from acids. Prolonged storage may cause product to cake from atmospheric moisture.

PRECAUTIONARY LABEL ☐ ATTACHED ☒ NOT ATTACHED

Label warning statement: "Caution! May cause eye and skin irritation."

SPILL OR LEAK

Shovel up dry chemical and place in metal drum with a cover.
Cautiously spray residue with plenty of water. (See Section I for disposal methods.)

FIRE EXTINGUISHING AGENTS RECOMMENDED

NA

SPECIAL FIRE FIGHTING PRECAUTIONS

NA

FIRE EXTINGUISHING AGENTS TO AVOID

NA

SPECIAL PRECAUTIONS/PROCEDURES

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION

Where required, use a respirator approved by NIOSH for product dusts.

EYES AND FACE

As a minimum, wear hard hat and chemical safety goggles.
Do not wear contact lenses.

HANDS, ARMS, AND BODY

As a minimum, wear long-sleeve shirt and trousers, and gloves for routine product
. Cotton gloves permitted for dry product - impervious gloves when using solutions.

OTHER CLOTHING AND EQUIPMENT

TRW-02263

0908-3644

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS):	APPEARANCE AND ODOR	
☐ LIQUID ☒ SOLID ☐ GAS ☐ _____	White powder. Odorless.	
BOILING POINT °C MELTING POINT 854 °C	SPECIFIC GRAVITY (H_2O = 1) 2.533	VAPOR DENSITY (AIR = 1) NA
SOLUBILITY IN WATER (% by weight) 17% solution at 20°C	pH 1% solution; pH = 11.3	VAPOR PRESSURE (mm Hg at 20° C) NA
EVAPORATION RATE (Butyl Acetate = 1) NA	% VOLATILES BY VOLUME (At 20° C) NA	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	

INCOMPATIBILITY (MATERIALS TO AVOID)

Contact with acids will release carbon dioxide gas.

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT	%	HAZARD DATA (SEE SECT. J)
NA		

I. ENVIRONMENTAL

DEGRADABILITY	OCTANOL/WATER PARTITION COEFFICIENT

WASTE DISPOSAL METHODS*

Dissolve in water using caution as solution can get hot. Neutralize with acid and flush to sewer with plenty of water if permitted by applicable disposal regulations. Good ventilation is required during neutralization due to release of CO_2 gas. Neutralized waste may have to be disposed of by an approved contractor.

*DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS.

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

REGULATORY STANDARDS

DOT Classification - Not Regulated (49 CFR).

GENERAL

K. ADDITIONAL INFORMATION

This product is not for food or drug use.

TRW-02265

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730

[redacted]

PRODUCT SAFETY DATA SHEET SODIUM BISULFITE SOLUTION

A GENERAL INFORMATION

TRADE NAME (COMMON NAME)	☒ CAS NO ☐ GENERAL PRODUCT CODE #
[redacted]N	7631-90-5

CHEMICAL NAME AND/OR SYNONYM

Sodium bisulfite, aqueous solution

FORMULA	MOLECULAR WEIGHT
38% $NaHSO_3$ in water	104.06

ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)

GENERAL CHEMICAL CORPORATION
90 East Halsey Road
Parsippany, New Jersey 07054-0389

CONTACT	PHONE NUMBER	LAST ISSUE DATE	CURRENT ISSUE DATE
Manager, Product Safety	(201) 515-1840	Sept. 1986	May, 1988

B FIRST AID MEASURES

EMERGENCY PHONE NUMBER
[redacted]

Eyes: Immediately flush with plenty of water, for at least 15 minutes. Get medical attention.

Skin: Promptly wash with plenty of soap and water.

Inhalation: Remove to fresh air. Get medical assistance for irritation or any other symptoms.

Ingestion: If conscious, give plenty of water or milk. Induce vomiting by touching finger to back of throat. Get immediate medical attention.

C HAZARDS INFORMATION

HEALTH

INHALATION

Inhalation of mist may irritate respiratory tract.

INGESTION

May irritate gastrointestinal tract. Very large doses cause violent colic, diarrhea, depression, and death. Reference (b). May cause severe allergic reaction in some asthmatics and sulfite sensitive individuals.

SKIN

Repeated or prolonged contact with solution may cause irritation.

EYES

Solution contact will irritate the eyes. Long untreated exposures may cause burns.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J)	BIOLOGICAL
TLV: 5mg/m^3 (equivalent to 2ppm)	None

UNUSUAL CHRONIC TOXICITY

None known.

TRW-02266

0908-3647

FIRE AND EXPLOSION

FLASH POINT °C	AUTO IGNITION TEMPERATURE °C	FLAMMABLE LIMITS IN AIR (% BY VOL.)
Not flammable. ☐ OPEN CUP ☐ CLOSED CUP	Not applicable.	LOWER – Not Applicable UPPER – Not Applicable

UNUSUAL FIRE AND EXPLOSION HAZARDS

See Hazardous Decomposition Products, Section G.

D. PRECAUTIONS PROCEDURES

FIRE EXTINGUISHING AGENTS RECOMMENDED

Not applicable.

FIRE EXTINGUISHING AGENTS TO AVOID

Not applicable.

SPECIAL FIRE FIGHTING PRECAUTIONS

Wear NIOSH-approved self-contained breathing apparatus.

VENTILATION

Sufficient to eliminate mists and reduce SO_2 levels below TLV. Packaging, unloading and open processing areas should be equipped with mechanical exhaust system.

NORMAL HANDLING

Avoid contact with skin, eyes, clothing. Avoid breathing mist and/or SO_2 vapors. Use normal personal hygiene and housekeeping. Keep away from acids, oxidizing agents, and heat.

STORAGE

Cool, well-ventilated space away from acids and oxidizing agents. (Releases sulfur dioxide gas slowly at ambient temperatures—see odor, Section F.)

SPILL OR LEAK (ALWAYS WEAR PERSONAL PROTECTIVE EQUIPMENT – SECTION E)

Dilute small spills cautiously with water. Neutralize residue with alkali such as soda ash, lime or limestone. Sulfur dioxide and carbon dioxide may be released during neurtalization.

SPECIAL PRECAUTIONS/PROCEDURES/LABEL INSTRUCTIONS

SIGNAL WORD – WARNING!

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION

Where required, use a NIOSH-approved respirator for dust, mist, and/or sulfur dioxide gas, as conditions indicate. Some exposures may require NIOSH-approved self-contained breathing apparatus or supplied-air respirator.

EYES AND FACE

Wear hard hat (or other head covering) and chemical safety goggles. Do not wear contact lenses.

HANDS, ARMS, AND BODY

Wear impervious gloves and full work-clothing, including acid resistant apron, long-sleeved shirt and trousers.

OTHER CLOTHING AND EQUIPMENT

Safety shower and eye-wash station recommended.

TRW-02267

0908-3648

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS)	APPEARANCE AND ODOR	
☐ LIQUID ☒ SOLID ☐ GAS ☐ _____	Yellow liquid. Pungent sulfur dioxide gas odor.	
BOILING POINT 104— °C MELTING POINT NA— °C	SPECIFIC GRAVITY (H_2O = 1) 1.33 (for 38% solution)	VAPOR DENSITY (AIR = 1) Not applicable.
SOLUBILITY IN WATER (% by Weight) 100%	pH 4.3-4.5	VAPOR PRESSURE (mm Hg at 20°C) ☐ (PSIG) ☐ est 9 (SO_2)
EVAPORATION RATE (Butyl Acetate = 1) ☐ (Ether = 1) ☐ < 1	% VOLATILES BY VOLUME (At 20°C) Not applicable.	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	Temperatures at or near boiling (104 C) cause evolution of toxic and corrosive sulfur dioxide. (Sulfur dioxide also will evolve slowly at ambient temperatures.)

INCOMPATIBILITY (MATERIALS TO AVOID)

Oxidizers may cause strong exothermic reactions.
Acids yield sulfur dioxide gas, which is toxic and corrosive.

HAZARDOUS DECOMPOSITION PRODUCTS

Sulfur dioxide gas: see above comments.

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID.
☐ MAY OCCUR ☒ WILL NOT OCCUR	Not applicable.

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT/C.A.S. #	WT. %	HAZARD DATA (SEE SECT. J)
Not Applicable		

TRW-02268

I ENVIRONMENTAL

DEGRADABILITY/AQUATIC TOXICITY	OCTANOL/WATER PARTITION COEFFICIENT
Aquatic toxicity; 240 ppm/24, 48, & 96 hr/mosquito fish/TL_m/fresh water — Reference (b) (100% basis)	N.D.

EPA HAZARDOUS SUBSTANCE? (CLEAN WATER ACT SECT. 311) ☒ YES ☐ NO IF SO, REPORTABLE QUANTITY: 5000 # (As Sodium Bisulfite) — 40 CFR 116-117

WASTE DISPOSAL METHODS (DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS)

Neutralize with alkali and flush to sewer with plenty of water if permitted by applicable disposal regulations. Good ventilation is required during neutralization because of the release of SO_2 gas. Oxidation to sodium sulfate solution is required prior to disposal. This may be done by adding a slight excess of dilute hydrogen peroxide carefully and with stirring. Neutralized or oxidized waste may have to be disposed of by an approved contractor.

RCRA STATUS OF UNUSED MATERIAL IF DISCARDED	HAZARDOUS WASTE NUMBER: (IF APPLICABLE)	
Not a "hazardous waste".		40 CFR 261

J REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

(1) "Threshold Limit Values for Chemical Substances", ACGIH, 1984/85.

REGULATORY STANDARDS — D.O.T. CLASSIFICATION: Corrisive — 49 CFR 173*

DOT ID NO.: NA 2693

FDA regulations apply to use food and NF grades (21 CFR). Food use in meats or in food recognized as a source of vitamin B1 is prohibited (21 CFR 132.3766).

GENERAL

(a) ACGIH, Documentation of the Threshold Limit Values, 4th ED., 1981, Am. Conf. of Governmental Industrial Hygienists, Cincinnati 45202 — a review for this material with 4 references.
(b) Coast Guard CHRIS system form covering Sodium Bisulfite and Metabisulfite, "SBS", October, 1978.

K ADDITIONAL INFORMATION

None

PSDS FILE NO. GC 3011

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TRW-02269

0908-3650

REPORT NUMBER: 703
MSDS NO: P1669
EFFECTIVE DATE: 01/24/91

VAN WATERS & ROGERS INC.
MATERIAL SAFETY DATA SHEET

VERSION: 012

PRODUCT: SODIUM CHLORIDE

ORDER NO: 109758
PROD NO : 335520

TRW FASTENERS DIVISION
195 BINNEY STREET

CAMBRIDGE ,MA 02142

VAN WATERS & ROGERS INC. , SUBSIDIARY OF UNIVAR (206)889-3400
6100 CARILLON POINT , KIRKLAND , WA 98033

---------- EMERGENCY ASSISTANCE ----------

FOR EMERGENCY ASSISTANCE INVOLVING CHEMICALS CALL - CHEMTREC
(800)424-9300

---------- FOR PRODUCT AND SALES INFORMATION ----------

CONTACT YOUR LOCAL VAN WATERS & ROGERS BRANCH OFFICE AT
VW&R BOSTON 508-745-3700 SALEM , MA

----------PRODUCT IDENTIFICATION----------

PRODUCT NAME: SODIUM CHLORIDE CAS NO.: 7647-14-5

COMMON NAMES/SYNONYMS: SOLAR SALT; SALT; HALITE MSDS #: P1669
IRON-FIGHTER SALT PELLETS/BLOCKS
SALT EVAPORATED OILFIELD
SALT CG-90
SALT CULINOX 999 FCC GRAN

FORMULA: NA CL DATE ISSUED: 01/91

MOLECULAR WEIGHT: 58.44 SUPERCEDES: 11/90

NFPA RATING (704 CRITERIA) HMIS RATING

HEALTH: 1
FIRE: 0
REACTIVITY: 0
SPECIAL: NONE

HAZARD RATING SCALE
0=MINIMAL 3=SERIOUS
1=SLIGHT 4=SEVERE
2=MODERATE

HEALTH: 1
FIRE: 0
REACTIVITY: 0

----------HAZARDOUS INGREDIENTS----------

EXPOSURE LIMITS, PPM

0908-3651

TRW-02270

PRODUCT: SODIUM CHLORIDE

ORDER NO: 109758
PROD NO : 335530

COMPONENT	CAS NO.	%	OSHA PEL	ACGIH TLV	OTHER LIMIT	HAZARD
SODIUM CHLORIDE	7647-14-5	>99	NONE	NONE	NONE	NONE

PHYSICAL PROPERTIES

BOILING POINT, DEG F: 2575

MELTING POINT, DEG F: 1474

SPECIFIC GRAVITY (WATER=1): 2.16

VAPOR PRESSURE, MM HG: 2.4 @ 1344.42F

pH: 7-10 (20% SOLUTION)

VAPOR DENSITY (AIR=1): N/A

WATER SOLUBILITY, %: 35.7

EVAPORATION RATE (BUTYL ACETATE=1): N/A

% VOLATILE (BY VOLUME): NONE

APPEARANCE AND ODOR: ODORLESS WHITE CRYSTALLINE SOLID

FIRST AID MEASURES

IF INHALED: REMOVE TO FRESH AIR.

IN CASE OF EYE CONTACT: IMMEDIATELY FLUSH EYES WITH LOTS OF RUNNING WATER FOR 15 MINUTES, LIFTING THE UPPER AND LOWER EYELIDS OCCASIONALLY. TREAT AS MILD ALKALINE IRRITATION WITH BORIC ACID SOLUTION. GET IMMEDIATE MEDICAL ATTENTION.

IN CASE OF SKIN CONTACT: IMMEDIATELY WASH SKIN WITH LOTS OF SOAP AND WATER. REMOVE CONTAMINATED CLOTHING AND SHOES; WASH BEFORE REUSE. GET MEDICAL ATTENTION IF IRRITATION PERSISTS AFTER WASHING.

IF SWALLOWED: IF CONSCIOUS, IMMEDIATELY INDUCE VOMITING BY GIVING 2 GLASSES OF WATER AND STICKING A FINGER DOWN THE THROAT. GET IMMEDIATE MEDICAL ATTENTION. DO NOT GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSING PERSON.

HEALTH HAZARD INFORMATION

PRIMARY ROUTES OF EXPOSURE: SKIN OR EYE CONTACT, INHALATION.

PRODUCT: SODIUM CHLORIDE

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SIGNS AND SYMPTOMS OF EXPOSURE

INHALATION: BREATHING DUST MAY IRRITATE THE NOSE AND THROAT AND CAUSE COUGHING AND CHEST DISCOMFORT.

EYE CONTACT: DUSTS MAY IRRITATE THE EYES.

SKIN CONTACT: NO IRRITATION IS LIKELY AFTER BRIEF CONTACT BUT MAY BE IRRITATING AFTER PROLONGED CONTACT.

SWALLOWED: INGESTION OF LARGE AMOUNTS (GREATER THAN 0.1 POUND) MAY CAUSE GASTROINTESTINAL UPSET.

CHRONIC EFFECTS OF EXPOSURE: NO SPECIFIC INFORMATION AVAILABLE.

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE: NONE REPORTED.

----------TOXICITY DATA----------

ORAL: RATS LD50 = 3.75 G/KG

DERMAL: NO DATA FOUND

INHALATION: NO DATA FOUND

CARCINOGENICITY: THIS MATERIAL IS NOT CONSIDERED TO BE A CARCINOGEN BY THE NATIONAL TOXICOLOGY PROGRAM, THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER, OR THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION

OTHER DATA: NONE

----------ECOLOGICAL INFORMATION----------

PRODUCT IS MORGAME AND MAY PERSIST IN THE ENVIRONMENT.

----------PERSONAL PROTECTION----------

VENTILATION: GENERAL ROOM VENTILATION.

RESPIRATORY PROTECTION: IF USE CONDITIONS GENERATE DUSTS, WEAR A NIOSH-APPROVED RESPIRATOR APPROPRIATE FOR THOSE EMISSION LEVELS. APPROPRIATE RESPIRATORS MAY BE A FULL FACEPIECE OR A HALF MASK AIR-PURIFYING CARTRIDGE RESPIRATOR WITH PARTICULATE FILTERS, A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE, OR A SUPPLIED-AIR RESPIRATOR.

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EYE PROTECTION: CHEMICAL GOGGLES UNLESS A FULL FACEPIECE RESPIRATOR IS ALSO WORN. IT IS GENERALLY RECOGNIZED THAT CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH CHEMICALS BECAUSE CONTACT LENSES MAY CONTRIBUTE TO THE SEVERITY OF AN EYE INJURY.

PROTECTIVE CLOTHING: LONG-SLEEVED SHIRT, TROUSERS, SAFETY SHOES, RUBBER GLOVES, AND RUBBER APRON.

OTHER PROTECTIVE MEASURES: AN EYEWASH AND SAFETY SHOWER SHOULD BE NEARBY AND READY FOR USE.

FIRE AND EXPLOSION INFORMATION

FLASH POINT, DEG F: N/A
METHOD USED: N/A

FLAMMABLE LIMITS IN AIR, %
LOWER: N/A UPPER: N/A

AUTOIGNITION TEMPERATURE, DEG. F: 800

EXTINGUISHING MEDIA: THIS MATERIEL IS NOT COMBUSTIBLE. USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE FIGHTING PROCEDURES: USE WATER SPRAY TO COOL NEARBY CONTAINERS AND STRUCTURES EXPOSED TO FIRE.

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE.

HAZARDOUS REACTIVITY

STABILITY: STABLE

POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: WET/DAMP CONDITIONS CAN CAUSE CAKING AND CORROSION.

MATERIALS TO AVOID: OXIDIZERS

HAZARDOUS DECOMPOSITION PRODUCTS: NONE

TRW-02273

SPILL, LEAK, AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS OR LEAKS: WEAR PROTECTIVE EQUIPMENT INCLUDING RUBBER BOOTS, RUBBER GLOVES, RUBBER APRON, AND A SELF-CONTAINED BREATHING APPARATUS IN THE PRESSURE DEMAND MODE OR A SUPPLIED-AIR RESPIRATOR. IF THE SPILL OR LEAK IS SMALL, A FULL FACEPIECE AIR-PURIFYING CARTRIDGE RESPIRATOR EQUIPPED WITH PARTICULATE FILTERS MAY BE SATISFACTORY. IN ANY EVENT, ALWAYS WEAR EYE PROTECTION. FOR S

PRODUCT: SODIUM CHLORIDE

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SPILLS, SWEEP UP AND DISPOSE OF IN DOT-APPROVED WASTE CONTAINERS. FOR LARGE SPILLS, SHOVEL INTO DOT-APPROVED WASTE CONTAINERS. KEEP OUT OF SEWERS, STORM DRAINS, SURFACE WATERS, AND SOIL.

COMPLY WITH ALL APPLICABLE GOVERNMENTAL REGULATIONS ON SPILL REPORTING, AND HANDLING AND DISPOSAL OF WASTE.

DISPOSAL METHODS: DISPOSE OF CONTAMINATED PRODUCT AND MATERIALS USED IN CLEANING UP SPILLS OR LEAKS IN A MANNER APPROVED FOR THIS MATERIAL. CONSULT APPROPRIATE FEDERAL, STATE AND LOCAL REGULATORY AGENCIES TO ASCERTAIN PROPER DISPOSAL PROCEDURES.

NOTE: EMPTY CONTAINERS CAN HAVE RESIDUES, GASES AND MISTS AND ARE SUBJECT TO PROPER WASTE DISPOSAL, AS ABOVE.

----------SPECIAL PRECAUTIONS----------

STORAGE AND HANDLING PRECAUTIONS: STORE IN A COOL, DRY, WELL-VENTILATED PLACE AWAY FROM INCOMPATIBLE MATERIALS. KEEP BAGS OR FIBER DRUMS DRY AT ALL TIMES. WASH THOROUGHLY AFTER HANDLING. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING.

REPAIR AND MAINTENANCE PRECAUTIONS: NONE.

OTHER PRECAUTIONS: CONTAINERS, EVEN THOSE THAT HAVE BEEN EMPTIED, WILL RETAIN PRODUCT RESIDUE AND VAPORS. ALWAYS OBEY HAZARD WARNINGS AND HANDLE EMPTY CONTAINERS AS IF THEY WERE FULL.

----------OTHER REGULATORY INFORMATION----------

SECTION 313: NONE

PROPOSITION 65: SEE BELOW

SECTION 313 & PROP. 65: SEE BELOW

SECTION 313 (WITH CHEMICALS LISTED): NONE

PROPOSITION 65 (WITH CHEMICALS LISTED): THIS PRODUCT CONTAINS THE FOLLOWING CHEMICAL(S) CONSIDERED BY THE STATE OF CALIFORNIA'S SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT OF 1986 (PROPOSITION 65) AS CAUSING CANCER OR REPRODUCTIVE TOXICITY AND FOR WHICH WARNINGS ARE NOW REQUIRED:

CHEMICAL(s)	CAS NO.	XWT.
ARSENIC	7440-38-2	TRACES

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CADMIUM	7440-43-9	TRACES
CHROMIUM	7440-47-3	TRACES

MASSACHUSETTS: UNDER THE MASSACHUSETTS RIGHT-TO-KNOW-LAW, HAZARDOUS SUBSTANCES AND EXTRAORDINARILY HAZARDOUS SUBSTANCES COMPONENTS PRESENT IN THIS PRODUCT WHICH REQUIRES REPORTING ARE:

EXTRAORDINARILY HAZARDOUS SUBSTANCES

CHEMICALS (s)	CAS NO.	CONCENTRATION (>0.0001%)
ARSENIC	7440-38-2	TRACES
CADMIUM	7440-43-9	TRACES
CHROMIUM	7440-47-3	TRACES

PENNSYLVANIA: NONE

CALIFORNIA SCAQMD: NONE

TSCA: THE INGREDIENTS OF THIS PRODUCT ARE ON THE TSCA INVENTORY.

----------REVISION----------

11/89: REVISED FORMATTING CHANGES FOR COMPUTER CONVERSION ONLY.

06/90: ADDED MOLECULAR WEIGHT, HMIS RATING, AUTOIGNITION TEMPERATURE, pH, VAPOR PRESSURE, % VOLATILE, ECOLOGICAL INFORMATION, OTHER REGULATORY INFORMATION, CALIFORNIA SCAQMD & TSCA, AND MADE OTHER REVISIONS AS NECESSARY.

11/90: ADDED: SYNONYM

12/90: ADDED: SYNONYM

01/91: ADDED: SYNONYM

PRODUCT: SODIUM CHLORIDE

ORDER NO: 109758
PROD NO : 335520

FOR ADDITIONAL INFORMATION

CONTACT: MSDS COORDINATOR VW&R BOSTON
DURING BUSINESS HOURS, PACIFIC TIME (206)889-3400

05/06/92 14:43 PRODUCT: 335520 CUST NO: 176298 ORDER NO: 109758

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*** END OF MSDS ***

Thiokol/Ventron Division
Alfa Products

300754

MATERIAL SAFETY DATA SHEET

$Na_3C_6H_5O_7 \cdot {}^2H_2O$

Lab Experimental

APPROVED
JAN 26 1987
ENVIRONMENTAL ENGINEERING

PRODUCT NAME: Sodi[redacted] CAS# 68-04-2

CHEMICAL NATURE: Organic salt.

% ACTIVITY: 99%

I. PHYSICAL DATA

BOILING POINT, 760 mm Hg	Decomposes	Melting POINT	loses water at 150°C
SPECIFIC GRAVITY	No Data	VAPOR PRESSURE AT 20°C.	No Data
VAPOR DENSITY	No Data	SOLUBILITY IN H_2O	65g/100ml
PER CENT VOLATILES BY WEIGHT	Nonvolatile	IONIC NATURE	Yes
APPEARANCE AND ODOR	White crystals.		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Sodium citrate	99%	Not determined
ivn-mus LD_{50}: 170 mg/kg		
ivn-rbt LD_{50}: 449 mg/kg		
(NIOSH/RTECS 1981-82)		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	No Data	AUTOIGNITION TEMPERATURE		No Data	
FLAMMABLE LIMITS IN AIR, % by volume	No Data	LOWER		UPPER	

EXTINGUISHING MEDIA	Non flammable. Use water, carbon dioxide dry chemical extinguishing agents, dry extinguishing agents, dry sand, or dry ground dolomite.
SPECIAL FIRE FIGHTING PROCEDURES	No special firefighting procedures needed, use normal procedures which include wearing NIOSH/MSHA approved self-contained breathing apparatus, flame and chemical resistant clothing; hats, boots and gloves. If without risk, remove material from fire area. Cool containers with water from maximum distance.
UNUSUAL FIRE AND EXPLOSION HAZARDS	NONE

Thiokol/Ventron Division
Alfa Products, 152 Andover Street, Danvers, Massachusetts 01923
(617) 777-1970, (415) 836-1777 Telex: 94-0

MAY 1984

TRW-02277

0908-3658

Thiokol/Ventron Division
Alfa Products

300754

MATERIAL SAFETY DATA SHEET

$Na_3C_6H_5O_7 \cdot {}^2H_2O$

PRODUCT NAME: Sodium citrate CAS# 68-04-2

CHEMICAL NATURE: Organic salt.

% ACTIVITY: 99%

I. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	Decomposes	Melting POINT	loses water at 150°C
SPECIFIC GRAVITY	No Data	VAPOR PRESSURE AT 20°C.	No Data
VAPOR DENSITY	No Data	SOLUBILITY IN H_2O	65g/100ml
PER CENT VOLATILES BY WEIGHT	Nonvolatile	IONIC NATURE	Yes
APPEARANCE AND ODOR	White crystals.		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Sodium citrate	99%	Not determined
ivn-mus LD_{50}: 170 mg/kg		
ivn-rbt LD_{50}: 449 mg/kg		
(NIOSH/RTECS 1981-82)		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	No Data	AUTOIGNITION TEMPERATURE		No Data	
FLAMMABLE LIMITS IN AIR, % by volume	No Data	LOWER		UPPER	

	Non flammable.
EXTINGUISHING MEDIA	Use water, carbon dioxide dry chemical extinguishing agents, dry extinguishing agents, dry sand, or dry ground dolomite.
SPECIAL FIRE FIGHTING PROCEDURES	No special firefighting procedures needed, use normal procedures which include wearing NIOSH/MSHA approved self-contained breathing apparatus, flame and chemical resistant clothing; hats, boots and gloves. If without risk, remove material from fire area. Cool containers with water from maximum distance.
UNUSUAL FIRE AND EXPLOSION HAZARDS	NONE

Thiokol/Ventron Division
Alfa Products, 152 Andover Street, Danvers, Massachusetts 01923
(617) 777-1970, (415) 836-1777 Telex: 94-0378 ALFA DARS

MAY 1984

TRW-02278

0908-3659

7/2

DATE PREPARED 1/89

MATERIAL SAFETY DATA SHEET

CP CHEMICALS

[redacted] Inc.

Required under 29 CFR 1910, 1200

EMERGENCY HAZARD RATING

NFPA
4 - EXTREME
3 - HIGH
2 - MODERATE
1 - SLIGHT
0 - INSIGNIFICANT

FIRE 1 / HEALTH 4 / REACTIVITY 2 / SPECIFIC HAZARD *

[redacted] *KEEP AWAY FROM ACIDS AND OXIDIZING AGENTS.

SECTION I - PRODUCTION INFORMATION: SINGLE SUBSTANCE ☒ MIXTURE ☐

Chemical Name & CAS No. [redacted] CAS # [14264-31-4]

Trade Name & Synonyms [redacted]

Chemical Family: Soluble Inorganic Cyanide Salts

Chemical Formula: $CuCN.2NaCN.2H_2O$

SECTION II - HAZARDOUS INGREDIENTS AND/OR CHARACTERISTICS

$CuCN.2NaCN.2H_2O$ - CAS # [14264-31-4] - >98%

SECTION III - PHYSICAL DATA

Melting Point (°F)	400°C	Specific Gravity (H2O=1)	1.235
Boiling Point (°F)	NA	Percent Volatile by Volume (%)	65
Bulk Density (LBS/Per Cu/Ft.)	35	pH	12.5-13

Solubility in Water: Complete

Appearance and Odor: Off-white to yellowish powder. Faint almond odor (do not smell-poisonous)

SECTION IV - REACTIVITY DATA

Stability		Conditions to Avoid
	Unstable	
	Stable X	Heat

Incompatability (Materials to Avoid): Acids and oxidizing materials.

Hazardous Decomposition Products: Hydrogen Cyanide gas (poisonous & flammable).

Hazardous Polymerization			Conditions to Avoid
	May Occur	X	Release of HCN gas by reaction with acid.
	Will Not Occur		

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Flammable Limits	LeL	UeL
NA	NA	NA	NA

Extinguishing Media: Avoid acid, (CO_2) or oxidizing materials.

Special Fire Fighting Procedures: Do not use carbon dioxide type extinguishers. Alkaline dry chemical, water fog or foam. Avoid flushing to sewer. Wear self-contained breathing apparatus and complete protective clothing.

Unusual Fire and Explosion Hazards: Not combustible itself, but thermal decomposition acidification releases poisonous and flammable hydrogen cyanide gas.

0908-3660

DOT EMERGENCY RESPONSE GUIDE NO. 55

TRW-02279

SECTION VI - HEALTH HAZARD DATA

Exposure Limits

Cyanide (AS CN)

TLV: NDA TWA: Skin: 5 mg/m^3 ACGIH Ceiling: NDA

Effects of Overexposure

Acute: Poisoning from ingestion, absorption through injured skin or by inhalation of hydrogen cyanide liberated by action of carbon dioxide or other acids. Accute exposure can be fatal. Dry Salts can be corrosive to eyes, skin. Can cause dizziness, vomiting, rapid pulse/respiration.

Chronic: Headache, nausea, fatigue, weakness, lung conjestion, anorexia, conjunctivitis mental deterioration.

Medical Conditions aggravated by exposure

Conjunctivitis, dermatitis, respiratory diseases, allergies, anoxia or anemia, nervous disorders.

Emergency First Aid Procedures - for any exposure, get emergency medical assistance at once.

Eye: Immediately flush with plenty of water (under lids) for at least 15 minutes.

Skin: Remove contaminated clothing. Immediately wash with plenty of water. Cyanide may be absorbed through skin.

Inhalation: Remove to fresh air, have victim lie down. Start treatment immediately with Cyanide First Aid Kit (amyl nitrite inhalant). Remove contaminated clothing and keep victim warm.

Ingestion: Remove by emesis, if conscious, follow instructions for inhalation. Gastric lavage and/or catharsis should be delayed until *Antidotes are given.

OTHER HEALTH INFORMATION:

LISTED: ☐ Carcinogen ☐ Teratogen ☐ Mutagen ☒ Other Acute poison, fatal dose 50-60 mg.

SECTION VII - SPECIAL PROTECTION INFORMATION — PRODUCTION AND/OR MAINTENANCE OPERATIONS

Respiratory Protection (Specify Type)

NIOSH-approved respirator for cyanides.

Ventilation	Local Exhaust	Special
	Maintain TLV	Eye wash & shower stations
	Mechanical (General)	Other
	Recommended	Fresh Cyanide First Aid Kit: Eli-Lilly Item M76-NDC #0002-238-501

Protective Gloves: Neoprene

Eye Protection: Do not wear contact lenses. Wear chemical safety glasses.

Other Protective Equipment: Rubber boots, rubber apron.

SECTION VIII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled

Wear protective equipment. Cover with soda ash or lime; pick up dry for disposal. Wash contaminated area with hypochlorite solution to oxidixe residual cyanide.

Waste Disposal Method

As prescribed for Cyanides and heavy metals by local, state, and federal regulations. Do not flush to sewer or stream.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storing

Do not ship or store next to acids or oxidizing agents. Keep containers tightly closed. Keep away from food and beverages. Keep solutions alkaline.

Other Precautions

Avoid contact with eyes, skin or mucous membrane, do not breathe, do not swallow.

SECTION X - TRANSPORTATION DATA

Proper Shipping Name	RQ	Hazard Class	ID # (49CFR 172-101)
CYANIDE MIXTURE, DRY	(10/4.54)	POISON B	UN 1588

Label Requirement: POISON PLACARD: POISON

Special Information

* ANTIDOTES: Amyl Nitrite and Sodium Thiosulfate from Cyanide First Aid Kit

NA NOT APPLICABLE NDA NO DATA AVAILABLE < LESS THAN > MORE THAN

The information herein is believed to be reliable. However, no warranty, express or implied, is made as to its accuracy or completeness, and none is made as to the fitness of this material for any purpose. The manufacturer shall not be liable for damages to person or property resulting. Shall not be construed as a recommendation for use in violation of any patent.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME: CP Chemical Inc.	EMERGENCY TELEPHONE NO.: (201)-636-4300
ADDRESS (Number, Street, City, State, and ZIP Code): Arbor Street, Somerset, N.J. 07077	
CHEMICAL NAME AND SYNONYMS: Sodium Copper Cyanide Concentrate	TRADE NAME AND SYNONYMS:
CHEMICAL FAMILY: Cyanides	FORMULA:

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL Copper	11	
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
In contact with acids and oxydizing agents it may liberate some poisonous hydrogen cyanide gas.		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	Decomposes	SPECIFIC GRAVITY (H_2O=1)	1.250
VAPOR PRESSURE (mm Hg.)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (AIR=1)		EVAPORATION RATE (water =1)	1
SOLUBILITY IN WATER	Miscible		
APPEARANCE AND ODOR	Coloreless to yellowish liquid		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	Non-flammable	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA				
SPECIAL FIRE FIGHTING PROCEDURES	Do not use carbon dioxide type extinguishers.			
UNUSUAL FIRE AND EXPLOSION HAZARDS	None			

TRW-02281

0908-3662

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

EFFECTS OF OVEREXPOSURE Dizziness, confusion, headache, vomiting, then loss of consciousness.

EMERGENCY AND FIRST AID PROCEDURES Carry the patient to fresh air. Have him lie down. Remove contaminated clothing. Keep the patient warm. Start treatment immediately with cyanide first aid kit. Call physician.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		
	STABLE	X	

INCOMPATABILITY (Materials to avoid) Acids and oxydizing materials

HAZARDOUS DECOMPOSITION PRODUCTS Hydrogen cyanide

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Flush with plenty of water into a separate waste treatment system.

WASTE DISPOSAL METHOD As prescribed for cyanides and heavy metals by the local, state and federal regulations.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) Respirators of approved type

VENTILATION			
	LOCAL EXHAUST	Adequate ventilation	SPECIAL
	MECHANICAL (General)		OTHER

PROTECTIVE GLOVES	Rubber gauntlet	EYE PROTECTION	Chemical safety glasses

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING Do not ship or store next to strong acids or oxydizing agents.

OTHER PRECAUTIONS Avoid contact with eyes, skin or clothing.

TRW-02282

0908-3663

HAMPDEN
MATHIEU
CHEMICAL COMPANY
126 Memorial Drive
Springfield, MA 01101
Office: 413-732-2112
FAX: 413-736-7350
Outside Mass Dial
1-800-225-3546

Date June 1, 1989

Dear Customer:

Enclosed please find the Material Safety Data Sheets listed below:

Sodium Cyanide Solid

It would be greatly appreciated if you would fill out the following and return this letter to us as soon as possible.

HAMPDEN COLOR & CHEMICAL COMPANY expressly disclaims liability for any injury or loss arising out of the improper use of these materials above described.

TRW Fastners Division acknowledges receipt of
(Name of Company)

the above listed Material Safety Data Sheets from HAMPDEN COLOR & CHEMICAL COMPANY.

Thank you.

Kevin J. Donovan
Environmental Compliance
Specialist

Date

Signature

Title

711/712

MATERIAL SAFETY DATA SHEET

CPI CHEMICALS [redacted] Inc.

Required under 29 CFR 1910, 1200

DATE PREPARED 6/88

EMERGENCY HAZARD RATING

N F P A
4 - EXTREME
3 - HIGH
2 - MODERATE
1 - SLIGHT
0 - INSIGNIFICANT

FIRE 1 HEALTH 4 REACTIVITY 1 * SPECIFIC HAZARD

Arbor Street, Sewaren, NJ 07077 • 201-636-4300 • CHEMTREC 800-424-9300

*KEEP AWAY FROM ACIDS AND OXIDIZING AGENTS.

SECTION I - PRODUCTION INFORMATION: SINGLE SUBSTANCE ☒ MIXTURE ☐

Chemical Name & CAS No. SODIUM CYANIDE CAS # [143-33-9].

Trade Name & Synonyms: Cyanide of Soda (also sold as "Brik & Granular")

Chemical Family: Soluble Cyanides

Chemical Formula: NaCN

SECTION II - HAZARDOUS INGREDIENTS AND/OR CHARACTERISTICS

Sodium Cyanide - CAS # [143-33-9] - 98/99%.

FREDERICK GUMM CHEMICAL CO., INC.
20 Industrial Drive
Smithfield, R.I. 02917

SECTION III - PHYSICAL DATA

Melting Point (°F)	1040	Specific Gravity (H2O=1)	1.6
Boiling Point (°F)	2725	Percent Volatile by Volume (%)	NA
Bulk Density (LBS/Per Cu/Ft.)	50.8	pH	11.0

Solubility in Water: Slight

Appearance and Odor: White crystalline powder or lumps; (toxic) almond odor.

SECTION IV - REACTIVITY DATA

Stability: Unstable X; Stable

Conditions to Avoid: Exposure to air, heat steam.

Incompatability (Materials to Avoid): Reacts violently with acids. Contact with oxidizers may cause explosion. Iodine, fluorine, magnesium, alkaloids or chloral hydrate may cause explosion.

Hazardous Decomposition Products: Decomposes in water to release hydrogen cyanide unless highly caustic pH is maintained

Hazardous Polymerization: May Occur ; Will Not Occur X

Conditions to Avoid: NA

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used) NA	Flammable Limits NA	LeL NA	UeL NA

Extinguishing Media: (Do not use water; CO_2.) Alkaline dry chemical, water spray or foam.

Special Fire Fighting Procedures: Wear self-contained breathing apparatus and full protective clothing. Stay upwind, avoid contact with poisonous liquid or dried product. Dike fire control water for later disposal. Do not mix with acids or acidic water, CO_2, steam. If safe, remove containers from fire area.

Unusual Fire and Explosion Hazards: Not combustible itself, but thermal decomposition or acidification releases poisonous and flammable hydrogen cyanide gas.

DOT EMERGENCY RESPONSE GUIDE NO. 35

TRW-02284

0908-3665

...ION VI - HEALTH HAZARD DATA

OSHA/PEL

...posure Limits Cyanide (as CN) Cyanide (as CN)

TLV: 5 mg/m^3 (ACGIH) TWA: 5 mg/m^3 (skin) Ceiling: (ACGIH: HCN, 10 ppm

Effects of Overexposure Poisoning from ingestion, absorption through injured skin or by inhalation of hydrogen cyanide liberated by action of carbon dioxide or other acids. Accute exposure can be fatal. Strong solutions are corrosive to eyes, skin. Can cause dizziness, vomiting, rapid respiration, headache, rapid pulse.

Chronic Weakness, dizziness, lung congjestion, hoarseness, anorexia, conjunctivitis, mental deterioration, nasal perforation possible.

Medical Conditions aggravated by exposure

Conjunctivitis, dermatitis, respiratory diseases, allergies, anoxia or anemia, nervous disorders.

Emergency First Aid Procedures - for any exposure, get immediate medical help.

Eye Wash immediately with large amounts of water (under lids) at least 15-20 min

Skin Immediately remove contaminated clothing. Wash with soap or detergent and large amounts of water at least 15-20 mins. Cover any chemical burn area with sterile dressing.

Inhalation Remove to fresh air. Begin treatment immediately with amyl nitrate inhalant. Remove contaminated clothing and keep victim warm.

Ingestion Remove by emesis, if conscious, follow instructions for inhalation. See warning label on container.

OTHER HEALTH INFORMATION: Always keep fresh cyanide first aid kit on hand.

LISTED: ☐ Carcinogen ☐ Teratogen ☐ Mutagen ☒ Other NDA

SECTION VII - SPECIAL PROTECTION INFORMATION — PRODUCTION AND/OR MAINTENANCE OPERATIONS

Respiratory Protection (Specify Type)

NIOSH-Approved respirator for cyanides.

Ventilation	Local Exhaust	Special
	Maintain TLV/TWA	Eye wash & shower stations.
	Mechanical (General)	Other Fresh Cyanide First Aid kit:
	Recommended	Eli-Lilly Item #M76-NDC# 0002-238-501

Protective Gloves Neoprene

Eye Protection Do not wear contact lenses. Full face mask. Goggles.

...er Protective Equipment Rubber boots, rubber rain suit. Boots should be covered by pants. Pants/gloves should be covered by jacke

SECTION VIII - SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material is Released or Spilled

Wearing respirator, cover spilled solid with lime. Sweep up and store in tightly closed marked containers for disposal. Decontaminate area with hypochlorite solution to oxidize residual cyanide.

Waste Disposal Method

React cautiously with sodium hypochlorite solution at pH 8.5-10 to oxidize cyanide safely. Ensure complete reaction before sewering resulting salt (NaCl) soltuion. Observe local, state, and federal regulations.

SECTION IX - SPECIAL PRECAUTIONS

Precautions to be taken in Handling and Storing

Avoid contact. Keep container tightly closed. Store away from acids, oxidizers. Keep solutions alkaline. Do not store in aluminum or black iron plate receptacles. Keep away from food and beverages.

Other Precautions

High concentrations of HCN produces paralysis, unconsciousness, convulsions, and respiratory arrest. Exposure to 150 ppm for ½ to 1 hr. may endanger life. Death can result from a few minutes exposure to 300 ppm. Average fatal dose: 50-60 mg. Lesser concentrations: headache, vertigo nausea & vomiting.

SECTION X - TRANSPORTATION DATA:

Proper Shipping Name	RQ	Hazard Class	ID # (49CFR 172-101)
SODIUM CYANIDE, SOLID	10/4.54	POISON B	UN 1689

Label Requirement POISON

Special Information High toxicity after inhalation. Fairly high concentrations (when inhaled app. 200 ppm; orally 200-300 mg NaCN) cause immediate loss of consciousness and death.

NA = NOT APPLICABLE NDA = NO DATA AVAILABLE < = LESS THAN > = MORE THAN

The information herein is believed to be reliable. However, no warranty, express or implied, is made as to its accuracy or completeness, and none is made as to the fitness of this material for any purpose. The manufacturer shall not be liable for damages to person, or property resulting from its use. Nothing herein shall be construed as a recommendation for use in violation of any patent

FORM NO. 01 (8) 85

710/712

J.T. BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
MATERIAL SAFETY DATA SHEET
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM CYANIDE
COMMON SYNONYMS: HYDROCYANIC ACID, SODIUM SALT; CYANOGRAN
CHEMICAL FAMILY: INORGANIC SODIUM COMPOUNDS
FORMULA: NACN
FORMULA WT.: 49.01
CAS NO.: 143-33-9
NIOSH/RTECS NO.: VZ7525000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 3662

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	3	SEVERE (POISON)
FLAMMABILITY	-	0	NONE
REACTIVITY	-	2	MODERATE
CONTACT	-	3	SEVERE (LIFE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

POISON DANGER

CAUSES EYE BURNS. MAY IRRITATE SKIN. CONTACT WITH ACID LIBERATES POISONOUS GAS. MAY BE FATAL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN. EXCEPTIONAL HEALTH AND CONTACT HAZARDS: READ MATERIAL SAFETY DATA SHEET.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE GAS OR DUST. KEEP IN TIGHTLY CLOSED CONTAINER. STORE IN DRY AREA AWAY FROM ACIDS. SWEEP UP SPILLAGE. DO NOT FLUSH TO SEWER.

INTERNATIONAL LABELING

VERY TOXIC BY INHALATION, IN CONTACT WITH SKIN AND IF SWALLOWED. CONTACT WITH ACIDS LIBERATES VERY TOXIC GAS.

CONTINUED ON PAGE: 2

PRECAUTIONARY LABELING (CONTINUED)

KEEP LOCKED UP AND OUT OF REACH OF CHILDREN. KEEP CONTAINER TIGHTLY CLOSED. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF SOAP AND WATER. DO NOT EMPTY INTO DRAINS. IN CASE OF ACCIDENT OR IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE IMMEDIATELY (SHOW THE LABEL WHERE POSSIBLE).

SAF-T-DATA* STORAGE COLOR CODE: BLUE (HEALTH)

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SODIUM CYANIDE	143-33-9	90-100	N/E	5 MG/M3

SECTION III - PHYSICAL DATA

BOILING POINT: 1496 C (2724 F) (AT 760 MM HG)

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: 564 C (1047 F) (AT 760 MM HG)

VAPOR DENSITY (AIR=1): 1.7

SPECIFIC GRAVITY: 1.60 (H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): APPRECIABLE (>10%)

% VOLATILES BY VOLUME: 0 (21 C)

PH: 11.7 (25% SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: SOLID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: WHITE GRANULES.

CONTINUED ON PAGE: 3

Solubility in Water
37% @ 20°C (68°F)

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A NFPA 704M RATING: 3-0-0

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE WATER SPRAY, ALCOHOL FOAM, OR DRY CHEMICAL. DO NOT USE CARBON DIOXIDE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
GIVES OFF FLAMMABLE VAPORS. VAPORS MAY FORM EXPLOSIVE MIXTURE WITH AIR. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE.

TOXIC GASES PRODUCED
HYDROGEN CYANIDE

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 5 MG/M3

TLV (SKIN) IS FOR CYANIDES, AS CN.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 5 MG/M3

PEL IS FOR CYANIDES, AS CN.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR SODIUM CYANIDE 6.4 MG/KG
INTRAPERITONEAL RAT LD50 FOR SODIUM CYANIDE 4.3 MG/KG
CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

EFFECTS OF OVEREXPOSURE

INHALATION: MAY BE FATAL, CYANOSIS, UNCONSCIOUSNESS, HEADACHES, WEAKNESS, RAPID INEFFECTIVE BREATHING, LOW BLOOD PRESSURE, CONVULSIONS

SKIN CONTACT: SEVERE IRRITATION OR BURNS

EYE CONTACT: SEVERE IRRITATION OR BURNS

SKIN ABSORPTION: MAY BE FATAL

INGESTION: MAY BE FATAL, CYANOSIS, UNCONSCIOUSNESS, HEADACHE, NAUSEA, VOMITING, DIZZINESS, WEAKNESS, RAPID INEFFECTIVE BREATHING, LOW BLOOD PRESSURE, CONVULSIONS

CHRONIC EFFECTS: NONE IDENTIFIED

TARGET ORGANS
CARDIOVASCULAR SYSTEM, CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS, SKIN

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
CENTRAL NERVOUS SYSTEM DISORDERS, KIDNEY DISORDERS, RESPIRATORY SYSTEM DISEASE, THYROID DISORDERS, DAMAGED SKIN

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, ABSORPTION, SKIN CONTACT, EYE CONTACT

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. KEEP CYANIDE ANTIDOTE KIT ON HAND AT ALL TIMESIF SWALLOWED, IF UNCONSCIOUS, BREAK AN AMYL NITRITE PEARL IN A CLOTH AND HOLD LIGHTLY UNDER NOSE FOR 15 SECONDS. WHEN CONSCIOUSNESS RETURNS, INDUCE VOMITING.

INHALATION: IF INHALED, BREAK AN AMYL NITRITE PEARL IN A CLOTH AND HOLD LIGHTLY UNDER NOSE FOR 15 SECONDS. REPEAT 5 TIMES AT ABOUT 15 SECOND INTERVALS. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE:	YES	CONTAINS SODIUM CYANIDE (RQ = 10 LBS, TPQ = 100 LBS)
CERCLA HAZARDOUS SUBSTANCE:	YES	CONTAINS SODIUM CYANIDE (NA(CN)) (RQ = 10 LBS)
TOXIC CHEMICALS:	YES	CONTAINS CYANIDE COMPOUNDS
GENERIC CLASS:		C16
TSCA INVENTORY:	YES	

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG OXIDIZING AGENTS, STRONG ACIDS, WATER

DECOMPOSITION PRODUCTS: HYDROGEN CYANIDE

CONTINUED ON PAGE: 6

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.
USE WATER SPRAY TO REDUCE VAPORS.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: P106 (ACUTE HAZARDOUS WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A DUST/MIST RESPIRATOR IS RECOMMENDED. IF CONCENTRATION EXCEEDS CAPACITY OF RESPIRATOR, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: BLUE (HEALTH)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN SECURE POISON AREA. ISOLATE FROM INCOMPATIBLE MATERIALS.

CONTINUED ON PAGE: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: SODIUM CYANIDE, SOLID
HAZARD CLASS: POISON B
UN/NA: UN1689 REPORTABLE QUANTITY: 10 LBS.
LABELS: POISON
REGULATORY REFERENCES: 49CFR 172.101; 173.370

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: SODIUM CYANIDE
HAZARD CLASS: 6.1 I.M.O. PAGE: 6227
UN: UN1689 MARINE POLLUTANTS: YES PACKAGING GROUP: I
LABELS: POISON
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: SODIUM CYANIDE
HAZARD CLASS: 6.1
UN: UN1689 PACKAGING GROUP: I
LABELS: POISON
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

U.S. CUSTOMS HARMONIZATION NUMBER: 28371100002

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES

CONTINUED ON PAGE: 8

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ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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===
APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

5822

MATERIAL SAFETY DATA SHEET

For Assistance, Contact:
Regulatory Affairs Dept.
PO Box 907 Ames, IA

HACH SYNTHESIS
PO BOX 3723
CASPER, WY 82602

Emergency Telephone #
(515) 232-2533

I. PRODUCT IDENTIFICATION

CATALOG NUMBER: 5822 PRODUCT NAME: Sodium Diethyldithiocarbamate
CAS. NO: 20624-25-3 CHEMICAL NAME: Diethyldithiocarbamic Acid, Sodium Salt, Trihydrate
FORMULA: (C2H5)2NCS2Na·3H2O
CHEMICAL FAMILY: Substituted Organic Acids

II. INGREDIENTS

INGREDIENTS	%	TWA	CAS NUMBER	NATURE of HAZARD	RCRA
Sodium Diethyldithiocarbamate	≥95	None listed	20624-25-3	Moderately toxic; irritant	None
Impurities	<5	Not determined	Not available	Toxicity unknown; may cause irritation	None

III. PHYSICAL DATA

STATE: solid | APPEARANCE: Light yellow | ODOR: Not determined

SOLUBILITY IN: WATER: Soluble | ACID: Not determined | OTHER: Alcohol

BOILING PT.: NA | MELTING PT.: 94C | SPECIFIC GRAVITY: *1.1 | pH: of 5% soln = 10.2

VAPOR PRESSURE: Not applicable | VAPOR DENSITY (air=1): 5.1 | EVAPORATION RATE: NA

METAL CORROSIVITY - ALUMINUM: 0.0167 in/yr STEEL: ND | STABILITY: Stable

STORAGE PRECAUTIONS: Store tightly closed.

IV. FIRE, EXPLOSION HAZARD AND REACTIVITY DATA

FLASH PT.: Not applicable | METHOD: NA | FLAMMABILITY LIMITS - LOWER: NA UPPER: NA

SUSCEPTIBLITY TO SPONTANEOUS HEATING: None

SHOCK SENSITIVITY: None | AUTOIGNITION PT.: ND

EXTINGUISHING MEDIA: water, carbon dioxide, or dry chemical

FIRE/EXPLOSION HAZARDS: May emit toxic fumes

HAZARDOUS DECOMP. PRODUCTS: Very toxic fumes of NOx, SOx and Na2O

OXIDIZER: No | NFPA Codes Health: 3 Flammability: 1 Reactivity: 0

CONDITIONS TO AVOID: Heat, flames, oxidizers

V. HEALTH HAZARD DATA

THIS PRODUCT IS irritating to eyes, skin and respiratory tract.

ACUTE TOXICITY: Oral rat LD50 = 1500 mg/Kg = Moderately toxic
ROUTE OF MOST DETRIMENTAL EXPOSURE: Not determined
TARGET ORGANS: Not determined

CHRONIC TOXICITY: Not determined
ROUTE OF MOST DETRIMENTAL EXPOSURE: Not determined
TARGET ORGANS: Not determined

LONG-TERM EFFECTS: None
ROUTE OF EXPOSURE: Not applicable
TARGET ORGANS: Not applicable

OVEREXPOSURE: May cause irritation.

Hach Company
WORLD HEADQUARTERS
PO Box 389 Loveland, CO 80539

5822

Hach Europe
BP 51
B5000 Namur 1
Belgium

VI. PRECAUTIONARY MEASURES

Wash thoroughly after handling.
Avoid contact with eyes, skin and clothing.
Do not breathe chemicals.
Keep away from oxidizers.

PROTECTIVE EQUIPMENT: adequate ventilation, safety glasses, disposable gloves

VII. FIRST AID

EYE AND SKIN CONTACT: Immediately flush eyes with water for 15 minutes. Call physician. Flush skin with plenty of water.

INGESTION: Give large quantities of water. Give at least 1 ounce of vinegar in an equal amount of water. Induce vomiting by sticking finger down throat. Never give anything by mouth to an unconscious person. Call physician.

INHALATION: Remove to fresh air.

VIII. SPILL AND DISPOSAL PROCEDURES

IN CASE OF SPILL OR RELEASE: Cover the spill with excess sodium bicarbonate and vermiculite. Mix and scoop into a large beaker of water. When the reaction is complete pour down the drain with a large excess of water. Wash the site with a soap solution.

DISPOSE OF IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS.

IX. TRANSPORTATION DATA

PROPER SHIPPING NAME: Not Currently Regulated

HAZARD CLASS: Not applicable | ID: NA

DATE: 11/11/861 CHANGE NO.: 5902

X. REFERENCES

1) Sax, N. Irving. Dangerous Properties of Industrial Materials, 6th Ed. New York: Van Nostrand Reinhold Co. 1984.
2) The Merck Index, 10th Ed. Rahway, New Jersey: Merck and Co., Inc., 1983
3) Technical judgement
4) Vendor information.
5) TLV's Threshold Limit Values for Chemical Substances in the Work Environment Adopted by ACGIH for 1986-1987. Cincinnati, 1986.
6) In-house information
7)
8)

THE INFORMATION CONTAINED HEREIN IS BASED ON DATA CONSIDERED ACCURATE. HOWEVER, NO WARRANTY IS EXPRESSED OR IMPLIED REGARDING THE ACCURACY OF THESE DATA OR THE RESULTS TO BE OBTAINED FROM THE USE THEREOF.

P.O. NUMBER	INVOICE NUMBER	SALE DATE		CATALOG NUMBER	MSDS FORM/DOC NUMBER
D 4356	4121701	06/10/88	JT	V030-8	S3670

J. T. BAKER CHEMICAL CO. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

S3670 -01 SODIUM DODECYL SULFATE (SDS) PAGE: 1
EFFECTIVE: 10/28/85 ISSUED: 01/23/86

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: **SODIUM DODECYL SULFATE (SDS)**
FORMULA: CH3(CH2)11OSO3NA
FORMULA WT: 288.33
CAS NO.: 00151-21-3
NIOSH/RTECS NO.: WT1050000
COMMON SYNONYMS: SODIUM LAURYL SULFATE; TEXAPON L-100; DODECYL SODIUM SULFAT
PRODUCT CODES: V060,L050

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH - 1
FLAMMABILITY - 0
REACTIVITY - 1
CONTACT - 2

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT

PRECAUTIONARY LABEL STATEMENTS

WARNING
CAUSES IRRITATION
AVOID CONTACT WITH EYES, SKIN, CLOTHING.
KEEP IN TIGHTLY CLOSED CONTAINER. WASH THOROUGHLY AFTER HANDLING.

SECTION II - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
SODIUM DODECYL SULFATE	90-100	151-21-3

SECTION III - PHYSICAL DATA

BOILING POINT: [illegible] VAPOR PRESSURE(MM HG): N/A

MELTING POINT: N/A VAPOR DENSITY(AIR=1): N/A

SPECIFIC GRAVITY: N/A (H2O=1) EVAPORATION RATE: N/A (BUTYL ACETATE=1)

SOLUBILITY(H2O): APPRECIABLE (MORE THAN 10 %) % VOLATILES BY VOLUME: 0

APPEARANCE & ODOR: WHITE OR CREAM-COLORED CRYSTALS OR POWDER.

CONTINUED ON PAGE: 2

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SECTION V - HEALTH HAZARD DATA

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 1288
LD50 (IPR-RAT)(MG/KG) - 210

EFFECTS OF OVEREXPOSURE
NO EFFECTS OF OVEREXPOSURE WERE DOCUMENTED.

EMERGENCY AND FIRST AID PROCEDURES
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES. FLUSH SKIN WITH WATER.

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: MOISTURE

INCOMPATIBLES: STRONG ACIDS

SECTION VII - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

DISPOSAL PROCEDURES
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

SECTION VIII - PROTECTIVE EQUIPMENT

VENTILATION: USE ADEQUATE GENERAL OR LOCAL EXHAUST VENTILATION TO KEEP FUME OR DUST LEVELS AS LOW AS POSSIBLE.

RESPIRATORY PROTECTION: NONE REQUIRED WHERE ADEQUATE VENTILATION CONDITIONS EXIST. IF AIRBORNE CONCENTRATION IS HIGH, USE AN APPROPRIATE RESPIRATOR OR DUST MASK.

EYE/SKIN PROTECTION: SAFETY GLASSES WITH SIDESHIELDS, UNIFORM, PROPER GLOVES ARE RECOMMENDED.

CONTINUED ON PAGE: 3

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: ORANGE

SPECIAL PRECAUTIONS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME CHEMICALS, N.O.S.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME CHEMICALS, N.O.S.

(TM) AND (R) DESIGNATE TRADEMARKS.
N/A = NOT APPLICABLE OR NOT AVAILABLE

THE INFORMATION PUBLISHED IN THIS MATERIAL SAFETY DATA SHEET HAS BEEN COMPILED FROM OUR EXPERIENCE AND DATA PRESENTED IN VARIOUS TECHNICAL PUBLICATIONS. IT IS THE USER'S RESPONSIBILITY TO DETERMINE THE SUITABILITY OF THIS INFORMATION FOR THE ADOPTION OF NECESSARY SAFETY PRECAUTIONS. WE RESERVE THE RIGHT TO REVISE MATERIAL SAFETY DATA SHEETS PERIODICALLY AS NEW INFORMATION BECOMES AVAILABLE.

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SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR
SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR
SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC
CHEMICAL DIVISION
1 REAGENT LANE
FAIR LAWN NJ 07410
(201) 796-7100

EMERGENCY NUMBER: (201) 796-7100
CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 1310-73-2
SUBSTANCE: **SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR**

TRADE NAMES/SYNONYMS:
CAUSTIC SODA; SODA LYE; LYE; WHITE CAUSTIC; CAUSTIC SODA, BEAD; CAUSTIC SODA, DRY; CAUSTIC SODA, FLAKE; CAUSTIC SODA, GRANULAR; CAUSTIC SODA, SOLID; SODIUM HYDRATE; SODIUM HYDROXIDE (NA(OH)); SODIUM HYDROXIDE, FLAKE; SODIUM HYDROXIDE, DRY; SODIUM HYDROXIDE, SOLID; ASCARITE; SODIUM HYDROXIDE; S318; S613; S320; S612; BP359; UN 1823; STCC 4935235; NAOH; ACC21300

CHEMICAL FAMILY:
INORGANIC BASE

MOLECULAR FORMULA: NA-O-H

MOLECULAR WEIGHT: 40.00

CERCLA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=0
NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=1

COMPONENTS AND CONTAMINANTS

COMPONENT: SODIUM HYDROXIDE PERCENT: 100
CAS# 1310 73-2

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:
SODIUM HYDROXIDE:
2 MG/M3 OSHA CEILING
2 MG/M3 ACGIH CEILING
2 MG/M3 NIOSH RECOMMENDED CEILING
2 MG/M3 DFG MAK TWA (TOTAL DUST);
4 MG/M3 DFG MAK 5 MINUTE PEAK, MOMENTARY VALUE, 8 TIMES/SHIFT

MEASUREMENT METHOD. PARTICULATE FILTER; HYDROCHLORIC ACID; TITRATION; (NIOSH VOL. III # 7401, ALKALINE DUSTS).

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

OSHA REVOKED THE FINAL RULE LIMITS OF JANUARY 19, 1989 IN RESPONSE TO THE 11TH CIRCUIT COURT OF APPEALS DECISION (AFL-CIO V. OSHA) EFFECTIVE JUNE 30, 1993 SEE 29 CFR 1910.1000 (58 FR 35338)

PHYSICAL DATA

DESCRIPTION: ODORLESS, WHITE OR OFF-WHITE HYGROSCOPIC SOLID.

BOILING POINT: 2534 F (1390 C) MELTING POINT: 604 F (318 C)

SPECIFIC GRAVITY: 2.130 VAPOR PRESSURE: 100 MMHG @ 1111 C

PH: 14 @ 5% SOLUTION SOLUBILITY IN WATER: 111 %

SOLVENT SOLUBILITY: SOLUBLE IN ALCOHOL, GLYCEROL; INSOLUBLE ACETONE, ETHER.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:
NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

FIREFIGHTING MEDIA:

DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5).

FIREFIGHTING:
MOVE CONTAINER FROM FIRE AREA IF YOU CAN DO IT WITHOUT RISK. APPLY COOLING WATER TO SIDES OF CONTAINERS THAT ARE EXPOSED TO FLAMES UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM ENDS OF TANKS (1990 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.5, GUIDE PAGE 60).

USE AGENT SUITABLE FOR TYPE OF FIRE. USE WATER IN FLOODING QUANTITIES AS FOG. APPLY WATER FROM AS FAR A DISTANCE AS POSSIBLE.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49-CFR 172.101:
CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49-CFR 172.101 AND SUBPART E:
CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49 CFR 173.245B
EXCEPTIONS: 49-CFR 173.244

FINAL RULE ON HAZARDOUS MATERIALS REGULATIONS (HMR, 49 CFR PARTS 171-180), DOCKET NUMBERS HM-181, HM-181A, HM-181B, HM-181C, HM-181D AND HM-204. EFFECTIVE DATE OCTOBER 1, 1991. HOWEVER, COMPLIANCE WITH THE REGULATIONS IS AUTHORIZED ON AND AFTER JANUARY 1, 1991. (55 FR 52402, 12/21/90)

EXCEPT FOR EXPLOSIVES, INHALATION HAZARDS, AND INFECTIOUS SUBSTANCES, THE EFFECTIVE DATE FOR HAZARD COMMUNICATION REQUIREMENTS IS EXTENDED TO OCTOBER 1, 1993. (56 FR 47158, 09/18/91)

U.S. DEPARTMENT OF TRANSPORTATION SHIPPING NAME-ID NUMBER, 49 CFR 172.101:
SODIUM HYDROXIDE, SOLID-UN 1823

U.S. DEPARTMENT OF TRANSPORTATION HAZARD CLASS OR DIVISION, 49 CFR 172.101:
8 - CORROSIVE MATERIAL

U.S. DEPARTMENT OF TRANSPORTATION PACKING GROUP, 49 CFR 172.101:
PG II

U.S. DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS, 49 CFR 172.101 AND SUBPART E:
CORROSIVE

U.S. DEPARTMENT OF TRANSPORTATION PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.154
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.240

U.S. DEPARTMENT OF TRANSPORTATION QUANTITY LIMITATIONS 49 CFR 172.101:
PASSENGER AIRCRAFT OR RAILCAR: 15 KG
CARGO AIRCRAFT ONLY: 50 KG

TOXICITY

SODIUM HYDROXIDE:
IRRITATION DATA: 500 MG/24 HOURS SKIN-RABBIT SEVERE; 1% EYE RABBIT SEVERE; 50 UG/24 HOURS EYE-RABBIT SEVERE; 1 MG/24 HOURS EYE-RABBIT SEVERE, 400 UG EYE-RABBIT MILD; 1 MG/30 SECONDS RINSED EYE-RABBIT SEVERE; 1%/24 HOURS EYE-MONKEY SEVERE.
TOXICITY DATA: 1350 MG/KG SKIN-RABBIT LD50 (VAN WATERS & ROGERS INC. MSDS); 500 MG/KG ORAL-RABBIT LDLO; 104-340 MG/KG ORAL-RAT LD50 (VAN WATERS & ROGERS INC. MSDS); 40 MG/KG INTRAPERITONEAL-MOUSE LD50; MUTAGENIC DATA (RTECS).
CARCINOGEN STATUS: NONE.
LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYE, INGESTION.
ACUTE TOXICITY LEVEL: TOXIC BY INGESTION; MODERATELY TOXIC BY DERMAL ABSORPTION.
TARGET EFFECTS. NO DATA AVAILABLE.
AT INCREASED RISK FROM EXPOSURE: PERSONS WITH PRE-EXISTING SKIN AND EYE CONDITIONS.

HEALTH EFFECTS AND FIRST AID

INHALATION:
SODIUM HYDROXIDE:
CORROSIVE. 250 MG/M3 IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.
ACUTE EXPOSURE- EFFECTS DUE TO INHALATION OF DUSTS OR MIST MAY VARY FROM MILD IRRITATION OF THE NOSE AT 2 MG/M3 TO SEVERE PNEUMONITIS DEPENDING ON THE SEVERITY OF EXPOSURE. LOW CONCENTRATIONS MAY CAUSE MUCOUS MEMBRANE IRRITATION WITH SORE THROAT, COUGHING, AND DYSPNEA. INTENSE EXPOSURES MAY RESULT IN DESTRUCTION OF MUCOUS MEMBRANES AND DELAYED PULMONARY EDEMA OR PNEUMONITIS. SHOCK MAY OCCUR.

0908-3681
TRW-02300

CHRONIC EXPOSURE- PROLONGED EXPOSURES TO HIGH CONCENTRATIONS OF DUSTS OR MISTS MAY CAUSE DISCOMFORT AND ULCERATION OF THE NASAL PASSAGES. REPEATED EXPOSURES OF 5000 MG/L WERE HARMLESS TO RATS, BUT 10,000 MG/L LED TO NERVOUSNESS, SORE EYES, DIARRHEA AND RETARDED GROWTH. RATS EXPOSED 30 MINUTES/DAY TO UNMEASURED CONCENTRATIONS OF SODIUM HYDROXIDE AEROSOLS SUFFERED PULMONARY DAMAGE AFTER 2-3 MONTHS. DEATH OCCURRED IN 2 OF 10 RATS EXPOSED TO AN AEROSOL OF 40% AQUEOUS SODIUM HYDROXIDE FOR 30 MINUTES, TWICE A WEEK FOR 3 WEEKS. HISTOPATHOLOGICAL EXAMINATION SHOWED MOSTLY NORMAL LUNG TISSUE WITH FOCI OF ENLARGED ALVEOLAR SEPTAE, EMPHYSEMA, BRONCHIAL ULCERATION, AND ENLARGED LYMPH ADENOIDAL TISSUES. AN EPIDEMIOLOGIC STUDY OF 291 WORKERS CHRONICALLY EXPOSED TO CAUSTIC DUSTS FOR 30 YEARS OR MORE FOUND NO SIGNIFICANT INCREASE IN MORTALITY IN RELATION TO DURATION OR INTENSITY OF SUCH EXPOSURES.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:
SODIUM HYDROXIDE:
CORROSIVE.
ACUTE EXPOSURE- UPON CONTACT WITH THE SKIN, DAMAGE INCLUDING REDNESS, CUTANEOUS BURNS, SKIN FISSURES AND WHITE ESCHARS MAY OCCUR WITHOUT IMMEDIATE PAIN. EXPOSURE TO SOLUTIONS AS WEAK AS 0.03 N (0.12%) FOR 1 HOUR HAS CAUSED INJURY TO HEALTHY SKIN. SOLUTIONS OF 25-50% CAUSED NO SENSATION OF IRRITATION WITHIN 3 MINUTES IN HUMAN SUBJECTS. WITH SOLUTIONS OF 0.4-4%, IRRITATION DOES NOT OCCUR UNTIL AFTER SEVERAL HOURS. SKIN BIOPSIES FROM HUMAN SUBJECTS HAVING 1 N SODIUM HYDROXIDE APPLIED TO THEIR ARMS FOR 15 TO 180 MINUTES SHOWED PROGRESSIVE CHANGES BEGINNING WITH DISSOLUTION OF THE CELLS IN THE HORNY LAYER AND PROGRESSING THROUGH EDEMA TO TOTAL DESTRUCTION OF THE EPIDERMIS IN 60 MINUTES. A 5% AQUEOUS SOLUTION CAUSED SEVERE NECROSIS TO THE SKIN OF RABBITS WHEN APPLIED FOR 4 HOURS. ALKALIES PENETRATE THE SKIN SLOWLY. THE EXTENT OF INJURY DEPENDS ON THE DURATION OF CONTACT. IF SODIUM HYDROXIDE IS NOT REMOVED FROM THE SKIN, SEVERE BURNS WITH DEEP ULCERATION MAY OCCUR. EXPOSURE TO THE DUST OR MIST MAY CAUSE MULTIPLE SMALL BURNS AND TEMPORARY LOSS OF HAIR. PATHOLOGIC FINDINGS DUE TO ALKALIES MAY INCLUDE GELATINOUS, NECROTIC AREAS AT THE SITE OF CONTACT.
CHRONIC EXPOSURE- EFFECTS ARE DEPENDENT UPON CONCENTRATION AND DURATION OF EXPOSURE. DERMATITIS OR EFFECTS SIMILAR TO THOSE FOR ACUTE EXPOSURE MAY OCCUR.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:
SODIUM HYDROXIDE:
CORROSIVE
ACUTE EXPOSURE- CONTACT MAY CAUSE DISINTEGRATION AND SLOUGHING OF CONJUNCTIVAL AND CORNEAL EPITHELIUM, CORNEAL OPACIFICATION, MARKED EDEMA AND ULCERATION. AFTER 7 TO 13 DAYS EITHER GRADUAL RECOVERY BEGINS OR THERE IS PROGRESSION OF ULCERATION AND CORNEAL OPACIFICATION. COMPLICATIONS OF SEVERE EYE BURNS ARE SYMBLEPHARON WITH OVERGROWTH OF THE CORNEA BY A VASCULARIZED MEMBRANE, PROGRESSIVE OR RECURRENT CORNEAL ULCERATION AND PERMANENT CORNEAL OPACIFICATION. BLINDNESS MAY OCCUR.
CHRONIC EXPOSURE- EFFECTS ARE DEPENDENT UPON CONCENTRATION AND DURATION OF EXPOSURE. CONJUNCTIVITIS OR EFFECTS SIMILAR TO THOSE FOR ACUTE EXPOSURE MAY OCCUR.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:
SODIUM HYDROXIDE:
CORROSIVE/TOXIC.
ACUTE EXPOSURE- THE REPORTED LETHAL DOSE IN RATS IS 140-340 MG/KG. INGESTION MAY CAUSE A BURNING SENSATION IN THE MOUTH, CORROSION OF THE LIPS, MOUTH, TONGUE AND PHARYNX, AND SEVERE ESOPHAGEAL AND ABDOMINAL PAIN, VOMITING OF BLOOD AND LARGE PIECES OF MUCOSA, AND BLOODY DIARRHEA. ASPHYXIA CAN OCCUR FROM SWELLING OF THE THROAT. MEDIASTINITIS, ALKALEMIA, PALLOR, WEAK, SLOW PULSE, CARDIOVASCULAR COLLAPSE, SHOCK, COMA AND DEATH MAY OCCUR. PERFORATION OF THE ALIMENTARY TRACT AND CONSTRICTIVE SCARRING MAY RESULT. ESOPHAGEAL STRICTURE MAY OCCUR WEEKS, MONTHS, OR EVEN YEARS LATER TO MAKE SWALLOWING DIFFICULT. THE ESTIMATED FATAL DOSE IN MAN IS 5 GRAMS. CASES OF SQUAMOUS CELL CARCINOMA OF THE ESOPHAGUS HAVE OCCURRED WITH LATENT PERIODS OF 12 TO 42 YEARS AFTER INGESTION. THESE CANCERS WERE BELIEVED TO BE SEQUELA OF TISSUE DESTRUCTION AND POSSIBLY SCAR FORMATION RATHER THAN THE RESULT OF DIRECT CARCINOGENIC ACTION OF SODIUM HYDROXIDE.
CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION OF ALKALINE SUBSTANCES MAY RESULT IN INFLAMMATORY AND ULCERATIVE EFFECTS ON

THE ORAL MUCOUS MEMBRANES AND OTHER EFFECTS AS WITH ACUTE INGESTION.

FIRST AID. DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ALKALI BY GIVING WATER OR MILK TO DRINK IMMEDIATELY AND ALLOWING VOMITING TO OCCUR. AS SOON AS POSSIBLE, HAVE QUALIFIED MEDICAL PERSONNEL DO ESOPHAGOSCOPY AND IRRIGATE INJURED AREAS WITH 1% ACETIC ACID UNTIL THE ALKALI IS COMPLETELY NEUTRALIZED. (DREISBACH, HANDBOOK OF POISONING, 11TH EDITION). GET MEDICAL ATTENTION IMMEDIATELY.

ANTIDOTE:
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

REACTIVITY

REACTIVITY:
REACTS EXOTHERMICALLY WITH WATER.

INCOMPATIBILITIES:
SODIUM HYDROXIDE:
ACETALDEHYDE: MAY RESULT IN VIOLENT POLYMERIZATION.
ACETIC ACID: MIXING IN CLOSED CONTAINER INCREASES TEMPERATURE AND PRESSURE.
ACETIC ANHYDRIDE: MIXING IN A CLOSED CONTAINER INCREASES TEMPERATURE AND PRESSURE.
ACIDS: MAY REACT VIOLENTLY.
ACROLEIN: MAY RESULT IN AN EXTREMELY VIOLENT POLYMERIZATION.
ACRYLONITRILE: MAY CAUSE VIOLENT POLYMERIZATION.
ALLYL ALCOHOL + BENZENE SULFONYL CHLORIDE: POSSIBLE EXPLOSION HAZARD.
ALLYL CHLORIDE: HYDROLYZES.
ALUMINUM: VIGOROUS REACTION.
ALUMINUM, ARSENIC TRIOXIDE, SODIUM ARSENATE: MAY GENERATE FLAMMABLE HYDROGEN GAS.
AMMONIA + SILVER NITRATE: PRECIPITATION OF EXPLOSIVE SILVER NITRIDE MAY OCCUR.
AMMONIUM SALTS: MAY REACT VIOLENTLY EVOLVING AMMONIA GAS
BENZENE-1,4-DIOL: EXOTHERMIC REACTION.
N,N'-BIS(TRINITROETHYL)UREA: FORMATION OF EXPLOSIVE COMPOUND
BROMINE: POSSIBLE EXPLOSION IF NOT STIRRED CONTINOUSLY.
CHLORINE TRIFLUORIDE: MAY CAUSE VIOLENT REACTION.
CHLOROFORM + METHYL ALCOHOL: EXOTHERMIC REACTION.
CHLOROHYDRIN: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
4-CHLORO-2-METHYLPHENOL: POSSIBLE IGNITION.
CHLORONITROTOLUENES: POSSIBLE EXPLOSION.
CHLOROPICRIN: MAY CAUSE VIOLENT REACTION.
CHLOROSULFONIC ACID: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
CINNAMALDEHYDE: EXOTHERMIC REACTION.
COATINGS: MAY BE ATTACKED.
COPPER: SOLUTIONS MAY SLOWLY CORRODE.
CYANOGEN AZIDE: MAY FORM SODIUM 5-AZIDOTETRAZOLIDE, WHICH IS EXPLOSIVE IF ISOLATED.
2,2-DICHLORO-3,3-DIMETHYLBUTANE: HAZARDOUS REACTION.
1,2-DICHLOROETHYLENE: MAY FORM SPONTANEOUSLY FLAMMABLE MONOCHLOROACETYLENE.
DIBORANE AND OCTANAL OXIME: EXOTHERMIC REACTION.
ETHYLENE CYANOHYDRIN: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
FLAMMABLE LIQUIDS: FIRE AND EXPLOSION HAZARD.
GLYCOLS: MAY CAUSE EXOTHERMIC DECOMPOSITION WITH EVOLUTION OF HYDROGEN GAS.
GLYOXAL: MIXING IN A CLOSED CONTAINER INCREASES TEMPERATURE AND PRESSURE.
HALOGENATED HYDROCARBONS: VIOLENT REACTION.
HYDROCHLORIC ACID: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
HYDROFLUORIC ACID: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
HYDROQUINONE: RAPID DECOMPOSITION OF HYDROQUINONE WITH EVOLUTION OF HEAT.
IRON: SOLUTIONS MAY SLOWLY CORRODE.
LEAD: MAY BE ATTACKED; FLAMMABLE HYDROGEN GAS MAY BE LIBERATED.
LEATHER: MAY BE ATTACKED.
MALEIC ANHYDRIDE: EXPLOSIVE DECOMPOSITION.
METALS: CORRODES METALS, REACTING TO FORM FLAMMABLE HYDROGEN GAS.
4-METHYL-2-NITROPHENOL: EXOTHERMIC REACTION.
NITRIC ACID: MIXING IN CLOSED CONTAINER INCREASES TEMPERATURE AND PRESSURE.
NITROBENZENE: POSSIBLY EXPLOSIVE REACTION UPON HEATING IN PRESENCE OF WATER.
NITROETHANE: FORMS AN EXPLOSIVE SALT.
NITROMETHANE: FORMS AN EXPLOSIVE SALT.
NITROPARAFFINS: THE NITROPARAFFINS, IN THE PRESENCE OF WATER, FORM DRY SALTS WITH ORGANIC BASES. THE DRY SALTS ARE EXPLOSIVE.
NITROPROPANE: FORMS AN EXPLOSIVE SALT.
O-NITROTOLUENE: POSSIBLE EXPLOSION.
OLEUM: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.
ORGANIC PEROXIDES: INCOMPATIBLE.
PENTOL (3-METHYL-2-PENTENE-4-YN-1-OL): POSSIBLE EXPLOSION.
PHOSPHORUS: MAY FORM MIXED PHOSPHINES WHICH MAY IGNITE SPONTANEOUSLY IN AIR.
PHOSPHORUS PENTOXIDE: MAY REACT VIOLENTLY WHEN HEATED.
PLASTICS: MAY BE ATTACKED.
B-PROPIOLACTONE: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERATURE AND PRESSURE.

PROPYLENE OXIDE: IGNITION OR EXPLOSION MAY OCCUR.
RUBBER: MAY BE ATTACKED.
SODIUM TETRAHYDROBORATE: DRY MIXTURES WITH SODIUM HYDROXIDE CONTAINING 15-40% OF TETRAHYDROBORATE LIBERATE HYDROGEN EXPLOSIVELY AT 230-270 C.
SULFURIC ACID: MIXING IN A CLOSED CONTAINER CAUSES AN INCREASE IN TEMPERAURE AND PRESSURE.
1,2,4,5-TETRACHLOROBENZENE: VIOLENT REACTION.
TETRACHLOROBENZENE + METHYL ALCOHOL: POSSIBLE EXPLOSION.
TETRACHLOROETHYLENE: POSSIBLE EXPLOSION.
TETRAHYDROFURAN: SERIOUS EXPLOSIONS CAN OCCUR.
TIN: EVOLUTION OF HYDROGEN GAS WHICH MAY FORM AN EXPLOSIVE MIXTURE.
1,1,1-TRICHLOROETHANOL: EXPLOSION MAY OCCUR.
TRICHLOROETHYLENE: FORMATION OF EXPLOSIVE MIXTURES OF DICHLOROACETYLENE.
TRICHLORONITROMETHANE + METHANOL: MAY CAUSE VIOLENT REACTION.
WOOL: MAY BE ATTACKED.
ZINC (DUST): FIRE AND EXPLOSION HAZARD.
ZIRCONIUM: MAY CAUSE EXPLOSIVE REACTION UPON HEATING.

DECOMPOSITION:
THERMAL DECOMPOSITION MAY RELEASE TOXIC FUMES OF SODIUM OXIDE.

POLYMERIZATION:
HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE.

STORAGE

STORE IN A COOL, DRY, WELL-VENTILATED LOCATION. SEPARATE FROM ACIDS, WATER, METALS. IMMEDIATELY REMOVE AND PROPERLY DISPOSE OF ANY SPILLED MATERIAL. (NFPA 49, HAZARDOUS CHEMICALS DATA, 1991)

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

DISPOSAL

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.
100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

****

CONDITIONS TO AVOID

MAY BURN BUT DOES NOT IGNITE READILY. FLAMMABLE, POISONOUS GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. MAY IGNITE COMBUSTIBLES (WOOD, PAPER, OIL, ETC.).

****

SPILL AND LEAK PROCEDURES

SOIL SPILL:
DIG HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

USE PROTECTIVE COVER SUCH AS A PLASTIC SHEET TO PREVENT MATERIAL FROM DISSOLVING IN FIRE EXTINGUISHING WATER OR RAIN.

WATER SPILL:
ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

OCCUPATIONAL SPILL:
DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR SMALL DRY SPILLS, WITH CLEAN SHOVEL PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER. MOVE CONTAINERS FROM SPILL AREA. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 1000 POUNDS
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:
PROVIDE LOCAL EXHAUST VENTILATION SYSTEM TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS, NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29 CFR 1910 SUBPART Z.
THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH/MSHA).

SODIUM HYDROXIDE:

50 MG/M3 - ANY POWERED AIR-PURIFYING RESPIRATOR WITH A DUST AND MIST FILTER.
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE

100 MG/M3 - ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.
ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH EFFICIENCY PARTICULATE FILTER.

250 MG/M3 - ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE - ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR WITH A HIGH EFFICIENCY PARTICULATE FILTER.
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

ANY SELF-CONTAINED BREATHING APPARATUS THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE.

ANY SUPPLIED-AIR RESPIRATOR THAT HAS A FULL FACEPIECE AND IS OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE-PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE-PRESSURE MODE.

CLOTHING:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:
EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:
EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:
WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC, INC.
CREATION DATE: 12/17/84 REVISION DATE: 07/14/93

-ADDITIONAL INFORMATION-

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SODIUM HYDROXIDE, DRY SOLID, FLAKE, BEAD, OR GRANULAR

FISHER SCIENTIFIC

MSDS

IMPORTANT SAFETY INFORMATION -- DO NOT DISCARD.
PLEASE ROUTE TO COMPANY SAFETY OFFICER.

AMERICAN ENGINEERED
COMPONENTS
120 ROGERS STREET

CAMBRIDGE MA 02142

IF NAME AND/OR ADDRESS HAVE CHANGED, CONTACT YOUR FISHER SALES REPRESENTATIVE OR LOCAL FISHER BRANCH.

FOR EACH CHEMICAL, A MSDS SHEET WILL BE SENT ONLY ON THE FIRST SHIPMENT UNLESS A SUBSTANTIAL REVISION OCCURS.

REQUIRED MATERIAL SAFETY DATA SHEETS (MSDS) NOT INCLUDED IN THIS MAILING WILL FOLLOW UNDER SEPARATE COVER.

THIS PACKET MAY CONTAIN MSDS FOR PRODUCTS MANUFACTURED BY OTHERS AND DISTRIBUTED BY FISHER SCIENTIFIC COMPANY. THESE MSDS WERE PREPARED BY THE MANUFACTURER AND FISHER DISCLAIMS ALL LIABILITY FOR THE CONTENT.

FISHER SCIENTIFIC HAS A COMPLETE LINE OF SAFETY PRODUCTS AND INFORMATION FOR THE LABORATORY. CONTACT YOUR LOCAL FISHER BRANCH FOR FILMS, BROCHURES, CATALOGS AND PRODUCTS.

Lab

J.T.BAKER INC. 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865
M A T E R I A L S A F E T Y D A T A S H E E T
24-HOUR EMERGENCY TELEPHONE -- (201) 859-2151
CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: SODIUM HYDROXIDE, SOLUTIONS
COMMON SYNONYMS: CAUSTIC SODA SOLUTION
CHEMICAL FAMILY: VOLUMETRIC SOLUTIONS AND CONCENTRATES
FORMULA: NAOH IN H2O
FORMULA WT.: 40.00
CAS NO.: 1310-73-2
NIOSH/RTECS NO.: WB4900000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 5635,5634,5638,5636

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	3	SEVERE (CORROSIVE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

DANGER

CAUSES BURNS. REACTS VIOLENTLY WITH ACIDS. HARMFUL IF SWALLOWED OR INHALED. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL, CAREFULLY NEUTRALIZE SPILL WITH DILUTE HCL. FLUSH SPILL AREA WITH WATER.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: WHITE STRIPE (STORE SEPARATELY)

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SODIUM HYDROXIDE	1310-73-2	0.1-4	2 MG/M3	2 MG/M3
WATER	7732-18-5	>95	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: N/A

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: N/A (H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: >95 (21 C)

PH: 14.0 (1.0M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. ODORLESS.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

NFPA 704M RATING: 3-0-1

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
NONE IDENTIFIED.

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

UNUSUAL FIRE & EXPLOSION HAZARDS
NONE IDENTIFIED.

TOXIC GASES PRODUCED
NONE IDENTIFIED

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 2 MG/M3

TLV (CEILING) IS FOR SODIUM HYDROXIDE.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 2 MG/M3

PEL IS FOR SODIUM HYDROXIDE.

TOXICITY OF COMPONENTS

INTRAPERITONEAL MOUSE LD50 FOR SODIUM HYDROXIDE	40	MG/KG
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: IRRITATION OF MUCOUS MEMBRANES, IRRITATION OF UPPER RESPIRATORY TRACT

SKIN CONTACT: IRRITATION, BURNS

EYE CONTACT: IRRITATION, BURNS, PERMANENT EYE DAMAGE

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: SEVERE BURNS TO MOUTH, THROAT, AND STOMACH, NAUSEA, VOMITING

CHRONIC EFFECTS: NONE IDENTIFIED

TARGET ORGANS
EYES, SKIN, RESPIRATORY SYSTEM, LUNGS

DICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER. FOLLOW WITH DILUTED VINEGAR, FRUIT JUICE OR WHITES OF EGGS, BEATEN WITH WATER.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE: NO
CERCLA HAZARDOUS SUBSTANCE: YES CONTAINS SODIUM HYDROXIDE (RQ = 1000 LBS)
TOXIC CHEMICALS: YES CONTAINS SODIUM HYDROXIDE
GENERIC CLASS: C16
TSCA INVENTORY: YES

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT

INCOMPATIBLES: STRONG ACIDS, MOST COMMON METALS, COMBUSTIBLE MATERIALS, ORGANIC MATERIALS, ZINC, ALUMINUM, MAGNESIUM, PEROXIDES, HALOGENATED HYDROCARBONS

DECOMPOSITION PRODUCTS: NONE IDENTIFIED

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. CAREFULLY NEUTRALIZE SPILL WITH DILUTE HCL. FLUSH AREA WITH FLOODING AMOUNTS OF WATER. (USE CAUTION.)

J. T. BAKER NEUTRACIT(R)-2 OR BUCAIM* CAUSTIC NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

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SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 60 PPM, A HIGH-EFFICIENCY PARTICULATE RESPIRATOR IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: WHITE STRIPE (STORE SEPARATELY)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA. ISOLATE FROM INCOMPATIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: SODIUM HYDROXIDE, SOLUTION
HAZARD CLASS: CORROSIVE MATERIAL (LIQUID)
UN/NA: UN1824 REPORTABLE QUANTITY: 1000 LBS.
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.249

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: SODIUM HYDROXIDE, SOLUTION
HAZARD CLASS: 8 I.M.O. PAGE: 8142
UN: UN1824 MARINE POLLUTANTS: NO PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

CONTINUED ON PAGE: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

AIR (I.C.A.O.)

PROPER SHIPPING NAME: SODIUM HYDROXIDE, SOLUTION
HAZARD CLASS: 8
UN: UN1824 PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

U.S. CUSTOMS HARMONIZATION NUMBER: 28151200007

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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CONTINUED ON PAGE: 8

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APPROVED BY QUALITY ASSURANCE DEPARTMENT.

-- LAST PAGE --

73 8

GEORGE MANN & CO., INC.
MERCHANTS AND DISTRIBUTORS OF INDUSTRIAL CHEMICALS
SINCE 1921
P.O. BOX 9066 • PROVIDENCE, RHODE ISLAND 02940

MAIN OFFICE AND PLANT
HARBORSIDE BOULEVARD · MUNICIPAL DOCK
TELEPHONE 401 781-5600

BRANCH OFFICE AND PLANT
P.O. BOX 231
105 CENTRAL STREET · STONEHAM MASS 02180
TELEPHONE 617 438-1335

BRANCH OFFICE
2600 DIXWELL AVENUE · HAMDEN, CONN 06514
TELEPHONE 203 248-1840

SPECIFICATION

PRODUCT: Sodium Hypochlorite Solution 15%
Industrial Grade

TYPICAL PROPERTIES:

Chemical Formula	NaoCl
Appearance	Clear, greenish yellow liquid
Odor	Pungent, typical of chlorine
* Concentration (when loaded)	15.0 - 15.4% by volume
Sodium Hypochlorite	12.8 - 13% by weight
Available Chlorine	150-154 g/l
Excess Alkali (as NaoH)	0.8 - 1.5% W/W
Specific Gravity 60° F	1.21 - 1.22

* Sodium Hypochlorite Solutions degrade with time. The rate of degradation depends upon temperature and other storage conditions.

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Material Safety Data Sheet
May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY (As Used on Label and List) WILCLOR 1, WILCLOR 2
SODIUM HYPOCHLORITE

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name: GEORGE MANN & CO., INC.	Emergency Telephone Number: (401) 781-5600
Address (Number, Street, City, State, and ZIP Code): PO BOX 9066 HARBORSIDE BLVD.	Telephone Number for Information: (401) 781-5600
PROVIDENCE, RI 02940	Date Prepared: 6/1/87
	Signature of Preparer (optional): [signature]

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
SODIUM HYPOCHLORITE	NA	NONE		15%
CAS NO 7681-52-9				
SODIUM HYDROXIDE	TWA 2 mg/cubic meter ceiling conc.			1%
CAS No 1310-73-2				
WATER				72%
CAS NO 007732-18-5				
SODIUM CHLORIDE				12%
CAS NO 007647-14-5				

Section III — Physical/Chemical Characteristics

Boiling Point	~ 212° F	Specific Gravity (H_2O = 1)	1.15-1.25
Vapor Pressure (mm Hg.) V.P. OF WATER PLUS V.P. OF DECOMPOSITION PRODUCTS		Melting Point	~ -10° C
Vapor Density (AIR = 1)		Evaporation Rate (Water = 1)	~ 1

Solubility in Water
COMPLETE

Appearance and Odor
LIGHT YELLOW GREEN LIQUID WITH CHARACTERISTIC CHLORINE ODOR

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) NON-FLAMMABLE	Flammable Limits NA	LEL	UEL

Extinguishing Media
USE MEDIA SUITABLE FOR SURROUNDING FIRE; KEEP MATERIAL COOL BY USING A WATER SPRAY

Special Fire Fighting Procedures
WEAR SELF CONTAINED BREATHING APPARATUS AND FULL PROTECTION CLOTHING; AVOID BODY CONTACT AND INHALATION OF FUMES

Unusual Fire and Explosion Hazards
REACTS VIGOROUSLY WITH OXIDIZABLE MATERIALS; WILL REACT WITH SOME METALS WHICH MAY RELEASE OXYGEN: MANY REACTIONS CAN CAUSE FIRE AND EXPLOSION; TOXIC FUMES CAN BE LIBERATED BY HEAT

(Reproduce locally) OSHA 174, Sept. 1985

0908-3694

TRW-02313

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable	X	HEAT, ACIDS, AMMONIA, METAL CONTAMINANTS
	Stable		

Incompatibility (Materials to Avoid)
ACIDS, AMMONIA, OXIDIZABLE MATERIALS, METALS, SOURCES OF HEAT AND LIGHT

Hazardous Decomposition or Byproducts
HCl, CHLORINE, HOCl, O_2

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	DO NOT MIX WITH AMMONIA; DO NOT MIX WITH ACIDS

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? YES Skin? YES Ingestion? YES

Health Hazards (Acute and Chronic)
ACUTE - SEVERE IRRITANT TO SKIN, EYES, NOSE, THROAT AND GASTROINTESTINAL TRACT

CHRONIC - EYES: SEVERE IRRITANT; SKIN: SEVERE IRRITANT; INHALATION: IRRITANT TO RESPIRATORY TRACT; INGESTION: CORROSION OF MUCOUS MEMBRANES PERFORATION OF ESOPHAGUS AND STOMACH, MAYLEAD TO CONVULSION, COMA AND DEATH

Carcinogenicity: NTP? NOT LISTED IARC Monographs? NOT LISTED OSHA Regulated? NOT LISTED

Signs and Symptoms of Exposure
EYES & SKIN - SEVERE IRRITATION AND REDDENING OF SKIN

INHALATION - COUGHING AND IRRITATION TO RESPIRATORY TRACT

Medical Conditions
Generally Aggravated by Exposure: NONE KNOWN TO US

Emergency and First Aid Procedures EYES- FLUSH WITH WATER FOR AT LEAST 15 MINUES AND CALL PHYSICIAN; SKIN- REMOVE CONTAMINATED CLOTHING AND FLUSH WITH WATER. IF SKIN IS BURNED, CALL PHYSI[illegible] INHALATION- REMOVE TO FRESH AIR AND CALL PHYSICIAN; INGESTION- RINSE MOUTH WITH WATER, [illegible] LARGE AMOUNTS OF WATER AND MILK AND INDUCE VOMITING, CALL PHYSICIAN

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
TOXIC TO FISH AND AQUATIC LIFE. DO NOT ALLOW MATERIAL TO ENTER SEWERS, STREAMS, PONDS;

PERSONNEL INVOLVED WITH CLEAN UP MUST BE EQUIPPED WITH NIOSH APPROVED RESPIRATORY PROTECTIO

RUBBER BOOTS, RUBBER GLOVES AND PROTECTIVE CLOTHING

Waste Disposal Method
DO NOT ABSORB SPILLS WITH FLAMMABLE MATERIALS SUCH AS SAWDUST OR COMBUSTIBLE ABSORBENTS; CONTAINS SPILLS IN PLASTIC DRUMS; CONTAIN IN AS SMALL AN AREA AS POSSIBLE FOR DILUTION AND NEUTRALIZATION; DISPOSE OF IN ACCORDANCE WITH FEDERAL,STATE AND LOCAL REGULATIONS

Precautions to Be Taken in Handling and Storing
STORE IN VENTILATED CONTAINERS AWAY FROM SUNLIGHT; STORE IN COOL AREA; DO NOT STORE NEAR

ACIDS, HEAT OXIDIZABLE MATERIALS

Other Precautions
DO NOT MIX WITH OTHER CLEANING AGENTS SUCH AS ACIDS AND AMMONIA THAT MAY LIBERATE

CHLORINE AND CHLORAMINES

Section VIII — Control Measures

Respiratory Protection (Specify Type) SUITABLE FOR ACID GAS AND CHLORINE
SELF CONTAINED BREATHING APPARATUS SHOULD BE USED FOR STRONG CONCENTRATION

Ventilation		
	Local Exhaust: YES	Special:
	Mechanical (General): RECOMMENDED	Other:

Protective Gloves	Eye Protection
RUBBER	CHEMICAL SPLASH GOGGLES

Other Protective Clothing or Equipment
EYE WASH STATION; SAFETY SHOWER; HARD HATS, BOOTS; PROTECTIVE CLOTHING

Work/Hygienic Practices
AVOID SKIN CONTACT; WASH THOROUGHLY AFTER USING

TRW-02314

0908-3695

The information contained herein is [illegible]

SODIUM METABISULFITE

CAS No. 7681-57-4 General Chemical Product No(s)._____

Synonyms: Anhydrous Sodium Bisulfite, Sodium Pyrosulfite

Formula: $Na_2S_2O_5$

Physical Description: White granules which have a pungent odor, particularly when moist.

Physical Characteristics: Very soluble in water.

Potential Harmful Effects on Those Who Handle or Use it:

- Skin Contact - May cause irritation
- Eye Contact - May irritate or burn eyes
- Inhalation (Breathing Dust, Vapor or Fumes) - May cause irritation. (*) Note Special Hazard Information Below
- Ingestion (Swallowing) - May cause irritation. Large amounts will produce serious health effects. To some asthmatics and sulfite sensitive individuals, relatively small amounts of this product may cause severe allergic reactions leading to possible brain damage and death.
- Long Term Exposure - Although there are no known studies which show this product to have any long term effects, steps should be taken to minimize exposure.

First Aid Fundamentals:

- Skin Contact - Wash with plenty of water.
- Eye Contact - Wash with plenty of water, then get medical attention.
- Inhalation (Breathing Dust, Vapor or Fumes) - Remove to fresh air. If symptoms of irritation continue, get medical attention.
- Ingestion (Swallowing) - Induce vomiting, then get medical attention.

* SPECIAL HAZARD - UNDER CERTAIN CONDITIONS SUCH AS CONTACT WITH WATER OR ACIDS, SULFUR DIOXIDE GAS MAY BE GENERATED. SULFUR DIOXIDE GAS IS COLORLESS, NONFLAMMABLE, AND HAS A STRONG SUFFOCATING ODOR. THIS GAS IS INTENSELY IRRITATING TO THE EYES AND RESPIRATORY ORGANS. IT CAN CAUSE SEVERE HEALTH EFFECTS, INCLUDING DEATH.

April, 1990
/922/

730

Hoechst Celanese

Hoechst

SODIUM BISULFITE, ANHYDROUS

Fine Chemicals Division
801 Water Street
Portsmouth, VA 23704

MATERIAL SAFETY DATA SHEET

Information Telephone: 804/393-3100 Emergency Telephone: 804/484-5000 CHEMTREC Telephone: 800/424-9300

68-109 886V

I. IDENTIFICATION

PRODUCT NAME:	Sodium Bisulfite, Anhydrous	REVISION DATE:	10/88
CHEMICAL NAME:	Pyrosulfurous Acid, Disodium Salt	FORMULA:	$Na_2S_2O_5$
SYNONYMS:	Sodium Metabisulfite; Sodium Pyrosulfite	MOLECULAR WEIGHT:	190.1
D.O.T. HAZARD CLASS:	Not Applicable	UN No. 2693	CAS No. 7681-57-4
D.O.T. SHIPPING NAME:	Not Applicable	CAS NAME:	Pyrosulfurous Acid, Disodium Salt

II. PHYSICAL DATA

PHYSICAL STATE:	Solid	DENSITY, BULK, g/cc:	1.053 (loose); 1.192 (packed)
MELTING POINT, °C:	Decomposes	SOLUBILITY IN WATER, wt. %:	36.5
DECOMPOSES, °C:	163	VOLATILES, VOLUME %:	None
APPEARANCE:	White Crystal	ODOR:	Slight Sulfur Dioxide

III. HAZARDOUS COMPONENTS

COMPONENT	CAS NO.	%	EXPOSURE LIMITS		
			OSHA PEL	ACGIH TLV	OTHER
Sodium Metabisulfite	7681-57-4	> 99	None Est.	5 mg/m^3	Hoechst Celanese: 5 mg/m^3

IV. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT, °C	Not Flammable	FLAMMABLE LIMITS, IN AIR, Vol. %	LEL: No Information Available UEL:

NORMAL EXTINGUISHING AGENT:

Not Flammable - Use water spray (fog), carbon dioxide (CO_2), Dry Chemical or foam, as appropriate to the burning material.

SPECIAL FIRE FIGHTING PROCEDURES:

Wear positive pressure self-contained breathing apparatus and full fire-fighting protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

Eliminate sources of ignition, static discharge, open flame.

TRW-02316

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V. REACTIVITY DATA

STABLE: Yes	CONDITIONS TO AVOID: Heat, flame, sources of ignition.
UNSTABLE: No	

INCOMPATIBILITY (Materials to Avoid):
Contact with acids or water will generate sulfur dioxide in quantities which, without adequate ventilation, may be hazardous.

HAZARDOUS COMBUSTION OR HAZARDOUS DECOMPOSITION PRODUCTS:
Sulfur dioxide

HAZARDOUS POLYMERIZATION CONDITIONS TO AVOID:
None known

CORROSIVE TO METAL: Corrosive to most common metals in presence of moisture.	OXIDIZER: No

VI. HEALTH HAZARD DATA

EFFECTS OF SINGLE OVEREXPOSURE (ACUTE)	
INHALATION:	Can cause irritation of the nose, throat and respiratory system. High temperatures or contact with acids will release sulfur dioxide, a severe respiratory irritant.
SKIN CONTACT:	May cause mild to moderate skin irritation (reddening and swelling).
SKIN ABSORPTION:	No information available
SWALLOWING:	Can cause hypersensitivity reactions in people with asthma; symptoms may including hives, breathing difficulty, skin swelling and anaphylactic shock.
EYE CONTACT:	Can cause moderate to severe irritation and swelling which may persist for several days.
EFFECTS OF REPEATED OVEREXPOSURE (CHRONIC)	
OTHER HEALTH DATA:	A two year feeding study in laboratory rats indicated no adverse effects at 0.215%, indicating low systemic toxicity. See Section X, page 4 for additional information.
MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE	Asthma, other respiratory disorders. Skin disorder.
EMERGENCY AND FIRST AID PROCEDURES	
SWALLOWING:	Seek medical assistance immediately.
SKIN:	Wash affected area thoroughly with soap and water. Remove contaminated clothing and wash before reuse. Seek medical attention if irritation persists.
INHALATION:	Remove to fresh air. If breathing is difficult, administer oxygen. If breathing has stopped, administer cardiopulmonary resuscitation. Seek medical assistance immediately.
EYES:	Flush with water for at least 15 minutes. Obtain medical assistance.
OTHER:	Asthmatics should be excluded from exposure.

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VII. – ENVIRONMENTAL DATA

ENVIRONMENTAL TOXICITY DATA:

Toxicity data not available.
Discharge to surface water will result in depletion of oxygen and probably damage to aquatic life.

SPILL OR LEAK CONTROL PROCEDURES:

Contain all spilled material. Shovel into drums or other suitable containers. Do not hose or wash into storm sewers or onto ground.

HAZARDOUS SUBSTANCE SUPERFUND: No RQ (lbs.): —

WASTE DISPOSAL METHOD:

Discard to industrial waste water treatment system or otherwise as directed by local regulatory agency personnel.

HAZARDOUS WASTE 40CFR261: No HAZARDOUS WASTE NUMBER: —

CONTAINER DISPOSAL METHOD:

Shake bags to remove all material. Discard bags with industrial non-hazardous trash.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION:

Use NIOSH/MSHA approved acid gas respirator fitted with dust filters. For firefighting and other emergencies use positive pressure, self-contained breathing apparatus.

PROTECTIVE GLOVES:	EYE PROTECTION:
Use neoprene or other impermeable gloves	Chemical safety glasses or chemical goggles.
VENTILATION:	**SPECIAL EQUIPMENT:**
Use local exhaust to control dust exposure.	Work clothing to cover exposed areas. Safety shower and eyewash facilities.

IX. SPECIAL PRECAUTIONS

HANDLING AND STORING:

Store in a cool dry area away from acids and oxidizing agents.

OTHER: LABEL CODE: 7-101

Persons suffering from asthma or other respiratory ailments should avoid any contact or exposure to sodium bisulfite.

TRW-02318

X. ADDITIONAL INFORMATION

SECTION VI - HEALTH HAZARD DATA (continued)

Sodium metabisulfite was negative in the following in vivo mutagenicity assays: dominant lethal assay in male rats and female mice; heritable translocation assay in male mice.

Sodium metabisulfite has produced both negative and weakly mutagenic (positive) responses in various strains of Salmonella in the Ames test. However the positive results have occurred under conditions irrelevant to man.

OTHER REGULATORY INFORMATION

SARA Section 302 (Extremely Hazardous Substances) Lists:	No
SARA Section 311/312 Hazardous Categories:	Immediate Health Hazard
SARA Section 313 (Toxic Chemicals) List:	No
TSCA Inventory Status:	On Inventory

0908-3700

TRW-02319

To the best of our knowledge, the information contained herein is accurate. However, neither Hoechst Celanese, its parent company nor their subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information. Final determination of the suitability of any material is the sole responsibility of the user. All materials may present unknown health hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards which exist.

Allied Chemical
An ALLIED Company

SODIUM METABISULFITE

Characteristics:

Sodium metabisulfite is a free-flowing, white, fine granular product which has a characteristic odor of sulfur dioxide. It affords a source of sulfur dioxide, a reducing agent, in convenient dry solid form.

Properties:

Formula	$Na_2S_2O_5$
Molecular weight	190.11
Absolute density, g/mL	1.48
Solubility at 60°F, %	39
pH of 1% solution (approx.)	4.3
Bulk density, lb/ft³	90
kg/m³	1440

Typical Analysis:

	Technical Grade	Food & NF Grade
Sodium metabisulfite ($Na_2S_2O_5$)	98.5%	99.0%
Sulfur dioxide (SO_2)	66.5%	67.0%
Sodium sulfite (Na_2SO_3)	0.5%	0.4%
Iron (Fe)	—	4 ppm
Arsenic (AS_2O_3)	—	<0.5 ppm
Lead (Pb)	—	<0.5 ppm
Selenium (Se)	—	2.0 ppm
Screen Anaylsis:		
Cumulative % on U.S. No. 20	0	0
100	70	70

Product Markets and Uses:

Market	Use
Chemical processing and waste treatment	• Reducing agent
Fruit and vegetable processing	• Bleach and preservative
Photo processing	• Preservative for thiosulfate fixing baths. Reductant for reversal developing
Tanneries	• Accelerates dipilatory action of lime for unhairing hides • Solubilizes quebracho in vegetable tanning
Textiles	• Antichlor and mordant
/ater treatment	• Antichlor

TRW-02320

0908-3701

Grades, Forms and Shipping Containers:

NF and Food	50 & 100-lb paper bag 100 & 400-lb drum 2000-lb bag
Photo (1)	100-lb paper bag 100 & 400-lb drum
Technical (1)	100-lb paper bag 100 & 400-lb drum
Food grade (2) (El Segundo, CA only)	100-lb paper bag
Solution: 38% (1)	tank transport, tank car

(1) These products are not for food or drug use.
(2) This product is not for drug use.

Shipping Locations:

North Claymont, DE
El Segundo, CA

Shipping Regulations:

Dry — DOT Classification: ORM-B
Proper Shipping Name: Sodium Metabisulfite
DOT ID Number: NA 2693

Solution — DOT Classification: Corrosive Material
Proper Shipping Name: Sodium Hydrogen Sulfite Solution
DOT ID Number: NA 2693

Product Safety Information:

Sodium metabisulfite may irritate eyes, nose and throat and may cause skin irritation. Ingestion may be harmful. When heated or mixed with acids, toxic sulfur dioxide gas is released.

As with any chemical, sodium metabisulfite requires care in handling. Anyone responsible for the procurement, use, or disposal of this product should familiarize himself and those handling the product with the appropriate safety and handling precautions involved. Such information is outlined in our product safety data sheet, which may be obtained by contacting Technical Service.

In the event of an emergency with this product, call the 24-hour Allied Chemical emergency number: (201) 455-2000.

Additional Information Available:

"Water & Wastewater Dechlorination," Form No. 521-053

"Treatment of Chromium Waste Liquors with Sodium Metabisulfite," Form No. 507-058

For literature or technical information, contact:

Allied Chemical
Technical Service
P.O. Box 6
Solvay, NY 13209
(315) 487-4990

How to Order:

To place an order, to obtain a sample, price or availability information from any location in the continental United States, except New Jersey, call toll-free: (800) 631-8050. From New Jersey, call toll free: (800) 452-9163.

Or write:

Allied Chemical
Marketing Manager — Fine Chemicals
P.O. Box 1053R
Morristown, NJ 07960

In Canada, please contact:

Allied Chemical Canada, Ltd.
201 City Center Drive
Mississauga, Ontario L5B 2T4
(416) 276-9211

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TRW-02321

506-479 Printed in U.S.A.

0908-3702

DU PONT

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

Name
SULFURIC ACID 77 to 100%

Grade 60° Tech., 66° Tech., 1.83 Electrolyte, Reagent, 98% Tech., 99% Tech, 100% Tech.

Synonyms

Chemical Family
Mineral Acid

Formula
H_2SO_4

CAS Name
Sulfuric Acid

CAS Registry No.
7664-93-9

I.D. Nos./Codes NIOSH Registry NO.WS5600000
Wiswesser Code: WSQQ

Du Pont Registry No.

Manufacturer/Distributor
E. I. du Pont de Nemours & Co. (Inc.)

Product Information and Emergency Phone
(302) 774-2421

Address
Wilmington, DE 19898

Transportation Emergency Phone
(800) 424-9300

PHYSICAL DATA

Boiling Point, 760 mm Hg 193-327°C(380-621°F)
See Page 4 for specific grades

Melting Point -35 to 11°C (-31 to 51°F)
See Page 4 for specific grades

Specific Gravity 1.70 to 1.84
See Page 4 for specific grades

Vapor Pressure <0.3 mmHg at 25°C (77°F)
<0.6 mmHg at 38°C (100°F)

Vapor Density
~3.4

Solubility in H_2O
100%

% Volatiles by Vol.
0 at 21°C (70°F)

Evaporation Rate (Butyl Acetate = 1)
<1

Form
Liquid

Appearance Oily; clear to turbid

Color Colorless to Light brown

Odor
None

pH Information
<1

Octanol/Water Partition Coefficient

HAZARDOUS COMPONENTS

Material(s)	Approximate %
Sulfuric Acid:	
60° Technical	77.7
66° Tech; 1.835 Electrolyte	93.2
Reagent	96.0
98%, 99%, and 100%	98, 99 and 100%, respectively

HAZARDOUS REACTIVITY

Instability
Stable but reacts with many chemicals.

Incompatibility Vigorous reactions occur with water, alkaline solutions; metals, metal powders; strong oxidizing, reducing or combustible materials. Hazardous gases are evolved on contact with chemicals such as cyanides, sulfides, carbides.

Decomposition
Releases sulfur dioxide at extremely high temperatures.

Polymerization
Will not occur.

TRW-02322

E-52969 Date: 1/83

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process. The information set forth herein is furnished free of charge and is based on technical data that Du Pont believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, express or implied, and assume n... information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

0908-3703

FIRE AND EXPLOSION DATA

Flash Point	*Method*	*Autoignition Temperature*
Will not burn		

Flammable Limits in Air, % by Vol.

Lower
Upper Will not burn.

Fire and Explosion Hazards
Reacts with most metals, especially when dilute, to give flammable, potentially explosive hydrogen gas.

Extinguishing Media
Water, dry chemical, carbon dioxide (CO_2) for fires in area. Use water spray to cool container exposed to fire; do not get water inside containers.

Special Fire Fighting Instructions
Generates heat upon addition of water, with possible spattering. Wear full protective clothing. Run-off from fire control may cause pollution. Neutralize run-off with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas. Wear self-contained breathing apparatus if fumes or mists are present.

HEALTH HAZARD INFORMATION

Exposure Limits

OSHA 8-hour Time-Weighted Average (TWA) and ACGIH TLV® = 1 mg/m^3

Significant Routes and Effects of Exposure
Causes severe burns of skin, eyes, and all body tissues.
Ingestion causes severe burns of mouth, esophagus, and stomach.
Inhalation of mists or vapors may cause respiratory irritation.
Long-term overexposure to mists or vapors may cause damage to teeth.

Safety Precautions
Do not get in eyes, on skin, on clothing.
Keep container closed.
Avoid breathing vapor or mists.
Do not add water to contents while in container because of violent reaction.
Wash thoroughly after handling.

First Aid

In Case of Contact: Immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing and shoes before reuse.

If Swallowed: Do not induce vomiting. Have patient drink large quantities of water immediately. Call a physician. Do not give carbonates. Do not give anything by mouth to an unconscious person.

If Inhaled: Remove person to fresh air immediately, have patient lie down and keep quiet. Apply artificial respiration, preferably mouth-to-mouth, if breathing has stopped. Administer oxygen if breathing is difficult. Call a physician.

TRW-02323

0908-3704

PROTECTION INFORMATION

Ventilation

Good general ventilation should be provided to keep vapor and mist concentrations below exposure limits.

Personal Protective Equipment

Have available and wear as needed: Chemical splash goggles; acid-proof gauntlet gloves, apron, and boots; hard hat with brim; and shirt and trousers of wool, acrylic, or polyester fibers.

In case of emergency or where there is a possibility of considerable exposure, wear a complete acid suit. Respiratory protection is not required for normal use.

Other

DISPOSAL INFORMATION

Aquatic Toxicity

Spill, Leak or Release

Stop flow if possible. Soak up small spills with dry sand, clay or diatomaceous earth. Dike large spills, cautiously dilute and neutralize with lime or soda ash and transfer to waste water treatment system. Comply with Federal, State and Local regulations on reporting releases.

Waste Disposal

Comply with Federal, State and Local regulations. If approved, neutralize and transfer to waste water treatment center.

SHIPPING INFORMATION

Transportation

DOT Hazard Class.*:
Corrosive Material

IMCO Class.:
8

DOT Shipping Name*:
Sulfuric Acid

UN No.: UN 1830

NA No.:

RQ Quantity*:
1,000 lb/454 kg

**49 CFR 172.101*

Shipping Containers

Railroad tank cars, tank trucks, 55 gallon stainless steel drums. Reagent Grade only: 55 gallon P.E. drums, 5 pint bottles.

Storage Conditions

Keep out of sun and away from heat, sparks and flame. Keep container tightly closed and (drum) closure up to prevent leakage. Loosen closure carefully. Relieve internal pressure when received and at least weekly thereafter. Do not use pressure to empty. Be sure closure is securely fastened before moving container. Do not wash out container or use it for other purposes; replace closure and return it with empty container.

ADDITIONAL INFORMATION AND REFERENCES

Physical Properties (Cont's. from Page 1)

Grade	Boiling Point °C	Boiling Point °F	Melting Point °C	Melting Point °F	Specific Gravity
60° Technical	193	380	-12	10	1.706
66° Technical	279	535	-35	-31	1.835
1.835 Electrolyte	279	535	-35	-31	1.835
Reagent	308	586	-14	6	1.843
98% Technical	327	621	-2	29	1.844
99% Technical	310	590	4	40	1.842
100% Technical	274	526	11	51	1.839

For further information, see Du Pont Safety and Handling bulletin, "Sulfuric Acid" and Du Pont Data Sheets, "Sulfuric Acid and Oleum" and "Electronic Reagents".

TRW-02325

DU PONT

REG. U.S. PAT. & TM. OFF.

0908-3706

Thiokol/Ventron Division
Alfa Products

308100, 89821

MATERIAL SAFETY DATA SHEET

$Na_2 S_2 O_3 \cdot 5H_2O$

APPROVED
JAN 28 1987
ENVIRONMENTAL ENGINEERING

PRODUCT NAME: Sodium Thiosulfate

CHEMICAL NATURE: Inorganic Sulfate

% ACTIVITY: 97+%

I. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	dec. 48°C	Melting POINT	40-45°C
SPECIFIC GRAVITY	1.729	VAPOR PRESSURE AT 20°C.	No Data
VAPOR DENSITY	No Data	SOLUBILITY IN H_2O	Soluble
PER CENT VOLATILES BY WEIGHT	Not applicable	IONIC NATURE	Yes
APPEARANCE AND ODOR	Colorless, transparent crystals		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Sodium Thiosulfate	97+%	Not determined
scu-rbt LD_{Lo}: 4000 mg/kg		
scu-frog LD_{Lo}: 6000 mg/kg		
(NIOSH/RTECS-1979)		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	No Data	AUTOIGNITION TEMPERATURE		No Data	
FLAMMABLE LIMITS IN AIR, % by volume	No Data	LOWER		UPPER	

EXTINGUISHING MEDIA	Use water, carbon dioxide dry chemical extinguishing agents, dry extinguishing agents, dry sand, or dry ground dolomite.
SPECIAL FIRE FIGHTING PROCEDURES	No special firefighting procedures needed, use normal procedures which include wearing NIOSH/MSHA approved self-contained breathing apparatus, flame and chemical resistant clothing; hats, boots and gloves. If without risk, remove material from fire area. Cool containers with water from maximum distance.
UNUSUAL FIRE AND EXPLOSION HAZARDS	May emit toxic fumes of SOx when heated to decomposition.

Thiokol/Ventron Division
Alfa Products, 152 Andover Street, Danvers, Massachusetts 01923
(617) 777-1970, (415) 836-1777 Telex: 94-0378 ALFA DARS

TRW-02326

0908-3707

THE BURDEN OF SAFE USE OF OUR MATERIALS MUST REST ENTIRELY WITH THE USER. WE CANNOT ASSUME RESPONSIBILITY FOR THE COMPLETENESS OR ACCURACY OF ANY INFORMATION SUPPLIED BY US CONCERNING THE HAZARDS OR RECOMMENDED USE OF THE CHEMICALS.

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	Not determined
EFFECTS OF OVEREXPOSURE	May cause irritation of skin, eyes, mucous membranes, and G.I. tract.
EMERGENCY AND FIRST AID PROCEDURES	Remove from exposure. Eyes: Flush with copious amounts of water for at least 15 minutes. Skin: Remove any contaminated clothing. Flood skin with large volumes of water for 15 minutes. Ingestion/Inhalation: Seek prompt, competent medical attention.

V. REACTIVITY DATA

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	Excessive heating
	X		
INCOMPATIBILITY (materials to avoid)		Strong oxidizing agents	
HAZARDOUS DECOMPOSITION PRODUCTS		SO_x	
HAZARDOUS POLYMERIZATION			
May Occur	Will not Occur	CONDITIONS TO AVOID	
	X		

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Wearing full protective clothing and respiratory protection (See Sect. VII), eliminate all sources of ignition. Cover spill with dry sand or dry vermiculite, mix well and carefully transfer to a well-marked container. Close container tightly. Submit or retain for disposal.
WASTE DISPOSAL METHOD	Consult state, local, and federal regulations for proper

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		NIOSH/MSHA approved self-contained breathing apparatus for emergency use.		
VENTILATION	LOCAL EXHAUST	Acceptable	SPECIAL	
	MECHANICAL		OTHER	
PROTECTIVE GLOVES		Rubber	EYE PROTECTION	OSHA approved safety goggles
OTHER PROTECTIVE EQUIPMENT		Lab coat and apron, flame & chemical resistant coveralls, eyewash capable of sustained flushing, safety drench shower and hygienic facili-		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	Caution! Irritant!
OTHER HANDLING AND STORAGE CONDITIONS	Keep container tightly closed. Store in a cool, dry, well-ventilated area. Wash thoroughly after use.

HARRIS
SOLDERING, BRAZING & WELDING PRODUCTS

UNIBRAZE
SUBSIDIARY OF J.W. HARRIS CO. INC.

MATERIAL SAFETY DATA SHEET

SOLDERS

SECTION 1 - MATERIAL IDENTIFICATION

Manufacturers Name **J. W. Harris Co., Inc.** Distributor Name (If Applicable)

Address **10930 Deerfield Road**

Address **Cincinnati, Ohio 45242**

Emergency Telephone **(513) 891-2000**

MSDS Date **November 1985**

The following table lists the trade name and composition of products covered by this Material Safety Data Sheet. **See section 2 and especially section 6 for important health hazard data.**

	Wire Composition wt%					
Trade Name	**Sn**	**Pb**	**Sb**	**Ag**	**Cd**	**Zn**
Stay Brite®	96			4		
Stay Brite® #8	95			5		
Alsolder 500					83	17
95/5	95		5			
50/50	50	50				
60/40	60	40				
40/60	40	60				
63/37	63	37				
30/70	30	70				

Core Composition for Flux Cored Solders

	Element	Wt. (% of core Wt.)	Wt. (% of total solder Wt.)
Acid Core	Zinc Chloride	70	1-3
Rosin Core	Activated Rosin	100	1-3

SECTION 2 - HAZARDOUS MATERIALS

Solder wire is a nonhazardous solid at ambient temperature. Hazards (as defined by OSHA 29CFR 1910.1200) may result from fume generated during soldering. Section 1 lists product designations and composition as manufactured. IMPORTANT - See Section 6 for information on potential fume hazard resulting from use of the product.

SECTION 3 - PHYSICAL DATA

Wire, grey to silver in color. Solder may be solid or contain an inner core of flux.

SECTION 4 - FIRE AND EXPLOSION DATA

Nonflammable. Open flame and sparks can ignite combustibles, See ANSI/ASC Z49.1-1983 Section 6.

SECTION 5 - HEALTH HAZARD DATA

Exposure - Section 1 lists nominal composition of solders. Section 6 lists exposure limits for hazardous decomposition products which might be present in fume generated during soldering. Actual exposure should be determined by monitoring the fume in the operator's breathing zone.

Primary Route of Exposure - Inhalation of fume. Possible lead dust ingestion from smoking or eating after handling lead bearing solders.

Pre-Existing Medical Conditions - Individuals with impaired pulmonary functions or illness may have symptoms exacerbated by fume irritants.

Possible Effects of Exposure - Ingestion of lead dust or inhalation of lead oxide fume is one of the main hazards. Over exposure can produce symptoms such as headache, nausea, dizziness, body aches, and anemia. Symptoms are similar to other illnesses and require medical verification. Lead accumulates in the body and small amounts can build up over a period of time to toxic levels. Short term exposure to cadmium fume causes irritation of the nose and throat. Chest pain, cough, fever or shortness of breath may develop after several hours. Severe over exposure can cause pulmonary edema. Prolonged inhalation exposure may cause lung or kidney damage. Cadmium compounds should be considered suspected carcinogens based on some animal tests and recent epidemiological studies. Tin and antimony fume may cause metal fume fever, characterized by fever, body ache, chills. Fumes from acid and rosin core can irritate nose, throat. Zinc chloride in acid core solder may irritate the skin

Emergency First Aid - Remove from dust or fume exposure. If breathing has stopped perform artificial respiration. Summon medical aid immediately.

Other Health Considerations - Solid wire solders are frequently used with a zinc chloride type flux. If applicable, flux fume should be considered in evaluation of hazards.

SECTION 6 - REACTIVITY DATA

Solid Wire

Soldering fumes cannot be classified simply. The composition and quantity are dependent upon the metal being soldered, the process, procedures, and filler metals used. Other conditions which also influence the composition and quantity of the fumes and gases to which workers may be exposed include: coatings on the metal being soldered (such as paint, plating, or galvanizing), the number of operators and the volume of the work area, the quality and amount of ventilation, the position of the operator's head with respect to the fume plume, as well as the presence of contaminants in the atmosphere (such as chlorinated hydrocarbon vapors from cleaning and degreasing activities).

A stable material in closed containers at room temperature under normal storage and handling conditions. This material can be considered a weak acid. It can be mildly corrosive to some metals, especially when hot.

Zinc chloride flux in acid core solders is incompatible with cyanides, may release HCN gas when mixed with zinc chloride. If combined with sulfides the liquid flux may release H_2S gas.

Element	CAS#	PEL mg/m^3(1)	TLV mg/m^3(2)
Tin (oxide)	7440-31-5	2.0	2.0
Lead (as dust & fume)	7439-92-1	0.05	0.15
Silver (metal)	7440-22-4	0.01	0.1
Silver (soluble compounds)	7440-22-4	0.01	0.01
Antimony	7440-36-0	0.5	0.5
Cadmium (oxide fume)	1306-19-0	0.1	0.05
		0.3 (ceiling limit)	0.3 (ceiling limit)
Zinc (oxide)	1314-13-2	5.0	5.0 (fume)
	Additional Data for Flux Core		
Zinc Chloride (acid core)	7646-86-7	1.0	1.0
Activated Rosin (Rosin core)	No Listing	None	None

(1) Permissable exposure limit OSHA 1910 Subpart Z.
(2) Threshold limit value American Conference of Government Industrial Hygenists.

One recommended way to determine the composition and quantity of fumes and gases to which workers are exposed is to take an air sample in the worker's breathing zone. See ANSI/AWS F1.1, available from the American Welding Society, P.O. Box 351040, Miami, Florida 33135.

SECTION 7 - SPILL OR LEAK PROCEDURES

Not Applicable.

SECTION 8 AND 9 - SPECIAL PROTECTION INFORMATION AND PRECAUTIONS

Read and understand the manufacturer's instructions and the precautionary label on the product. See American National Standard Z49.1, *Safety in Welding and Cutting* published by the American Welding Society, P.O. Box 351040, Miami, FL 33135 and OSHA Publication 2206 (29CFR1910), U.S. Government Printing Office, Washington, D.C. 20402 for more detail on many of the following.

Ventilation
Use enough ventilation, local exhaust at the arc (or flame) to keep the fumes and gases below TLV's in the worker's breathing zone and the general area. Train the employee to keep his head out of the fumes. See ANSI/ASC Z49.1 Section 5.

Respiratory Protection
Use respirable fume respirator or air supplied respirator when soldering in confined space or where local exhaust or ventilation does not keep exposed below TLV.

Eye Protection
Wear helmet or use face shield with filter lens of appropriate shade number (see ANSI/ASC Z49.1 -Section 4.2). Provide protection screens and flash goggles, if necessary, to shield others.

Protective Clothing
Wear head and body protection which help to prevent injury from sparks and flame. See ANSI Z491.1. At a minimum this includes gloves and a protective face shield, and may include arm protectors, aprons, hat, shoulder protection, as well as dark substantial clothing.

Other Precautions
Wash hands thoroughly before smoking or eating after using lead bearing solders.

The information and recommendations contained in this publication have been compiled from sources believed to be reliable and to represent the best information on the subject at the time of issue. No warranty, guarantee, or representation is made by Unibraze Corp. or J.W. Harris Co., Inc. as to the absolute correctness or sufficiency of any representation contained in this and other publications; Unibraze Corp. and J.W. Harris Co., Inc. assume no responsibility in connection therewith; nor can it be assumed that all acceptable safety measures are contained in this (and other publications), or that other or additional measures may not be required under particular or exceptional conditions or circumstances.

HARRIS

J. W. HARRIS CO., INC. | 10930 DEERFIELD ROAD | CINCINNATI, OHIO 45242 | 513-891-2000
UNIBRAZE CORP. | 7502 WEST STATE RT. 41 | COVINGTON, OHIO 45318 | 513-473-2001

POTASSIUM HYDROXIDE
(CAUSTIC POTASH)

APPENDIX D

Form Approved
Budget Bureau No. 44-R1387
Approval Expires April 30, 1971

Form No. LSB-005-4
May 1969

U.S. DEPARTMENT OF LABOR

WORKPLACE STANDARDS ADMINISTRATION
Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME [redacted]	EMERGENCY TELEPHONE NO. [redacted]
ADDRESS (Number, Street, City, State, and ZIP Code) One Gateway Center, Pittsburgh, Pa. 15222	
CHEMICAL NAME AND SYNONYMS Solid and Flake Potassium Hydroxide	TRADE NAME AND SYNONYMS [redacted]
CHEMICAL FAMILY Alkali	FORMULA KOH

SECTION III PHYSICAL DATA

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)

SECTION II HAZARDOUS

BOILING POINT (°F.)	2408 F	SPECIFIC GRAVITY (H_2O=1)	2.044
VAPOR PRESSURE (mm Hg.) 1 mm @	719 C	PERCENT VOLATILE BY VOLUME (%)	NA
VAPOR DENSITY (AIR=1)	NA	EVAPORATION RATE (_____=1)	NA
SOLUBILITY IN WATER	Appreciable		
APPEARANCE AND ODOR	White to light gray, no odor		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) Noncombustible	FLAMMABLE LIMITS	Lel	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES			
UNUSUAL FIRE AND EXPLOSION HAZARDS			

TRW-02332

0908-3713

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
None to assigned to caustic potash; 2 Mg/M^3 (Dust,1969) for comparable caasticsdda

EFFECTS OF OVEREXPOSURE
Solid and flake caustic potashis destructive to tissues, producing severe burns. Dust inhalation can injure respiratory tract.

EMERGENCY AND FIRST AID PROCEDURES
In case of contact, ommediately flush skin or eyes with plenty of water for at least 15 minutes; for eyes, get prompt medical attention. Contaminated clothing and shoes should be removed and washed before re-use.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	Avoid conact with some organic material

INCOMPATABILITY (Materials to avoid) Na

HAZARDOUS DECOMPOSITION PRODUCTS Na

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Spilled flake or solid caustic potash may be shoveled up, followed by flushing with water. Dilute acetic acid may be used to neutralize final traces of caustic potash immediately after flushing.

WASTE DISPOSAL METHOD
Waste caustic potash solution should not be discharged directly into sewers or streams. Caustic potash should first be neutralized with dilute acid and then well diluted with water.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
Bureau of Mines Approved Filter-Type Dust Respirtors

VENTILATION	LOCAL EXHAUST: Must prevent dust accumulation	SPECIAL
	MECHANICAL (General)	OTHER

PROTECTIVE GLOVES	Rubber gloves	EYE PROTECTION	Close fitting safety goggles

OTHER PROTECTIVE EQUIPMENT
Rubber boots with safety toes, rubber aprons, PVC clorhing, "Hard" hat safety shower, eye-washing fountain.

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Do not get into eyes, on skin or clothing Avoid breathing dust. Do not take internally. Wear safety equipment when handling caustic potash.

OTHER PRECAUTIONS

Po: D662

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME
BUEHLER LTD.
ADDRESS
41 WAUKEGAN ROAD, LAKE BLUFF, IL 60044

EMERGENCY TEPHONE NO.
(312) 295-6500

CHEMICAL NAME AND SYNONYMS N/A
TRADE NAME AND SYNONYMS 10-3330 SOLUBLE OIL.
CHEMICAL FAMILY COOLANT
FORMULA SEE SECTION II

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESEVATIVES, & SOLVENTS %	TLV (UNITS)	ALLOYS AND METALLIC COATINGS %	TLV (UNITS)
PIGMENTS		BASE METAL	
CATALYST		ALLOYS	
VEHICLE		METALLIC COATINGS	
SOLVENT		FILLER METAL	
		PLUS COATING OR CORE FLUX	
ADDITIVES		OTHERS	
OTHERS			

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES % TLV (UNITS)

	C.A.S. NO.	%		C.A.S. NO.	%
WATER	7732-18-5	<50	CORROSION INHIBITOR.....	PROPRIETARY	<10
TRIETHANOLAMINE..	102-71-6	<35	HEXAHYDROL 1-2-5. TRIS-HYDROXYETHYL-S-TRIAZINE.	4719-04-4	< 2
BORIC ACID******	10043-35-3	<5	CAPRYLIC ACID	124-07-2	< 3
			DYE.....	PROPRIETARY	< 1

SECTION III - PHYSICAL DATA

BOILING POINT (DEG F.)	N/A	SPECIFIC GRAVITY (H2O=1)	1.03
VAPOR PRESSURE (MM HG.)	N/A	PERCENT, VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (_____ =1)	N/A
SOLUBITY IN WATER	100%	PH= 2% AQUEOUS	8.6

APPEARANCE AND ODOR CLEAR GREENISH COLOR - BLAND ODOR LIQUID

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED) N/A
FLAMMABLE LIMITS LEL UEL
EXTINGUISHING MEDIA WATER OR FOAM
SPECIAL FIRE FIGHTING PROCEDURES NONE

UNUSUAL FIRE AND EXPLOSION HAZARDS NONE

SECTION V - HELATH HAZARD DATA

THRESHOLD LIMIT VALUE 5 MGM/CUBIC METER AIR
EFFECTS OF OVEREXPOSURE N/A

EMERGENCY AND FIRST AID PROCEDURES
SKIN CONTACT - WASH HANDS AT END OF WORK DAY. EYE CONTACT - FLUSH EYES WITH WATER, GET MEDICAL ATTENTION.. INHALATION-UNDER NORMAL CONDITIONS NOT BELIEVED TO BE AN IRRITANT. INGESTION-IF INGESTED, GET MEDICAL ATTENTION.

SECTION VI - REACTIVITY DATA

STABILITY UNSTABLE CONTIONS TO VOID
STABLE X
INCOMPATABILITY (MATERIALS TO VOID)
HAZARDOUS DECOMPOSITION PRODUCTS
HAZARDOUS MAY OCCUR CONDITIONS TO AVOID
POLYMERIZATION WILL NOT OCCUR X

SECTION VII - SPILL OF LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OF SPILLED
CONTAIN SPILL AND THEN FLUSH INTO WASTE TREATMENT FACILITIES.

WASTE DISPOSAL METHOD
DISPOSE IN MANNER CONSISTENT WITH FEDERAL, STATE OF LOCAL WASTE REGULATIONS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (SPECIFY TYPE)
VENTILATION LOCAL EXHAUST NORMAL SPECIAL
MECHANICAL (GENERAL) NORMAL OTHER
PROTECTIVE GLOVES N/A EYE PROTECTION GLASSES
OTHER PROTECTIVE EQUIPMENT N/A

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
NOT HAZARDOUS TO TRANSPORT-NOT REGULATED
USE AS DIRECTED.
OTHER PRECAUTIONS

LAST PAGE

MATERIAL SAFETY DATA SHEET

COOK'S INDUSTRIAL LUBRICANTS
5 NORTH STILES STREET
LINDEN, N. J. 07036

REVISION DATE
23-FEB-89

DATE ISSUED
17-APR-89

IDENTIFICATION AND EMERGENCY INFORMATION

COOK'S PRODUCT NAME:
Solvent B-27

COOK'S PRODUCT #:
E2I701A

CHEMICAL NAME:
Petroleum-based solvent

CAS #'S:
Mixture

PRODUCT APPEARANCE AND ODOR:
Clear liquid, solvent odor

CHEMICAL FAMILY:
Petroleum solvent

SYNONYMS:
Solvent cleaner

EMERGENCY TELEPHONE:
(201) 862-2500

COMPONENTS AND HAZARD INFORMATION

COMPONENTS:	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION
This product can be defined as:		
Hydrotreated heavy naphtha (petroleum)	64742-48-9	100%

It consists predominantly of C11-C12 isoparaffinic hydrocarbons.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HMIS):

Health	Flammability	Reactivity	BASIS
1	2	0	Recommended by Exxon

EXPOSURE LIMIT FOR TOTAL PRODUCT	BASIS
300 ppm (1900 mg/m3) for an 8-hour workday	Recommended by Exxon

TRANSPORTATION INFORMATION

TRANSPORTATION INCIDENT INFORMATION:
DOT: Combustible liquid, NOS NA 1993.

DOT IDENTIFICATION NUMBER:
UN 1255

EMERGENCY FIRST AID

E CONTACT:
If splashed into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

EMERGENCY FIRST AID

SKIN CONTACT:
In case of skin contact, remove contaminated clothing and wash skin thoroughly with soap and water.

INHALATION:
If overcome by vapor, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation, administer oxygen, if available.

INGESTION:
If ingested, DO NOT induce vomiting; call a physician immediately.

FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM):
COMBUSTIBLE - Per DOT 49 CFR 173.115
49°C (120°F)
ASTM D 56, Tag Closed Cup

AUTOIGNITION TEMPERATURE:
Approximately 349°C (660°F)
ASTM D 2155

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION:

Health	Flammability	Reactivity	BASIS
1	2	0	Recommended by Exxon

''ANDLING PRECAUTIONS:
.ep product away from heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (Approximate percent by volume in air):
Estimated values: Lower Flammable Limit 0.7% Upper Flammable Limit 7%

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES:
Foam, water spray (fog), dry chemical, carbon dioxide and vaporizing liquid type extinguishing agents may all be suitable for extinguishing fires involving this type of product, depending on size or potential size of fire and circumstances related to the situation. Plan fire protection and response strategy through consultation with local fire protection authorities or appropriate specialists.

The following procedures for this type of product are based on the recommendations in the National Fire Protection Association's "Fire Protection Guide on Hazardous Materials", Eighth Edition (1984):

Use dry chemical, foam or carbon dioxide. Water may be ineffective, but water should be used to keep fire-exposed containers cool. If a leak or spill has ignited, use water spray to disperse the vapors and to protect men attempting to stop a leak. Water spray may be used to flush spills away from exposures. Minimize breathing gases, vapor, fumes or decomposition products. Use supplied-air breathing equipment for enclosed or confined spaces or as otherwise needed.

te: The inclusion of the phrase "water may be ineffective" is to indicate .hat although water can be used to cool and protect exposed material, water may not extinguish the fire unless used under favorable conditions by experienced fire fighters trained in fighting all types of flammable liquid fires.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS:

FIRE AND EXPLOSION HAZARD INFORMATION

fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING:
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS:
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptons of exposure):
High vapor concentrations (greater than approximately 1000 ppm) are irritating to the eyes and the respiratory tract, may cause headaches and dizziness, are anesthetic, and may have other central nervous system effects.

NATURE OF HAZARD AND TOXICITY INFORMATION:
Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Laboratory animal studies have shown that prolonged and repeated inhalation exposure to light hydrocarbon vapors in the same naphtha boiling range as this product can produce adverse kidney effects in male rats. However, these effects were not observed in similar studies with female rats and male and female mice and in limited studies with other animal species. Additionally, in a number of human studies, there was no clinical evidence of such effects at normal occupational levels. It is therefore highly unlikely that the kidney effect observed in male rats have significant implications for humans exposed at or below the recommended vapor limits in the workplace.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion may cuase mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PHYSICAL DATA

e following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE:
Approximately 169-193°C (335-380°F)

SPECIFIC GRAVITY (15.6°C/15.6°C):
0.76

MOLECULAR WEIGHT:
160

pH:
Essentially neutral

POUR, CONGEALING OR MELTING POINT:
Less than -18°C (0°F)
Pour Point by ASTM D97

VISCOSITY:
1.29 cP @ 25°C ASTM D 445

VAPOR PRESSURE:
Less than 10 mm Hg @ 25°C
ASTM D 2879

VAPOR DENSITY (AIR = 1):
Greater than 5

PERCENT VOLATILE BY VOLUME:
100 @ 1 ATM. AND 25°C (77°F)

EVAPORATION RATE @ 1 ATM. AND 25°C (77°F):
(N-BUTYL ACETATE = 1)
0.1

SOLUBILITY IN WATER @ 1 ATM. AND 25°C (77°F):
Negligible; less than 0.1%

REACTIVITY

This product is stable and will NOT react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

TOXICITY

ORAL (Acute)	LD 50 > 5 g/kg (total body weight)
DERMAL (Acute)	LD 50 > 3.16 g/kg (total body weight)
EYE	N/E
INHALATION (Acute)	N/E
CHRONIC, SUBCHRONIC, ETC.	N/E

Medical Conditions Aggravated by Exposure: Unknown

This product does NOT contain any ingredients identified as carcinogenic by IRAC, NTP, or OSHA.

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Shut off and eliminate all ignition sources. Keep people away. Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Ventilate confined spaces. Open all ndows and doors. Keep product out of sewers and watercourses by diking or ampounding. Advise authorities if product has entered or may enter sewers, watercourses or extensive land areas. Assure conformity with local regulations. Continue to observe precautions for volatile, combustible vapors from absorbed

SPILL OR LEAK PROCEDURES

material.

WASTE DISPOSAL METHOD: (Consult federal, state, or local authorities for proper disposal procedures.)
Assure conformity with applicable disposal regulations. Dispose of absorbed material at an approved waste site or facility.

PROTECTION AND PRECAUTIONS

VENTILATION:
Use only with ventilation sufficient to prevent exceeding recommended exposure limit or buildup of explosive concentrations of vapors in air. Use explosion-proof equipment. No smoking or open lights.

RESPIRATORY PROTECTION: (Use only NIOSH approved equipment.)
Use supplied air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES:
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION:
Use splash goggles or face shield when eye contact may occur.

HER PROTECTIVE EQUIPMENT:
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES/ENGINEERING CONTROLS:
Keep containers closed when not in use. Do not handle near heat, sparks, flame. or strong oxidants. To prevent fire or explosion risk from static accumulation and discharge, effectively ground product transfer system in accordance with the National Fire Protection Association standard for petroleum products.

PERSONAL HYGIENE:
Minimize breathing vapor, mist, or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean before reuse; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

PREPARED BY: Dave Townsend Product Safety Manager

THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY STANDARDS, AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE AND THE CONDITIONS OF HANDLING AND USE, OR MISUSE ARE BEYOND OUR CONTROL, SELLER MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. USER SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

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MATERIAL SAFETY DATA SHEET

FOR COATINGS, RESINS AND RELATED MATERIALS

DATE OF PREP. 6-22-83

PRODUCT 8728-3

Section I

MANUFACTURER'S NAME RAFFI AND SWANSON, INC.

STREET ADDRESS 100 Eames Street

CITY, STATE, AND ZIP CODE Wilmington, Mass. 01887

EMERGENCY TELEPHONE NO. 617-933-4200

MANUFACTURER'S CODE IDENTIFICATION 8728-3 White Enamel

PRODUCT CLASS Solvent Based Compound

TRADE NAME N/A

Information on the composition of Raffi and Swanson, Inc. products is confidential proprietary information and is provided solely to aid in safe handling of these materials. Use or disclosure for any other purpose is expressly forbidden.

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	LEL	VAPOR PRESSURE
Xylene	55	100		1.0%	5.9 mm Hg
n-Butanol	10	100		1.4%	4.3 mm Hg

Section III — PHYSICAL DATA

BOILING RANGE 232-313°F.

VAPOR DENSITY [X] HEAVIER [ ] LIGHTER, THAN AIR

EVAPORATION RATE [ ] FASTER [X] SLOWER, THAN ETHER

PERCENT VOLATILE BY VOLUME 67.8%

WEIGHT PER GALLON 9.44#

Section IV — FIRE AND EXPLOSION HAZARD DATA

DOT CATEGORY Flammable Liquid
Flammable Liquid Class 1B

FLASH POINT 81°F. (Lowest flashing component)

LEL 1.0%

EXTINGUISHING MEDIA

Carbon Dioxide, Dry Chemical or Foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS

Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES

Water may be ineffective. Water may be used to cool closed containers.

TRW-02341

LIABILITY IS EXPRESSLY DISCLAIMED FOR ANY LOSS OR INJURY ARISING OUT OF THE USE OF THIS INFORMATION OR ANY MATERIALS DESIGNATED.

R&S Form R-421

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE See Section II

EFFECTS OF OVEREXPOSURE

INHALATION: Vapor irritating to eyes, nose, and throat. Can cause headache, dizziness, nausea, weakness, loss of consciousness.

EYE CONTACT: Burning and irritation.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Provide fresh air. Give artificial respiration or oxygen if necessary. Call physician.

EYE CONTACT: Lubricate eye with C. P. Castor Oil or wash with large amounts of water. SEE PHYSICIAN.

Section VI — REACTIVITY DATA

STABILITY [ ] UNSTABLE [X] STABLE CONDITIONS TO AVOID

INCOMPATABILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION [ ] MAY OCCUR [X] WILL NOT OCCUR

CONDITIONS TO AVOID

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition. Avoid breathing vapors. Ventilate area. Remove with inert absorbent and non-sparking tools.

WASTE DISPOSAL METHOD Incinerate in approved facility. Solid residue to sanitary land fill. Dispose in accordance with local, state, and federal regulations. Do not incinerate closed containers.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION

Avoid breathing concentrated vapors or overspray particles if sprayed. In confined or poorly ventilated areas, use Bureau of Mines approved mask with chemical canister or supplied air.

VENTILATION

Provide general mechanical ventilation or local exhaust ventilation sufficient to keep TLV of vapors below 100 PPM.

PROTECTIVE GLOVES Use for prolonged or repeated contact.
Safety goggles or face shield where splashes can occur.

OTHER PROTECTIVE EQUIPMENT

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

FLAMMABLE. Keep in closed containers. Avoid sparks or flame when handling. Can be stored under ambient conditions.

OTHER PRECAUTIONS

Avoid prolonged contact with the skin.

TRW-02342

LIABILITY IS EXPRESSLY DISCLAIMED FOR ANY LOSS OR INJURY ARISING OUT OF THE USE OF THIS INFORMATION OR ANY MATERIALS DESIGNATED.

Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE 9734-076J

DATE OF PREP. Jan. 21, 1986

Section I

MANUFACTURER: RAFFI & SWANSON INC.
100 EAMES STREET
WILMINGTON, MA 01887

MANUFACTURERS' CODE IDENTIFICATION: 9734-076J Black Bake Enamel

EMERGENCY TELEPHONE NO.: 617-933-4200

PRODUCT CLASS: Solvent Based Coating

TRADE NAME: None

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX. PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Propylene Glycol Methyl Ether (Dowanol PM)	107-98-2	15	100		Not Avail.	8
Propylene Glycol Methyl Ether Acetate (Dowanol PM Acetate)	108-65-6	10	None Est.		1.5	3.7
Dipropylene Glycol Methyl Ether (Dowanol DPM)	34590-94-8	5	None Est. 100 recomm.		Not Avail.	0.05
Toluol	108-88-3	10	100		1.2	22
n-Butyl Alcohol - Skin	71-36-3	<5	50		1.4	4.3
iso-Butyl Alcohol	78-83-1	<5	50		1.7	8
Xylol	1330-20-7	<5	100		1.0	5.9
Formaldehyde *C*	50-00-0	0.07	1	-----Not Applicable-------		
Zinc Chromate	13530-65-9	10	----------Not Applicable----------			
(dispersed in liquid)		(0.95 as Cr)		0.05asCr	--Not Applicable---	

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 225-298°F

PERCENT VOLATILE BY VOL: 65%

WEIGHT PER GAL: 10.1#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid-Class IB

FLASH POINT (closed cup): 40°F lowest flashing component

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC., RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

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Section V — HEALTH HAZARD DATA (Based on data for ... ingredients)

THRESHOLD LIMIT VALUE - See Section II

EFFECTS OF OVEREXPOSURE

CHRONIC TOXICITY: See Section IX.

INHALATION: Vapor irritating to eyes, nose, and throat. Can cause headache, dizziness, nausea, weakness, loss of consciousness. Prolonged overexposure may cause permanent injury

SKIN: Penetrates skin.
Prolonged and repeated contact may cause drying of the skin, and absorption of harmful amounts.

EYE CONTACT: Burning and irritation.

INGESTION: Do not take internally. May cause nausea, vomiting, diarrhea and other toxic effects.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Provide fresh air. Give artificial respiration or oxygen if necessary. CALL A PHYSICIAN.

SKIN: Wash thoroughly with soap and water. Remove contaminated clothing and shoes. Wash clothes thoroughly before re-use.

EYE CONTACT: Flush with water for at least 15 minutes. SEE PHYSICIAN.

INGESTION: DO NOT INDUCE VOMITING.
If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. CALL A PHYSICIAN.

Section VI — REACTIVITY DATA

STABILITY: ☐ UNSTABLE ☒ STABLE HAZARDOUS POLYMERIZATION: ☐ MAY OCCUR ☒ WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion produces carbon monoxide and carbon dioxide. Unidentified organic compounds may be formed.

MATERIALS AND CONDITIONS TO AVOID: Strong acids, strong alkalis, strong oxidizers.

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all sources of ignition. Avoid breathing vapors. Ventilate area. Remove with inert absorbent and non-sparking tools.

WASTE DISPOSAL METHOD: Incinerate in approved facility. Do not incinerate closed containers. Dispose in accordance with local, state and federal regulations.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Avoid breathing concentrated vapors or overspray particles if sprayed. In confined or poorly ventilated areas, use NIOSH approved mask with chemical canister or supplied air.

VENTILATION: Provide general mechanical ventilation or local exhaust ventilation sufficient to keep concentration of solvent vapors below 50 PPM

PROTECTIVE GLOVES: Use chemical resistant, impervious gloves for contact.

EYE PROTECTION: Safety goggles or face shield where splashes can occur.

OTHER PROTECTIVE EQUIPMENT:

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: ☒ FLAMMABLE ☐ COMBUSTIBLE
Keep in closed containers. Avoid sparks or flame when handling. Can be stored under ambient conditions. Keep closures tight and containers upright to prevent leakage.

OTHER PRECAUTIONS: Avoid contact with the skin. Use good personal hygiene practices. Wash hands thoroughly before eating/drinking/smoking/using toilet facilities.

Inhalation of Formaldehyde has been shown to cause cancer in laboratory animals.

Contains chromate pigment (suspect carcinogen). If subject to spray application or sanding operation, control exposure level below 0.05mg/m^3 as chromium. If controls are not adequate, use respirator.

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Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 9734-AT40B

DATE OF PREP. 1/22/86

Section I

APPROVED APR 21 1987 ENVIRONMENTAL ENGINEERING

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

MANUFACTURERS' CODE IDENTIFICATION: 9734-AT40B Blue Bake Enamel

EMERGENCY TELEPHONE NO.: 617-933-4200

PRODUCT CLASS: Solvent Based Coating

TRADE NAME: None

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX. PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Propylene Glycol Methyl Ether (Dowanol PM)	107-98-2	20	100		Not Avail.	8
Propylene Glycol Methyl Ether Acetate (Dowanol PM Acetate)	108-65-5	10	None Est.		1.5	3.7
Dipropylene Glycol Methyl Ether (Dowanol DPM)	34590-94-8	10	None Est. (100 recomm)		Not Avail.	0.05
Toluol	108-88-3	10	100		1.2	22
n-Butyl Alcohol - Skin	71-36-3	< 5	50		1.4	4.3
iso-Butyl Alcohol	78-83-1	< 5	50		1.7	8
Xylol	1330-20-7	< 5	100		1.0	5.9
Zinc Chromate *C* (dispersed in liquid)	13530-65-9	10 (0.94 asCr)	----------Not Applicable----------	0.05asCr	---Not Applicable-	
Formaldehyde *C*	50-00-0	0.06	1	-----Not Applicable-------		

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 225-298°F

PERCENT VOLATILE BY VOL: 67%

WEIGHT PER GAL: 9.7#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid-Class IB

FLASH POINT (closed cup): 40°F lowest flashing component

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC., RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

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Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 9734-CC21G

DATE OF PREP. Jan. 21, 1986

Section I

APPROVED

APR 21 1987

ENVIRONMENTAL ENGINEERING

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

MANUFACTURERS' CODE IDENTIFICATION: 9734-CC21G Green Bake Enamel

EMERGENCY TELEPHONE NO.: 617-933-4200

PRODUCT CLASS: Solvent Based Coating

TRADE NAME: None

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX. PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Propylene Glycol Methyl Ether (Dowanol PM)	107-98-2	15	100		Not Avail.	8
Propylene Glycol Methyl Ether Acetate (Dowanol PM Acetate)	108-65-5	10	None est.		1.5	3.7
Dipropylene Glycol Methyl Ether (Dowanol DPM)	34590-94-8	5	None est. (100recomm)		Not Avail.	0.05
Toluol	108-88-3	10	100		1.2	22
n-Butyl Alcohol - Skin	71-36-3	<5	50		1.4	4.3
iso-Butyl Alcohol	78-83-1	<5	50		1.7	8
Xylol	1330-20-7	<5	100		1.0	5.9
Formaldehyde *C*	50-00-0	0.07	1	-----Not	Applicable------	

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 225-298°F

PERCENT VOLATILE BY VOL: 65%

WEIGHT PER GAL: 10.3#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid-Class IB

FLASH POINT (closed cup): 40°F lowest flashing component

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC., RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

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Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 9734-AA81Y

DATE OF PREP. March 18, 1986

Section I

APPROVED

APR 21 1987

ENVIRONMENTAL ENGINEERING

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

MANUFACTURERS' CODE IDENTIFICATION:
9734-AA81Y **Yellow Bake Enamel**

EMERGENCY TELEPHONE NO.: 617-933-4200

PRODUCT CLASS: **Solvent Based Coating**

TRADE NAME: None

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX. PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Propylene Glycol Methyl Ether (Dowanol PM)	107-98-2	20	100		Not Avail	8
Propylene Glycol Methyl Ether Acetate (Dowanol PM Acetate)	108-65-5	10	None Est.		1.5	3.7
Dipropylene Glycol Methyl Ether (Dowanol DPM)	34590-94-8	5	None Est. (100recomm)		Not Avail.	0.05
Toluol	108-88-3	10	100		1.2	22
n-Butyl Alcohol - Skin	71-36-3	< 5	50		1.4	4.3
iso-Butyl Alcohol	78-83-1	< 5	50		1.7	8
Xylol	1330-20-7	< 5	100		1.0	5.9
Zinc Chromate *C* (dispersed in liquid)	13530-65-9	10 (1.0 as Cr)	←Not Applicable→	0.05 as Cr	←Not Applicable→	
Formaldehyde *C*	50-00-0	0.06	1		←Not Applicable→	

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 225-298°F

PERCENT VOLATILE BY VOL: 65%

WEIGHT PER GAL: 10.0#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid - Class IB

FLASH POINT (closed cup): 40°F lowest flashing component

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC., RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

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TRW-02347

0908-3728

NFPA Code	
Health	1
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 6045

DATE OF PREP: October 21, 1986

Section I

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

EMERGENCY TELEPHONE NO.: 617-933-4200

TRADE NAME: None

MANUFACTURERS' CODE IDENTIFICATION: Clear Primaplate 6045

PRODUCT CLASS: Solvent Based Compound

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Ethyl Alcohol	64-17-5	80	1000		4.3	45
Propylene Glycol Methyl Ether (Dowanol PM)	107-98-2	10	100		Not Avail.	8
Methyl Alcohol - Skin	67-56-1	4	200		6.0	96

Mixture does not contain any known or suspect carcinogen according to ACGIH, OSHA, NTP or IARC.

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 147-248°F

PERCENT VOLATILE BY VOL: 93.5%

WEIGHT PER GAL: 7.1#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid - Class IB

FLASH POINT (closed cup): 52°F lowest flashing component

LEL: 4.3%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC. RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

Section V — HEALTH HAZARD DATA (Based on data for individual ingredients)

THRESHOLD LIMIT VALUE - See Section II

EFFECTS OF OVEREXPOSURE

CHRONIC TOXICITY: See Section IX.

INHALATION: Vapor irritating to eyes, nose, and throat. Can cause headache, dizziness, nausea, weakness, loss of consciousness. Prolonged overexposure may cause permanent injury.

SKIN: Penetrates skin.
Prolonged and repeated contact may cause drying of the skin, and absorption of harmful amounts.

EYE CONTACT: Burning and irritation.

INGESTION: Do not take internally. May cause nausea, vomiting, diarrhea and other toxic effects.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Provide fresh air. Give artificial respiration or oxygen if necessary. CALL A PHYSICIAN.

SKIN: Wash thoroughly with soap and water. Remove contaminated clothing and shoes. Wash clothes thoroughly before re-use.

EYE CONTACT: Flush with water for at least 15 minutes. SEE PHYSICIAN.

INGESTION: DO NOT INDUCE VOMITING.
If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. CALL A PHYSICIAN.

Section VI — REACTIVITY DATA

STABILITY: ☐ UNSTABLE ☒ STABLE HAZARDOUS POLYMERIZATION: ☐ MAY OCCUR ☒ WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion produces carbon monoxide and carbon dioxide. Unidentified organic compounds may be formed.

MATERIALS AND CONDITIONS TO AVOID: Strong acids, strong alkalis, strong oxidizers.

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all sources of ignition. Avoid breathing vapors. Ventilate area. Remove with inert absorbent and non-sparking tools.

WASTE DISPOSAL METHOD: Incinerate in approved facility. Do not incinerate closed containers. Dispose in accordance with local, state and federal regulations.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Avoid breathing concentrated vapors or overspray particles if sprayed. In confined or poorly ventilated areas, use NIOSH approved mask with chemical canister or supplied air.

VENTILATION: Provide general mechanical ventilation or local exhaust ventilation sufficient to keep concentration of solvent vapors below 100 PPM

PROTECTIVE GLOVES: Use chemical resistant, impervious gloves for contact.

EYE PROTECTION: Safety goggles or face shield where splashes can occur.

OTHER PROTECTIVE EQUIPMENT:

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: ☒ FLAMMABLE ☐ COMBUSTIBLE
Keep in closed containers. Avoid sparks or flame when handling. Can be stored under ambient conditions. Keep closures tight and containers upright to prevent leakage.

OTHER PRECAUTIONS: Avoid contact with the skin. Use good personal hygiene practices. Wash hands thoroughly before eating drinking/smoking/using toilet facilities.

Repeated overexposure to methanol may injure retina and optic nerve and cause blindness.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON INC. RAFFI AND SWANSON INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED

NFPA Code	
Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 4292-2J

DATE OF PREP. October 21, 1986

Section I

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

MANUFACTURERS' CODE IDENTIFICATION:
002 Glossy Black Bake Enamel 4292-2J

EMERGENCY TELEPHONE NO.: 617-933-4200

PRODUCT CLASS: Solvent Based Compound

TRADE NAME: None

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX PERCENT BY WEIGHT	TLV PPM	TLV mg M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Xylol	1330-20-7	50	100		1.0	5.9
n-Butyl Alcohol - Skin	71-36-3	5	50		1.4	4.3
Formaldehyde *C*	50-00-0	0.6	1		--Not Applicable-----	
Carbon Black (dispersed in liquid)	1333-86-4	--	---------Not applicable----------			

C indicates a carcinogen or suspect carcinogen according to ACGIH, OSHA, NTP or IARC.

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 243-291°F

PERCENT VOLATILE BY VOL: 67.2%

WEIGHT PER GAL: 8.09#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid - Class IB

FLASH POINT (closed cup): 81°F lowest flashing component

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

TRW-02350

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC. RAFFI AND SWANSON, INC. ASSUMES NO LEGAL RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF THESE DATA OR ANY MATERIALS DESIGNATED.

S-527

0908-3731

MATERIAL SAFETY DATA SHEET

NPCA 1-72

FOR COATINGS, RESINS AND RELATED MATERIALS

(Approved by U.S. Department of Labor "Essentially Similar" to Form OSHA-20)

DATE OF PREP 11/27/84

Section I

MANUFACTURER'S NAME: MAN-GILL CHEMICAL COMPANY-PAINT GROUP

STREET ADDRESS: 214 NORTHFIELD ROAD CITY, STATE, AND ZIP CODE: BEDFORD, OHIO 44146

EMERGENCY TELEPHONE NO.: ~~216/232-3800~~ 1-800-424-9300

PRODUCT CLASS: SOLVENT MANUFACTURERS CODE IDENTIFICATION

TRADE NAME: SOLVENT BLEND REDUCER X84-439

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	LEL	VAPOR PRESSURE
Toluene	60	200		1.2	38.0
Isopropyl Alcohol	15	400		2.5	33.0
n-Butyl Acetate	25	260		1.7	10.0

Section III — PHYSICAL DATA

BOILING RANGE: 180-260° F

VAPOR DENSITY: [ ] HEAVIER, [X] LIGHTER THAN AIR

EVAPORATION RATE: [ ] FASTER [X] SLOWER THAN ETHER

PERCENT VOLATILE BY VOLUME: 100

WEIGHT PER GALLON: 7.15 lbs

Section IV — FIRE AND EXPLOSION HAZARD DATA

DOT CATEGORY: Flammable Liquid

FLASH POINT: 40°F

LEL: 1.2

EXTINGUISHING MEDIA

Mechanical Foam, Dry Chemical, CO_2, Water Fog

UNUSUAL FIRE AND EXPLOSION HAZARDS

A vapor accumulation would flash and/or explode if ignited.

SPECIAL FIRE FIGHTING PROCEDURES

A straight water stream would spread paint fires.

TRW-02351

0908-3732

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE 200 ppm

EFFECTS OF OVEREXPOSURE

Inhalation — headache, nausea, impairment of reaction time and coordination.
Skin contact— prolonged and repeated contact may cause irritation.

EMERGENCY AND FIRST AID PROCEDURES

Inhalation — move to fresh air.
Skin contact— wash with soap and water.
Eye contact — flush with water for at least 15 minutes; call a physician.

Section VI — REACTIVITY DATA

STABILITY [ ] UNSTABLE [X] STABLE CONDITIONS TO AVOID None

INCOMPATABILITY (*Materials to avoid*) None

HAZARDOUS DECOMPOSITION PRODUCTS

Carbon monoxide, carbon dioxide, smoke, oxides of nitrogen

HAZARDOUS POLYMERIZATION [ ] MAY OCCUR [X] WILL NOT OCCUR

CONDITIONS TO AVOID None

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Remove all sources of ignition, ventilate and remove with inert absorbent.

WASTE DISPOSAL METHOD Incinerate in approved facility. Do not incinerate closed containers. Dispose in accordance with federal, state and local pollution control requirements.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION

Adequate ventilation is required. In confined areas, use U.S.Bureau of Mines approved respirator device.

VENTILATION

Provide sufficient ventilation to keep vapor concentration below the given TLV and LEL limits.

PROTECTIVE GLOVES Required for prolonged or repeated contact.
EYE PROTECTION Use safety eyewear with unperforated sideshields.
OTHER PROTECTIVE EQUIPMENT As required to avoid wetting clothes.

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Keep away from heat, sparks and open flame. Close container after each use. Consult NFPA code for additional storage requirements.

OTHER PRECAUTIONS

Use approved bonding and grounding procedures. Paint accumulations (such as spray booth cleanings) may spontaneously ignite. Immerse accumulations in water.

Experimental Dept #[illegible]

McGean-Rohco, Inc.

1250 Terminal Tower, Cleveland, Ohio 44113, 216/621-6425

MATERIAL SAFETY DATA SHEET

APPROVED
MAY 01 1987
ENVIRONMENTAL ENGINEERING

Product Name: Special Reducer #75-988	**Emergency Phone No.:** 313-872-1800
Plant Address: 38521 Schoolcraft Avenue, Livonia, Michigan 48150	**Chemtrec Phone No.** 800/424-9300
Prepared By: M. Arthur Detrisac — **Issue Date:** 1-21-87	**Revised Date:**

INGREDIENTS AND HAZARDOUS COMPONENTS

Material	%	TLV	C.A.S. #	Suspect Carcinogen
Methyl Isobutyl Ketone	50	50 PPM	108-10-1	No
Xylene	50	100 PPM	1330-20-7	No

PHYSICAL DATA

Boiling Point: 176-285°F.	**Freezing Point:** UK	**Specific Gravity:** 0.84	**pH:** N.A.
Vapor Pressure at 20°C: 5.1 MM	**Vapor Density (Air = 1):** UK	**% Volatiles by Volume:** 100	**Odor:** Characteristic Paint
Evaporation Rate (Butyl Acetate = 1) 0.75		**Solubility in Water:** Insoluble	
Appearance and Form: Clear Liquid			

FIRE AND EXPLOSION HAZARD DATA

Flash Point: 65°F.	**Flammable Limits in Air:**
Test Method: Seta Flash	**% By Volume** Upper: Lower: 1.0
Extinguishing Media: CO_2, Foam, Dry Chemical, Water Fog.	
Special Fire Fighting Procedures: Use water to cool closed containers.	
Unusual Fire and Explosion Hazards: Closed containers may explode if exposed to extreme heat.	
DOT Classification: Flammable Liquid NOS	**Note:** UK = Unknown NA = Not Applicable

After 5:00 P.M., Call 559-2775 or 455-6587

TRW-02353

0908-3734

HEALTH HAZARD DATA

Effects of Overexposure and Primary Entries to Body: Inhalation: Anesthetic. Irritation of the respiratory tract or acute nervous depression characterized by headache, dizziness, staggering gait, confusion, unconsciousness or coma. Eye Contact: Primary irritation. Skin Contact: Primary irritation.

Emergency and First Aid Procedures: Inhalation: Remove to fresh air. Restore breathing. Treat symptomatically. Consult physician. Splash (eyes): Flush immediately with large amounts of water for at least 15 minutes. Take to physician for medical treatment. Splash (skin): Wash affected areas with soap and water. Remove contaminated clothing. Consult physician if irritation persists. Ingestion: Drink 1 or 2 glasses of water to dilute. Do not induce vomiting. Treat symptomatically. Consult physician or poison control center immediately.

REACTIVITY DATA

☒ Stable ☐ Unstable **Conditions to Avoid:** Heat, Sparks, Open Flame and Fire

Incompatability — Materials to Avoid: Strong oxidizing agents.

Hazardous Decomposition Products: CO, CO_2, oxides of nitrogen.

Hazardous Polymerization: ☐ May Occur ☒ Will Not Occur

SPILL OR LEAK PROCEDURES

Spills: Dike area to contain spill. Avoid breathing vapors. Recover free liquid by addition of inert absorbent to spill. Clean up area and place material in a suitable disposal container using non-sparking tools.

Waste Disposal Methods: Disposal must be made in accordance with local, state and federal disposal laws. Incineration or landfilling must be in an approved facility. Do not incinerate closed containers.

SPECIAL PROTECTION INFORMATION

Respirator: None required if adequate ventilation used.

Ventilation: Local-normal rate.

Gloves:	Eye and Face:	Other:
Rubber	Goggles	Rubber apron

Handling and Storage: Do not store above 120°F. Store away from high heat, sparks or open flame. Avoid skin and eye contact. Avoid prolonged or repeated breathing of vapors or mist.

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

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• COPYRIGHT _____ McGean-Rohco, Inc.
Date

Spectro Wax
CORP

Cold Coat (See "C" file)

Neutral Cleaner (See "N" file)

0908-3736

TRW-02355

CHESTERTON®

MATERIAL SAFETY DATA SHEET

Essentially Similar to Form OSHA-20

DATE OF PREP. February 4, 1983

Section I

MANUFACTURER'S NAME: A. W. CHESTERTON COMPANY
MIDDLESEX INDUSTRIAL PARK
STONEHAM, MASSACHUSETTS 02180

EMERGENCY TELEPHONE NO. 617-438-7000 (Day)
617-438-7013 (Night)

TRADE NAME: Spraflex® (Aerosol)

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	VAPOR PRESSURE
Perchloroethylene	10-15	100	--	13 mm Hg
1,1,1-Trichloroethane	15-20	350	1,900	120 mm Hg
Propane	5-10	1000	--	--
Isobutane	5-10	1000	--	--

Section III — PHYSICAL DATA

INITIAL BOILING POINT 74°C. (165°F.)

VAPOR DENSITY [x] HEAVIER [ ] LIGHTER THAN AIR

EVAPORATION RATE [ ] FASTER [x] SLOWER THAN ETHER

PERCENT VOLATILE BY VOLUME 55

WEIGHT PER GALLON 7.6 lbs. (0,91kg/l)

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT 270°C. (520°F.) Open Cup Product Only

LEL --

DOT CLASSIFICATION
Compressed Gas, n.o.s.
Flammable Gas

EXTINGUISHING MEDIA

Carbon dioxide, dry chemical, foam or water fog

UNUSUAL FIRE AND EXPLOSION HAZARDS

Pressurized containers when heated are a potential explosive hazard. Thermal decomposition can form hydrogen chloride, and other toxic fumes.

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus. Cool exposed containers with water.

The information contained herein is based on data believed to be correct. However, no warranty is expressed or implied regarding the accuracy of this data. Since the information contained herein may be applied under conditions beyond our control, the persons receiving it shall make their own determination of the suitability of the product for their particular purpose.

RECEIVED
JUN 18 1984

7-82 REV. 1

TRADE NAME Spraflex® (Aerosol) DATE February 4, 1983

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE 100 ppm

EFFECTS OF OVEREXPOSURE

Inhalation of vapor concentrations in excess of TLV may result in dizziness and headache, and loss of consciousness. Prolonged or repeated skin contact may cause skin irritation and may defat skin.

EMERGENCY AND FIRST AID PROCEDURES If overcome by vapors, remove to fresh air. If not breathing, give artificial respiration. Contact physician. Wash skin with soap and water. Flush eyes with large amounts of water for at least 15 minutes contact. Consult physician. If ingested, do not induce vomiting. Contact physician immediately.

Section VI — REACTIVITY DATA

STABILITY [ ] UNSTABLE [X] STABLE CONDITIONS TO AVOID Open flames and red hot surfaces.

INCOMPATABILITY *(Materials to avoid)* Strong oxidizers like liquid chlorine and concentrated oxygen.

HAZARDOUS DECOMPOSITION PRODUCTS Hydrogen chloride and other toxic fumes.

HAZARDOUS POLYMERIZATION [ ] MAY OCCUR [X] WILL NOT OCCUR

CONDITIONS TO AVOID

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

Evacuate area. Provide adequate ventilation. Contain spill to a small area. Flush away from ignition sources with water. Pick up with absorbent material and transfer to a suitable container for disposal.

WASTE DISPOSAL METHOD

Incinerate absorbed material. Do not incinerate sealed containers. Landfill sealed containers in an approved area. Check local, State and Federal regulations.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION Not normally needed

VENTILATION Room ventilation is usually adequate

PROTECTIVE GLOVES Not normally needed

EYE PROTECTION Safety glasses

OTHER PROTECTIVE EQUIPMENT None

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

Do not store in direct sunlight or above 49°C. (120°F.)

OTHER PRECAUTIONS

D.P.

CHESTERTON®

MATERIAL SAFETY DATA SHEET

Essentially Similar to Form OSHA-20

DATE OF PREP. February 4, 1983

Section I

MANUFACTURER'S NAME A. W. CHESTERTON COMPANY
MIDDLESEX INDUSTRIAL PARK
STONEHAM, MASSACHUSETTS 02180

EMERGENCY TELEPHONE NO. 617-438-7000 (Day)
617-438-7013 (Night)

TRADE NAME Spraflex® (Bulk)

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	VAPOR PRESSURE
Perchloroethylene	10-15	100	--	13 mm Hg
1,1,1-Trichloroethane	15-20	350	1,900	120 mm Hg

Section III — PHYSICAL DATA

INITIAL BOILING POINT 74°C. (165°F.)

VAPOR DENSITY [X] HEAVIER [ ] LIGHTER THAN AIR

EVAPORATION RATE [ ] FASTER [X] SLOWER THAN ETHER

PERCENT VOLATILE BY VOLUME 30

WEIGHT PER GALLON 9.4 lbs. (1,12kg/l)

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT 270°C. (520°F.) Open Cup

LEL --

DOT CLASSIFICATION Nonhazardous
Not Restricted

EXTINGUISHING MEDIA

Carbon dioxide, dry chemical, foam or water fog

UNUSUAL FIRE AND EXPLOSION HAZARDS

Thermal decomposition can form hydrogen chloride and other toxic fumes.

SPECIAL FIRE FIGHTING PROCEDURES

Wear self-contained breathing apparatus.

The information contained herein is based on data believed to be correct. However, no warranty is expressed or implied regarding the accuracy of this data. Since the information contained herein may be applied under conditions beyond our control, the persons receiving it shall make their own determination of the suitability of the product for their particular purpose.

TRADE NAME Spraflex® (Bulk) DATE February 4, 1983

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE 100 ppm

EFFECTS OF OVEREXPOSURE Inhalation of vapor concentrations in excess of TLV may result in dizziness and headache and in extreme cases, loss of consciousness. Prolonged or repeated skin contact may cause skin irritation and may defat skin.

EMERGENCY AND FIRST AID PROCEDURES If overcome by vapors, remove to fresh air. If not breathing, give artificial respiration. Contact physician. Wash skin with soap and water. Flush eyes with water for at least 15 minutes Consult physician. If ingested, do not induce vomiting. Contact physician immediately.

Section VI — REACTIVITY DATA

STABILITY [ ] UNSTABLE [X] STABLE CONDITIONS TO AVOID Open flames and red hot surfaces.

INCOMPATABILITY *(Materials to avoid)* Strong oxidizers like liquid chlorine and concentrated oxygen.

HAZARDOUS DECOMPOSITION PRODUCTS Hydrogen chloride and other toxic fumes.

HAZARDOUS POLYMERIZATION [ ] MAY OCCUR [X] WILL NOT OCCUR

CONDITIONS TO AVOID

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED Evacuate area. Provide adequate ventilation. Contain spill to a small area. Flush away from ignition sources with water. Pick up with absorbent material and transfer to a suitable container for disposal.

WASTE DISPOSAL METHOD Incinerate absorbed material. Check local, State and Federal regulations.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION Not normally needed

VENTILATION Room ventilation is usually adequate

PROTECTIVE GLOVES Chemical-resistant gloves

EYE PROTECTION Safety glasses

OTHER PROTECTIVE EQUIPMENT None

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

OTHER PRECAUTIONS

D.P.

SPRAFLEX®

Surface lubricant for chain drives, open gears, and wire rope.

SERVICES:
Elastic, retractable film to cushion and lubricate load bearing surfaces of chain drives, open gears, wire rope winches, machine tools, metal forming presses, etc. Resists extrusion by bonding a "wear shield" to metals.

Bonds a WEAR-SHIELD to metal surfaces.
SPRAFLEX is a complex lubricating compound that bonds a WEAR-SHIELD to load bearing surfaces. Where extreme pressures would extrude ordinary oils and greases, SPRAFLEX holds a lubricating cushion between friction surfaces.

Replaces lubricant every revolution.
Not only does SPRAFLEX resist extrusion, it replaces its own lubricant every revolution by forming an elastic, retractable film.

Chain drives
Forms elastic film. Reduces sprocket-to-chain wear and noise.

Wire ropes
SPRAFLEX cushions the wire-to-wire contact that wears out wire rope.

Open gears
SPRAFLEX bonds anti-wear shield to metals. Stays put under high pressures.

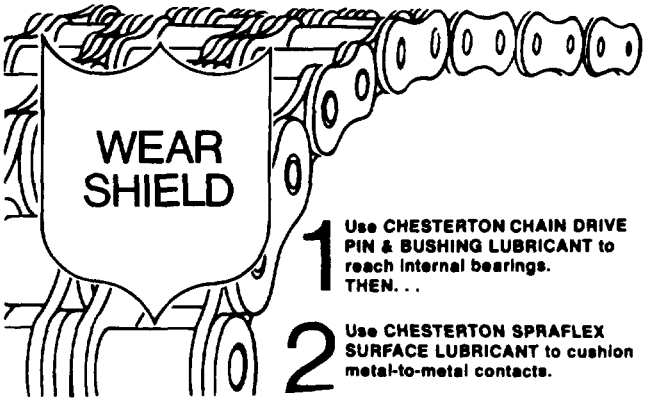
Water resistant and rust resistant.
Regular applications of SPRAFLEX maintain a WEAR-SHIELD that repels water and guards against rust and corrosion.

Quiets, lubricates and protects in severe environments.
Highly efficient, long-lasting lubricant for equipment and machinery exposed to the weather or indoors to moisture and industrial fumes.

Authorized by the United States Department of Agriculture (USDA) for use in federally inspected meat and poultry plants.

FEATURES:
- ☐ Self-Adhering Lubricant
- ☐ Water Resistant
- ☐ Resistant to Acid Fumes
- ☐ Moisture Barrier
- ☐ Resists Extrusion
- ☐ USDA Accepted

2-SHOT TREATMENT
A modern concept to protect chain drives.



3

CHESTERTON

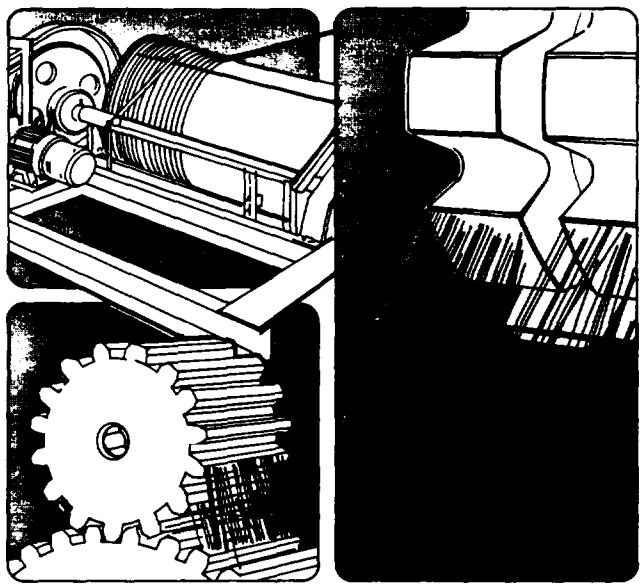
SPRAFLEX®

SAFETY ENGINEERING GUIDE

Petroleum Base Lubricant - Flash Point 215°C (420°F)
TLV 100

PRECAUTIONARY INFORMATION:
As with any organic solvent based product, care should be taken to avoid excessive inhalation of vapors. This is especially important in enclosed areas or areas with poor ventilation. This product has a Threshold Limit Value (TLV) of about 100 parts per million (ppm). Care should be taken to avoid keeping the skin continually wet with this product. Occasional skin contact should not be damaging, but repeated or prolonged contact may defat the skin and possibly cause dermatitis.

APPLICATIONS:



PROPERTIES:

Bulk (Liquids)	
Specific Gravity at 70°F	1.03-1.11
Wt./Gal.	8.6-9.2 lbs. (1.0-1,1 kg./l.)
Flash Point, Closed Cup	215°C (420°F)
Total Solids	60%
TLV, ppm	100
Diluents	Volatile chlorinated solvents
Solids (Dry)	
Specific Gravity at 70°F	1.1
Wt./Gal	9.1 lbs. (1,1 kg/l.)
Flash Point, Closed Cup	215°C (420°F)
Viscosity, SSU at 210°F	3000
Odor	Negligible

DIRECTIONS:
Apply using handy CHESTERTON pressurized container or transfer economical bulk product to squirt oiler or oil can with extended spout.

CAUTION:
Stand well away from moving machinery at all times. For added safety, equipment should be stopped prior to use of Spraflex.

A.W. CHESTERTON CO.
MIDDLESEX INDUSTRIAL PARK ROUTE 93
STONEHAM, MASSACHUSETTS 02180
Tel. Area 617-438-7000 • Telex Number 94-9417
Cable Address Chesterton Stoneham, Mass.

AFFILIATE COMPANIES
CHESCO, INC., Stoneham, Mass., U.S.A.
CHESTERTON INTERNATIONAL, Bantry, Ireland
CHESTERTON INDUSTRIES B.V., Dublin, Ireland
CHESTERTON B.V., Oss, The Netherlands
A.W. CHESTERTON, LTD., Burlington, Ontario, Canada
CHESTERTON MEXICANA, S.A., Naucalpan de Juarez, Mexico

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FORM NO. 74310—5/81—PRINTED IN U.S.A.

DISTRIBUTED BY:

35 Crit

Health	2
Flammability	4
Reactivity	0
Personal Protection	A

HMIS Ratings

BOWMAN DISTRIBUTION MATERIAL SAFETY DATA SHEET

Health	2
Flammability	4
Reactivity	0
Specific Hazard	

NFPA Ratings

SECTION I

PRODUCT NAME SPRAY[redacted]	BOWMAN PART NO. 21950 (page 1 of 2)
SUPPLIER Bowman Distribution, Barnes Group Inc.	EMERGENCY TELEPHONE NO. (216) 391-7200[redacted]
ADDRESS 850 East 72nd Street, Cleveland, OH 44103	DATE 1/22/90
HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) Consumer Commodity ORM-D UN-1954	
ADDITIONAL HAZARD CLASSES (as applicable) None	
CHEMICAL FAMILY Mixture	FORMULA TM-3151

SECTION II - HAZARDOUS INGREDIENTS

CAS REGISTRY NUMBER	%W	%V	CHEMICAL NAME(S)	OSHA PEL	ACGIH TLV	STEL Other Limits	Listed as Carcinogen NTP, IARC or OSHA 1910(z) (specify)
110-54-3	13		Hexane	500	50	N.E.	No
71-55-6	35		*1,1,1 Trichloroethane	350	350	450	No
74-98-6	25		Propane/Isobutane	1000	1000	Asphyxiant	No
	27		Non-Hazardous	N.A.	N.A.	N.A.	No

*ALL CHEMICAL COMPOUNDS MARKED WITH AN ASTERISK (*) ARE TOXIC CHEMICALS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) OF 1986 AND 40 CFR PART 372.

SECTION III - PHYSICAL DATA

BOILING POINT -40°F - 191 °F ____ °C		SPECIFIC GRAVITY (H_2O = 1)	0.8		
VAPOR PRESSURE @ 70 °F ____ °C [ ] 55 mm Hg [XX] psi		PERCENT VOLATILE BY VOLUME (%)	N.E.	PERCENT SOLID BY WEIGHT (%)	N.E.
VAPOR DENSITY (AIR = 1) Heavier than air.	4.0	EVAPORATION RATE (= 1) Butyl Acetate	<4		
SOLUBILITY IN WATER	NIL	PH =	N.A.		
APPEARANCE AND ODOR Cloudy/Solvent odor				MATERIAL IS: LIQUID & GAS	

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT -40° °F ____ °C method used T.C.C.	FLAMMABLE LIMITS	LEL 1.8	UEL 12.0
EXTINGUISHING MEDIA Use water fog, dry chemical or carbon dioxide.			
SPECIAL FIRE FIGHTING PROCEDURES Aerosol cans may rupture when heated.			
UNUSUAL FIRE AND EXPLOSION HAZARDS Heated cans may burst.			

N.A. - Not Applicable
N.E. - Not Established
N.D. - Not Determined

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SECTION V - HEALTH HAZARD DATA

HEALTH HAZARDS (ACUTE AND CHRONIC – INCLUDE TARGET ORGAN EFFECTS)
May cause dizziness or narcosis in high vapor concentrations. Will cause defatting of skin. Effects are reversible. Long term exposure (years) to vapor may cause lung, liver or kidney damage. The solvents listed have been reported to affect the central nervous system.

CONDITIONS TO AVOID
See above.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
Inhalation - difficulty in breathing. Skin redness. Ingestion - vomiting.

PRIMARY ROUTES OF ENTRY Inhalation [X] Skin Contact [X] Other (specify)
Ingestion

EMERGENCY AND FIRST AID PROCEDURES
Give oxygen - do not induce vomiting. Gastric lavage. Wash eyes and skin with water.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Heart disease, respiratory disorders.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	**High temperatures**

INCOMPATIBILITY (materials to avoid)
The above solvents are incompatible with strong oxidizers. Not compatible with active metals.

HAZARDOUS DECOMPOSITION PRODUCTS:
In fire will decompose to carbon dioxide and water, Halogen acid & Phosgene.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	**None**

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Use absorbent sweeping compound to soak up material. Put into container. Dispose as hazardous waste.

WASTE DISPOSAL METHOD
Dispose as hazardous waste in accordance with EPA RCRA

CERCLA (Superfund) REPORTABLE QUANTITY (in lbs.)
N.E.

RCRA HAZARDOUS WASTE NO. (40 CFR 261.33)
D-001

VOLATILE ORGANIC COMPOUND (VOC) as packaged, minus water) **>70%**	[X]	Theoretical **6.6** lb/gal
	[ ]	Analytical _____ lb/gal

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
Self contained breathing apparatus if TLV limit is exceeded.

VENTILATION	LOCAL EXHAUST (specify rate) **Yes (See SECTION V).**	SPECIAL **None**
	MECHANICAL (general) (specify rate) **None**	OTHER **None**

PROTECTIVE GLOVES (specify type) **None required if spraying.**	EYE PROTECTION (specify type) **Wear eye protection.**

OTHER PROTECTIVE EQUIPMENT
Long sleeves and long pants.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Keep away from heat, sparks or open flame. Store at temperatures below 120°F.

OTHER PRECAUTIONS
None

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N.A. - Not Applicable
N.E. - Not Established
N.D. - Not Determined

BOWMAN DISTRIBUTION, BARNES GROUP INC.
860 East 72nd Street, Cleveland, Ohio 44103
Emergency Telephone No. (216) 391-7200
1/22/90

0908-3744

AMERICAN STEEL AND ALUMINUM CORPORATION

Material Safety Data Sheet

Company	Issue Date	Identification
American Steel and Aluminum Corporation 5 AMERICAN DRIVE NORWOOD, MA 02062-0428	April 17, 1986	STLS
	Emergency Phone Number (617) 762-8014	or contact your nearest American Steel office
Chemical Name Stainless Steel	Form Bar, Sheet, Plate, Tubing, Structurals	
Trade Name (Common Name) Examples: 304,347,17-4,410,303,17-7,416,316,330,420,309		

CARR DIV TRW INC
31 AMES ST
CAMBRIDGE, MA 00000

I. INGREDIENTS

Material or Component	CAS Number	% Weight	Exposure Limits	
			OSHA PEL (mg/m³)	ACGIH TLV (mg/m³)
Base Metal				
Iron (Fe)	7439-89-6	39-81	10 (Fe_2O_3 Fume)	5.0 (Fe_2O_3 Fume)
Alloying Elements				
Carbon (C)	7440-44-0	0.5 Max	None Listed	None Listed
Manganese (Mn)	7439-96-5	10.0 Max	5.0 as Manganese	1.0 as Manganese
Phosphorous (P)	7723-14-0	0.001 - 0.2	0.1 as Phosphorous	0.1 as Phosphorous
Sulfur (S)	7704-34-9	0.001 - 0.35 Max	13 (Sulfur Dioxide)	5 (Sulfur Dioxide)
Silicon (Si)	7440-21-3	2.0 Max	None Listed	None Listed
Chromium (Cr)	7440-47-3	10 - 27	1.0 as Chromium	0.5 as Chromium
Nickel (Ni)	7440-02-0	0 - 22	1.0 as Nickel	1.0 as Nickel
Selenium (Se)	7782-49-2	0 - 0.35	0.2 as Selenium	0.2 as Selenium
Columbium (Cb)	7440-03-1	10 x C % Wt	5.0 as Tantalum	5.0 as Tantalum
Tantalum (Ta)	7440-25-7			
Copper (Cu)	7440-50-8	0.04 - 4	0.2 as Copper	0.2 as Copper
Molybdenum (Mo)	7439-98-7	0 - 4	5.0 Soluble Compds	5.0 Soluble Compds
Aluminum (Al)	7429-90-5	0 - 2	None Listed	5.0 as welding fumes
Titanium (Ti)	7440-32-6	0.70 Max	15 as TiO_2	10 as total dust

Note: The above listing is a summary of elements used to alloy stainless steels. Various grades of stainless will contain different combinations of these elements. Trace elements may also be present in minute quantities.

II. PHYSICAL DATA

Material is (At Normal Conditions)	Appearance and Odor		
☐ Liquid ☒ Solid ☐ Gas ☐ Other	Gray Black With Metallic Lustre — Odorless		
Adding/Alkalinity	Approx. Melting Point 2700°F	Specific Gravity (H_2O = 1) — Approx 8	Vapor Pressure (mm Hg at 20°C)
pH = NA	Boiling Point NA	Solubility in water (% by weight) — NA	NA

III. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection	Hands, Arms, and Body
NIOSH approved dust/mist/fume respirator should be used during welding or burning if OSHA PEL or TLV is exceeded.	Use appropriate protective clothing such as welders aprons & gloves when welding or burning. Check local codes.
Eyes and Face	
Safety glasses should always be worn when grinding or cutting; face shields should be worn when welding or burning.	As required

IV. EMERGENCY MEDICAL PROCEDURES

Inhalation: Remove to fresh air; if condition continues, consult physician.

Eye Contact: Immediately flush well with running water to remove particulate; get medical attention.

Skin Contact: If irritation develops, remove clothing and wash well with soap and water. If condition persists, seek medical attention.

Ingestion: If significant amounts of metal are ingested, seek medical attention.

V. HEALTH/SAFETY INFORMATION

HEALTH

Steel products in the natural state do not present an inhalation, ingestion, or contact health hazard. However, operations such as welding, burning, sawing, brazing, grinding, and possibly machining, which results in elevating the temperature of the product to or above its melting point or results in the generation of airborne particulates may present hazards. The above operations should be performed in well ventilated areas. The major exposure hazard is inhalation.

Effects of overexposure:

Acute: Excessive inhalation of all metallic fumes and dusts may result in irritation of eyes, nose, and throat. Also high concentrations of fumes and dusts of iron-oxide, manganese, copper, & selenium may result in metal fume fever. Typical symptoms consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever, and usually last from 12 to 48 hours.

Chronic: Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:

- Iron (iron-oxide) - Pulmonary effects, siderosis.
- Manganese - Bronchitis, pneumonitis, lack of coordination.
- Chromium - Various forms of dermatitis, inflammation and/or ulceration of upper respiratory tract, and possibly cancer of nasal passages and lungs. Based on available information, there does not appear to be any evidence that exposure to welding fume induces human cancer.
- Nickel - SAME AS CHROMIUM.
- Selenium - Nasal and bronchial irritation, gastro-intestinal disturbances, garlic odor of breath.
- Copper - Pulmonary effects.
- Vanadium - No reported cases of exposure to vanadium.
- Cobalt - Inhalation of cobalt dust may cause an asthma-like disease with cough and dyspnea.
- Molybdenum - Pain in joints, hands and feet.

Occupational Exposure Limits

See Section I.

FIRE AND EXPLOSION

Flash Point	Auto Ignition Temperature	Flammable Limits in Air	Extinguishing Media
NA °F	NA °F	Lower NA % Upper NA %	NA

Fire and Explosion Hazards	Extinguishing Media Not to be Used
None	NA

REACTIVITY

Stability	Incompatibility (Materials to Avoid)
☒ Stable ☐ Unstable	Reacts with strong acids to form hydrogen gas.

Conditions to Avoid

Keep Area Well Ventilated

Non-ventilated areas when cutting, welding, burning, or brazing; avoid generation of airborne dusts and fumes.

Hazardous Decomposition Products

Metallic oxides.

VI. ENVIRONMENTAL

Spill or leak procedures

NA

Special Precautions: Use good housekeeping practices to prevent accumulation of dust and to keep airborne dust to a minimum.

Waste Disposal Method

Dust, etc. — follow federal, state, and local regulations regarding disposal.

VII. ADDITIONAL INFORMATION

DISCLAIMER-

American Steel and Aluminum makes no warranties, express or implied, including, but not limited to implied warranties of merchantability and fitness for a particular purpose.

The information contained in this Material Safety Data Sheet (MSDS) is believed to be correct, but no representations, guarantees or warranties of any kind are made as to its accuracy. Users assume all risk and liability of any use, processing, or handling of any material. Variations in methods, conditions, equipment used to store, handle or process the material and hazards connected with the use of the material are solely the responsibility of the user.

This MSDS is intended to be used solely for the purpose of satisfying informational requests. Compliance with all applicable federal, state and local laws and regulations remains the responsibility of the user and the user has the responsibility to provide a safe workplace to examine all aspects of its operation, and to determine if or when precautions in addition to those described herein are required.

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MATERIAL SAFETY DATA

OCEAN NETWORK EMERGENCY PHONE 1-800-OLIN-911

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE FEDERAL OSHA HAZARD COMMUNICATION STANDARD,29 CFR 1910.1200.THIS PRODUCT MAY BE CONSIDERED TO BE A HAZARDOUS CHEMICAL UNDER THAT STANDARD.(REFER TO THE OSHA CLASSIFICATION IN SEC.I.)THIS INFORMATION IS REQUIRED TO BE DISCLOSED FOR SAFETY IN THE WORKPLACE.THE EXPOSURE TO THE COMMUNITY,IF ANY,IS QUITE DIFFERENT.

I. PRODUCT IDENTIFICATION

REVISION NO : 2
REVISION DATE : 1/02/90
PRODUCT CODE : BPE120000
FILE NUMBER : BPE00316.0001
PRODUCT NAME: STAINLESS 3XX SERIES
SYNONYMS: Stainless steel alloys 301, 301HN, 301LN, 302, 304, 304M, 304L, 305, 309, 310S, 316, 316L, 321, 347, AM350.
CHEMICAL FAMILY: Metal/Mixture
FORMULA: Not Applicable/Mixture
DESCRIPTION: Austenitic stainless steel
OSHA HAZARD CLASSIFICATION: Dust or fume is classified as irritant, skin and eye hazard, lung toxin, sensitizer, carcinogen, reproductive and kidney toxin

II. COMPONENT DATA

PRODUCT COMPOSITION
CAS or CHEMICAL NAME: Chromium
CAS NUMBER: 7440-47-3
PERCENTAGE RANGE: 16-26%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:		1		0.5
CEILING:	None		None	
STEL:	None		None	

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CAS or CHEMICAL NAME: Nickel
CAS NUMBER: 7440-02-0
PERCENTAGE RANGE: 6-22%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:				
INSOLUBLE:		1		1
SOLUBLE:		0.1		0.1
CEILING:	None		None	
STEL:	None		None	

CAS or CHEMICAL NAME: Molybdenum
CAS NUMBER: 7439-98-7
PERCENTAGE RANGE: 0-3.3%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:				
SOLUBLE:		5		5
INSOLUBLE:	None			10
Total dust:		10	None	
Respirable:		5	None	
CEILING:	None		None	
STEL:	None		None	

CAS or CHEMICAL NAME: Manganese
CAS NUMBER: 7439-96-5
PERCENTAGE RANGE: 0-2%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:				
Dust:	None			5
Fume:		1		1
CEILING:		5	None	
STEL:				
Fume:		3		3

CAS or CHEMICAL NAME: Silicon
CAS NUMBER: 7440-21-3
PERCENTAGE RANGE: 0-1.5%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:		10		10
CEILING:	None		None	
STEL:	None		None	

CAS or CHEMICAL NAME: Columbium
CAS NUMBER: 7440-03-1
PERCENTAGE RANGE: 0-1%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS: None Established

CAS or CHEMICAL NAME: Tantalum
CAS NUMBER: 7440-25-7
PERCENTAGE RANGE: 0-1%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TWA:		5		5
CEILING:	None		None	
STEL:	None		None	

CAS or CHEMICAL NAME: Iron
CAS NUMBER: 7439-89-6
PERCENTAGE RANGE: Remainder to 100%
HAZARDOUS PER 29 CFR 1910.1200: Yes
EXPOSURE STANDARDS:

	OSHA(PEL)		ACGIH(TLV)	
	ppm	mg/cubic-meter	ppm	mg/cubic-meter
TOTAL PARTICULATE:			FUME:	
TWA:		10	2	5
CEILING:	None		None	
STEL:	None		None	

III. PRECAUTIONS FOR SAFE HANDLING AND STORAGE

AVOID CONTACT OF DUST OR FUME WITH SKIN, EYES AND CLOTHING. UPON CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER.
STORAGE CONDITIONS: Store in a cool, dry, well-ventilated place.
DO NOT STORE AT TEMPERATURES ABOVE: Not Applicable
PRODUCT STABILITY AND COMPATIBILITY
SHELF LIFE LIMITATIONS: Not known
INCOMPATIBLE MATERIALS FOR PACKAGING: None known
INCOMPATIBLE MATERIALS FOR STORAGE OR TRANSPORT: None known

IV. PHYSICAL DATA

APPEARANCE: Odorless metallic solid
MELTING RANGE: 1371-1454 Deg.C (2500-2650 Deg.F)
BOILING POINT: Not Applicable
DECOMPOSITION TEMPERATURE: Not Applicable
SPECIFIC GRAVITY: 7.750-8.027
BULK DENSITY: 7.750-8.027 (g/cc)
pH @ 25 DEG.C: Not Applicable
VAPOR PRESSURE @ 25 DEG.C: Not Applicable
SOLUBILITY IN WATER: Not Applicable
VOLATILES, PERCENT BY VOLUME: Not Applicable
EVAPORATION RATE: Not Applicable
VAPOR DENSITY: Not Applicable
MOLECULAR WEIGHT: Not Applicable/Mixture
ODOR: None
COEFFICIENT OF OIL/WATER DISTRIBUTION: No Data

V. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

PERSONAL PROTECTION FOR ROUTINE USE OF PRODUCT:
RESPIRATORY PROTECTION: Respiratory protection not normally needed. If significant dusting or fuming occurs, wear a NIOSH/MSHA approved respirator equipped with HEPA filters.

VENTILATION: Local exhaust ventilation is recommended if significant dusting or fuming occurs. Otherwise, use general exhaust ventilation.

SKIN PROTECTIVE EQUIPMENT: Impermeable gloves

OTHER: Safety glasses

EQUIPMENT SPECIFICATIONS (WHEN APPLICABLE):
RESPIRATOR TYPE: NIOSH/MSHA approved respirator with HEPA filters
PROTECTIVE CLOTHING TYPE (This includes: gloves, boots, apron, protective suit): Impervious

VI. FIRE AND EXPLOSION HAZARD INFORMATION

FLAMMABILITY DATA:
- FLAMMABLE: No
- COMBUSTIBLE: No
- PYROPHORIC: No
- FLASH POINT: Not Applicable
- AUTOIGNITION TEMPERATURE: Not Applicable
- FLAMMABLE LIMITS AT NORMAL ATMOSPHERIC TEMPERATURE AND PRESSURE (PERCENT VOLUME IN AIR): LEL - Not Applicable UEL - Not Applicable

NFPA RATINGS: Not Established

HMIS RATINGS:
- Health: 2
- Flammability: 0
- Reactivity: 0

EXTINGUISHING MEDIA: Not Applicable-Choose extinguishing media suitable for surrounding materials.

FIRE FIGHTING TECHNIQUES AND COMMENTS: Dust may be ignitable if mixed with air. See Section XI for protective equipment for fire fighting.

VII. REACTIVITY INFORMATION

CONDITIONS UNDER WHICH THIS PRODUCT MAY BE UNSTABLE:
- TEMPERATURES ABOVE: Not Applicable
- MECHANICAL SHOCK OR IMPACT: No
- ELECTRICAL (STATIC) DISCHARGE: No
- HAZARDOUS POLYMERIZATION: Will not occur
- INCOMPATIBLE MATERIALS: Strong acids and strong oxidizers
- HAZARDOUS DECOMPOSITION PRODUCTS: Nickel carbonyl, chromium oxides, manganese oxides.
- OTHER CONDITIONS TO AVOID: Presence of carbon monoxide during melting

SUMMARY OF REACTIVITY:
- OXIDIZER: No
- PYROPHORIC: No
- ORGANIC PEROXIDE: No
- WATER REACTIVE: No

VIII. FIRST AID

EYES: Immediately flush with large amounts of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. If eye irritation develops, call a physician.

SKIN: May cause minor skin irritation. Cleanse skin by washing with soap and water.

INGESTION: Immediately drink water to dilute. Consult a physician if symptoms develop.

INHALATION: Remove to fresh air. If respiratory irritation develops call a physician.

IX. TOXICOLOGY AND HEALTH INFORMATION

ROUTES OF ABSORPTION
For dust: ingestion, dermal contact, inhalation and eye contact
For fume: inhalation, eye contact and dermal contact
For alloy: dermal contact

WARNING STATEMENTS AND WARNING PROPERTIES
HARMFUL IF METAL FUME OR DUST IS INHALED. HARMFUL IF METAL DUST IS SWALLOWED. MAY BE HARMFUL IF METAL FUME OR DUST IS EXPOSED TO SKIN. MAY BE HARMFUL IF METAL FUME OR DUST IS EXPOSED TO EYES.

HUMAN THRESHOLD RESPONSE DATA
ODOR THRESHOLD: No available data
IRRITATION THRESHOLD: No available data
IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: The IDLH concentration has not been established.

SIGNS, SYMPTOMS, AND EFFECTS OF EXPOSURE

INHALATION
ACUTE:
The metal fume and dust may cause mild to moderate irritation to the nose, throat, upper respiratory tract, and lungs. Inhalation of the metal fume may also produce influenza-like symptoms known as metal fume fever. The symptoms are characterized by metallic taste, runny nose, nausea, fever, and chills. These effects usually disappear within 24 hours. Under extreme conditions the dust or fume may cause inflammation (swelling) of the nasal passages (mucosa) with nasal ulceration and bleeding.

CHRONIC:
Repeated inhalation of dust or fumes may cause a lung reaction in the form of asthma, as well as inflammation of the nasal mucosa. Under extreme conditions ulceration or bleeding may occur. Chronic inhalation of nickel and its compounds has been associated with nasal and lung carcinomas. Most of this data has been associated with the roasting of nickel and its ores, but some data exists on metallic nickel as well. Chronic inhalation of chromium has been associated with cancer of the lungs and upper respiratory tract. Control of dust and fume levels in the air will significantly reduce the risk of cancer.

SKIN
ACUTE:
Skin contact with the dust or fume may cause irritation consisting of transient redness. This irritant effect would not be expected to result in permanent damage.
CHRONIC:
Repeated or prolonged contact with the alloy, the dust, or the fume, may cause dermatitis and/or an allergic reaction to the skin, usually referred to as a "nickel itch". This response may resemble eczema. Symptoms may begin as a sensation of burning or itching, followed by redness and possible skin eruptions. Nodules may progress to pustules or ulceration. Fever may accompany these symptoms.

EYES
The dust or fume can irritate the eyes with effects consisting of reversible redness, swelling, and mucous discharge of the conjunctiva.

INGESTION
ACUTE:
Ingestion of the dust may cause gastroenteritis with any or all of the following symptoms: nausea, vomiting, lethargy and diarrhea.
CHRONIC:
No effects would be expected aside from those described from acute exposure.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
Asthma, emphysema, and other respiratory diseases. Diseases of the skin such as eczema, may be aggravated by exposure.

INTERACTIONS WITH OTHER CHEMICALS WHICH ENHANCE TOXICITY:
There are no chemicals known to enhance the toxicity of the product.

ANIMAL TOXICOLOGY

ACUTE TOXICITY:

Oral LD 50: No available data
Dermal LD 50: No available data
Inhalation LC 50: No available data
Irritation: Dust or fume is irritating to skin or eyes. Nickel and chromium have been shown to produce allergic sensitization to the skin.

ACUTE TARGET ORGAN TOXICITY:

Lung damage from inhalation of metal dust or fume.

CHRONIC TARGET ORGAN TOXICITY:

There are no known or reported effects from repeated exposure to this product. Nickel and its compounds and chromium have been shown to produce cancer in laboratory animals as well as damage to the lungs and kidneys.

Chronic inhalation of manganese may produce a condition similar to Parkinson's disease called manganism. It is judged that the low concentration of manganese in the product would preclude the risk of development of manganism. Inhalation of iron dust or fume has been shown to cause a benign pneumoconiosis known as siderosis. This condition is characterized by deposition of iron in the lungs without subsequent fibrotic changes or impairment of lung function.

Acute as well as chronic exposure to molybdenum has been shown to produce liver, kidney, and spleen damage in laboratory animals. It is judged that the low concentration of molybdenum in the product would preclude the development of these effects.

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY:

There are no known or reported effects on reproductive function or fetal development to this product. Nickel has been reported to affect reproductive capability in laboratory animals. The preponderance of data on nickel's ability to cause birth defects would indicate it is not a teratogen. There are no reports indicating that exposure to nickel containing compounds has caused malformations in human beings.

CARCINOGENICITY:

This product is not known or reported to be carcinogenic by any reference source including IARC, OSHA, NTP, or EPA. Nickel and its compounds and chromium are reported carcinogenic by IARC and NTP.

MUTAGENICITY:

This product is not known or reported to be mutagenic. Nickel and its salts and chromium have been reported mutagenic in a number of test systems.

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AQUATIC TOXICITY:

Nickel appears to be less toxic to fish and river crabs than copper, zinc, brass, and iron. For sticklebacks, however, the lethal limit has been reported as 0.8 mg/l of nickel. It has been found that nickel was more toxic to fish than iron and manganese. Fish have been found living in water polluted with mine effluent and containing 13-18 mg/l of nickel.

The toxicity of iron and iron salts depends on whether the iron is present in the ferrous or ferric state and whether it is in solution or suspension. The following limiting concentrations have been noted:

Concentration of iron, in mg/l	Remarks
0.2	Threshold concentration for lethality to three types of fish
0.9	Carp will die at this concentration if pH is 5.5 or lower
1-2	Death of pike, tench, and trout at pH 5.0-6.7
1-2	No deaths among dogfish during one week
1-2	Indicative of acid pollution and other conditions unfavorable to fish.
5	Killed dogfish in 3 hours
10	Caused serious injury or death to rainbow trout in 5 minutes.
40	Not lethal to fingerling channel catfish in 96 hours when added as ferrous disodium versanate.
50	Upper limit for fish life

The following concentrations of manganese have been tolerated by fish under the stated conditions:

Concentration in mg/l	Time of Exposure	Type of Fish
1	-	river crayfish
15	7 days	tench, carp, trout
15	7 days	crustacea, worms, insect larvae

X. TRANSPORTATION INFORMATION

THIS MATERIAL IS NOT REGULATED AS A DOT HAZARDOUS MATERIAL.

XI. SPILL AND LEAKAGE PROCEDURES

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC AT 800-424-9300.

REPORTABLE QUANTITY: Per 40 CFR 302.4 as chromium (5000 lbs.) and nickel (100 lbs.) when 100 micrometers in size or smaller.

SPILL MITIGATION PROCEDURES:
This product may represent an explosion hazard when in the form of dust. Remove all sources of ignition. Stop source of spill as soon as possible and notify appropriate personnel.

AIR RELEASE: Not Applicable

WATER RELEASE: Not Applicable

LAND SPILL: Emergency response to this material is unlikely unless in the form of dust or grindings. If so, use a vacuum system to gather material and assist in lowering the airborne concentrations.

SPILL RESIDUES:
Dispose of per guidelines under Section XII, WASTE DISPOSAL.

PERSONAL PROTECTION FOR EMERGENCY SPILL AND FIRE-FIGHTING SITUATIONS:
No extra protection required beyond that listed in Section V (in case of fire, use normal fire fighting equipment).

XII. WASTE DISPOSAL

If this product becomes a waste, it DOES NOT meet the criteria of a hazardous waste as defined under 40 CFR 261, in that it does not exhibit the characteristics of hazardous waste of Subpart C, nor is it listed as a hazardous waste under Subpart D.

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If this material becomes a waste, it should be sent to metal reclamation.

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OF THIS MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR HAZARDOUS AND NONHAZARDOUS WASTES.

XIII. ADDITIONAL REGULATORY STATUS INFORMATION

TOXIC SUBSTANCES CONTROL ACT:
The components of this product are listed on the Toxic Substance Control Act inventory.

SUPERFUND AMENDMENT AND REAUTHORIZATION ACT TITLE III:
HAZARD CATEGORIES, PER 40 CFR 370.2:
HEALTH:
Immediate (Acute)
Delayed (Chronic)
PHYSICAL:
None

EMERGENCY PLANNING AND COMMUNITY RIGHT TO KNOW, PER 40 CFR 355, APP.A:
EXTREMELY HAZARDOUS SUBSTANCE - THRESHOLD PLANNING QUANTITY:
None Established (For alloy metals)
SUPPLIER NOTIFICATION REQUIREMENTS, PER 40 CFR 372.45:
This mixture or tradename product contains a toxic chemical or chemicals subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR 372.

CHEMICALS LISTED ARE: Chromium, manganese, nickel

XIV. ADDITIONAL INFORMATION

No Additional Information

XV. MAJOR REFERENCES

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6. CERIS (Chemical Emergency Response Information System) On Line Database. Association of American Railroads.
7. Chemical Degradation and Permeation Database and Selection Guide for Resistant Protective Materials. Austin, TX.
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9. Code of Federal Regulations, Titles 21, 29, 40 and 49. Washington, DC: U.S. Government Printing Office.
10. Fire Protection Guide on Hazardous Materials, 9th Ed., National Fire Protection Association, Batterymarch Park, Quincy, MA, 1986.
11. Gosselin, R., et al., Gosselin-Clinical Toxicology of Commercial Products, 5th Ed., Baltimore: Williams and Wilkins, 1984.
12. Grant, W. Morton, M.D., Toxicology of the Eye, 2nd Ed., Springfield, IL: Charles C. Thomas, 1974.
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14. IARC Monogram on the Evaluation of Carcinogenic Risk of Chemicals to Man., Geneva: World Health Organization, International Agency for Research on Cancer.
15. Lenga, R., The Sigma-Aldrich Library of Chemical Safety Data, 1st Ed., Milwaukee, WI: Sigma-Aldrich Corporation, 1985.
16. Lewis, R. and D. Sweet, Eds., Registry of Toxic Effects of Chemical Substances, 1985-1986, Washington, DC: U.S. Government Printing Office, 1987.
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19. NIOSH Pocket Guide to Chemical Hazards. Washington, DC: U.S. Government Printing Office, 1985.
20. Olin Respiratory Protection Manual.
21. Sax, N. Irving, Dangerous Properties of Hazardous Materials 6th Ed., New York: Van Nostrand Reinhold Company, 1984.
22. Threshold Limit Values and Biological Exposure Indices for 1989-90. Cincinnati, OH: American Conference of Government Industrial Hygienists, 1989.
23. Toxic Substances Control Act Inventory, Washington, DC: U.S. Government Printing Office, 1986.

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET SHOULD BE PROVIDED TO ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. OLIN BELIEVES THIS INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION, BUT MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MATERIAL SAFETY DATA SHEET IS MORE THAN THREE YEARS OLD, YOU SHOULD CONTACT OLIN AT THE PHONE NUMBER LISTED BELOW TO MAKE CERTAIN THAT THIS SHEET IS CURRENT.

OLIN MSDS CONTROL GROUP
Olin Corporation
120 Long Ridge Road
Stamford, CT 06904

Phone Number: (203) 356-3449

OLIN CORPORATION SUBSIDIARIES AND AFFILIATED ENTITIES: ASAHI-OLIN LTD., BRIDGEPORT BRASS CORPORATION, INDY ELECTRONICS, INC., OLIN CHLORATE CORPORATION, OLIN FABRICATED METAL PRODUCTS INC., OLIN HUNT SPECIALTY PRODUCTS INC., OLIN ELECTRONICS TECHNOLOGY, OLIN MESA CORP., OLIN SPECIALTY METALS CORPORATION, PACIFIC ELECTRO DYNAMICS, INC., PHYSICS INTERNATIONAL COMPANY, ROCKET RESEARCH COMPANY.

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Olin

MATERIAL SAFETY DATA SHEET

The information in the Material Safety Data Sheet (MSDS) is organized into fifteen sections which are as follows:

- I Product Identification
- II Component Data
- III Precautions for Safe Handling and Storage
- IV Physical Data
- V Personal Protective Equipment Requirements
- VI Fire and Explosion Hazard Information
- VII Reactivity Information
- VIII First Aid
- IX Toxicology and Health Information
- X Transportation Information
- XI Spill and Leak Procedures
- XII Waste Disposal
- XIII Additional Regulatory Status Information
- XIV Additional Information
- XV Major References

Section I — *Product Identification*

The product name and product code are used to identify the product. The file number and revision number identify the Material Safety Data Sheet (MSDS) itself. The chemical family or name and synonyms are given with formula where applicable. A brief use description of the product is presented along with the OSHA Hazard Classifications.

Section II — *Component Data*

All Olin products are evaluated to determine if they are hazardous. According to the Occupational Safety and Health Administration (OSHA), a hazardous chemical refers to any chemical that presents a physical hazard or a health hazard. A chemical may be a physical hazard if it is combustible, flammable, pyrophoric, chemically unstable, water reactive or explosive, a compressed gas, an organic peroxide or other oxidizer.

A chemical may present a health hazard if exposure could result in acute or chronic adverse health effects. This definition of a hazardous material has been adapted from the OSHA Hazardous Communication Standard (29 CFR 1910.1200). The reader should refer to the Standard for further details. If it has been determined that a product is not hazardous, then this is stated. If it has been determined that the product is a health hazard then all components that present a health hazard and that comprise 1% or more of the material are listed in this section. Also, any component [illegible] carcinogen is listed if it comprises 0.1% or more of the product. If it has been determined that the product [illegible] hazard, then any component that presents a phys[illegible] is listed.

Normally, the chemical [illegible] and Chemical Abstracts Service (CAS) Number are used to identify a component. CAS numbers are assigned to chemicals and mixtures by the Chemical Abstracts Service (published by the American Chemical Society) as a specific identification. CAS numbers are not always available for mixture but are stated where available. Where the identity of a component is a trade secret, a descriptive name is used instead of the chemical name and a trade secret access number is given to that component. Disclosure of the identity of the trade secret component will be made to health professionals upon request, subject to the conditions specified in the Standard.

Exposure limits are given for each component where these have been established. Definitions of these exposure limits follow:

- **ACGIH TLV (Threshold Limit Value):** a term used by American Conference of Governmental Industrial Hygienists to express the airborne concentration of a material to which nearly all persons can be exposed day after day without adverse effects. ACGIH expresses TLVs in three ways:
  - **TLV-TWA:** = The allowable Time Weighted Average concentration for a normal 8-hour workday of a 40-hour work week.
  - **TLV-STEL:** = The Short-Term Exposure Limit, or maximum concentration for a continuous 15-minute exposure period. A maximum of four such periods per day, with at least 60 minutes between exposure periods are allowed, and provided that the daily TLV is not exceeded.
  - **TLV-C:** The Ceiling exposure limit; the concentration that should not be exceeded even instantaneously.
- **SKIN:** A notation used to indicate that the stated substance may be absorbed by the skin, mucous membranes and eyes, either by air or direct contact, and that this additional exposure must be considered part of the total exposure to avoid exceeding TLV for that substance.

  The value quoted is the TWA unless another category is stated.
- **OSHA PEL (Permissible Exposure Limits):** an exposure limit established by the Occupational Safety and Health Administration. May be a time weighted average (TWA) limit or ceiling (C) exposure limit. A skin notation has the same meaning as for the TLV.

Section III — *Precautions for Safe Handling and Storage*

This section provides vital information for handling and storing a product. It is important that all recommendations be followed.

Section IV — *Physical Data*

Knowledge of the physical properties of a substance is necessary for all safety and industrial hygiene decisions. Definitions of terms that apply to the physical data presented in this section are given below:

- **Freezing Point/Melting Point:** The temperature at which a substance changes state from liquid to solid or solid to liquid. For mixtures, a range may be given.
- **Boiling Point:** The temperature at which a liquid changes to a vapor state at a given pressure. (Usually 760 mmHg, or one atmosphere.) For mixtures, the initial boiling point or the boiling range may be given. Flammable materials with low boiling points generally present special fire hazards.
- **Decomposition Temp:** The temperature at which a substance will break down, or decompose, into smaller fragments.
- **Specific Gravity:** The weight of a material compared to

the weight of an equal volume of water; an expression of the density (or heaviness) of the material. Example: if a volume of material weighs 8 pounds, and an equal volume of water weighs 10 pounds, the material has a specific gravity of 0.8:

$$\frac{8 \text{ lbs}}{10 \text{ lbs.}} = 0.8$$

Insoluble materials with a specific gravity of less than 1.0 may float in (or on) water. Insoluble materials with a specific gravity greater than 1.0 may sink in water. Most insoluble flammable liquids having a specific gravity of less than 1.0 will float on water, an important consideration for fire suppression.

- **Bulk Density:** Weight of material per unit volume.
- **pH:** A value presenting the acidity or alkalinity of an aqueous solution.

1	7	14
Acidic _____	Neutral _____	Alkaline

- **Vapor Pressure:** The pressure (usually expressed in millimeters of mercury) characteristic at any given temperature of a vapor in equilibrium with its liquid or solid form.
- **Solubility in Water:** A term expressing the percentage of a material (by weight) that will dissolve in water at ambient temperature. Solubility information may be useful in determining spill cleanup methods and fire-extinguisher agents.
- **Volatiles, Percent by Volume:** The percentage of a liquid or solid (by volume) that will evaporate at an ambient temperature of 70°F (unless some other temperature is stated).
- **Evaporation Rate:** The rate at which a particular material will vaporize (evaporate) when compared to the rate of vaporization of a known material. The evaporation rate can be useful in evaluating the health and fire hazards of a material. The known material is usually either normal butyl acetate or water, with a vaporization rate designated as 1.0.
- **Vapor Density (Air = 1):** A relative comparison of the density of the vapor compared to the density of air (Air = 1). If the vapor density is greater than 1, then the vapor is heavier than air.
- **Molecular Weight:** The molecular weight of a chemical is the sum of the atomic weights of the atoms making up one molecule of the chemical.
- **Coefficient of Oil/Water Distribution:** If a substance which is soluble both in oil and in water is added to a two-phase oil/water system, then the ratio of the concentration of that substance in oil to its concentration in water is called the Coefficient of Oil/Water Distribution.

Section V — *Personal Protective Equipment Requirements*

The proper use of personal protective equipment is of the utmost importance, and the guidelines presented in this section must be closely followed. Descriptions of specific equipment (goggles, gloves, respiratory, etc.) required for routine use are given. Use of additional protective equipment, as required for fire-fighting and for spill and leak clean-up, is outlined in Section XI.

Use of some products may require specific ventilation requirements. The following definitions apply to ventilation systems:

- **General Exhaust:** A system for exhausting air containing contaminants from a general work area. General exhaust may be referred to as dilution ventilation.
- **Local Exhaust:** A system for capturing and exhausting contaminants from the air at the point where the contaminants are produced (welding, grinding, sanding, other processes or operations).

Section VI — *Fire and Explosion Hazard Information*

The recommended extinguishing media to be used in the event of a fire are given, together with any unusual fire and explosion hazards.

The following definitions are applicable to this section:

- **Pyrophoric:** A substance that burns spontaneously in air at a temperature of 130°F or below.
- **Flammable:** A flammable liquid is defined by NFPA and DOT as a liquid with a flash point below 100°F (37.8C). The OSHA definition is substantially the same. Solids, other than explosives that will ignite readily or are liable to cause fires under ordinary conditions of transportation through friction or retained heat from manufacturing or processing, and which burn so vigorously and persistently as to create a serious transportation hazard, are classified by DOT as "flammable solids."
- **Combustible:** A term used by NFPA, DOT and OSHA to classify liquids on the basis of a flash point range of 100°F to below 200°F.
- **Flash Point:** The temperature at which a liquid will give off enough flammable vapor to ignite in the presence of an ignition source.

  There are several flash point test methods. Because flash points may vary for the same material depending on the method used, the test method is indicated when the flash point is given. The methods most frequently quoted are:

  PMCC: Pensky-Martens Closed Cup — ASTM D93
  SETA: Setaflash Closed Cup — ASTM D3278
  TCC: Tag (Tagliabue) Closed Cup — ASTM D56

  Details of these methods can be found in Section V of the Annual Book of ASTM Standards.
- **Autoignition Temperature:** The lowest temperature at which a liquid will give off enough flammable vapors and heat energy to ignite spontaneously and maintain combustion.
- **UEL and LEL:** Upper Explosive Limit and Lower Explosive Limit are the highest concentration and lowest concentration respectively that will produce a flash of fire when an ignition source is present. At higher concentrations than the UEL, the mixture is too "rich" to burn. At concentrations lower than the LEL, the mixture is too "lean" to burn.
- **NFPA Ratings:** The National Fire Protection Association Standard System for the Identification of the Fire Hazards of Materials — NFPA No. 704.

  The NFPA ratings provide a general idea both of the hazards and of the degree of the hazards associated with a material relative to fire protection and control. The Standard addresses the hazards under the three categories of "Health," "Flammability" and "Reactivity" and assigns numeric ratings using a scale of 0 to 4 with 0 indicating no

particular hazard, and 4 the most hazardous. It should be noted that health hazard ratings refer specifically to short-term exposure under fire conditions. The Standard also makes provision for special hazard warnings, such as water reactivity. For further details see 'Fire Protection Guide on Hazardous Materials' — National Fire Protection Association, Quincy, MA.

- **HMIS Ratings:** The Hazard Materials Identification System of the National Paint and Coatings Association.

  The system is similar to the NFPA Standard in utilizing a 0-4 scale, rating the degree of hazard under the same three categories of health, flammability and reactivity, with 0 being the least hazardous and 4 the most. It should be noted that unlike NFPA ratings, HMIS ratings are not intended for emergency situations. The flammability and reactivity ratings will, however, usually be the same as the NFPA ratings. The health hazard rating is based on the acute toxicity of the chemical. For further information on these ratings, see 'HMIS Rating Manual' — National Paint and Coatings Association, Washington, DC.

Section VII — *Reactivity Information*

A substance is said to be reactive if it readily enters into chemical reactions and undergoes chemical change. For MSDS purposes the reactions can be grouped into three broad categories:

(a) Decomposition: The chemical breakdown of a material into parts or simpler compounds.

(b) Polymerization: A chemical reaction in which small molecules combine to form larger molecules.

(c) Reactions with other chemicals: Any other chemical reaction.

- **(a) Decomposition — stable/unstable:**

  A substance is stable if it is resistant to decomposition or possesses the ability to remain unchanged. For MSDS purposes, a material is stable if it remains in the same form under expected and reasonable conditions of use. A substance is considered unstable if it tends to suffer decomposition under these conditions. Some materials may become unstable at higher temperatures. Whenever relevant, the temperature at which a material can be said to be unstable is stated. Other conditions that may cause instability, such as shock from dropping or static electricity, are noted when applicable.

- **(b) Polymerization — Hazardous Polymerization:**

  A polymerization reaction is [illegible] when it takes place at a rate that releases large amounts of energy. If hazardous polymerization can occur with a given material, the MSDS usually will list conditions that could start the reaction. In addition, since the material usually contains a polymerization inhibitor, the expected time period before the inhibitor is used up is also given.

- **(c) Reactions with Other Chemicals — Incompatible Materials.**

  Materials that could cause dangerous reactions from direct contact with another are described as incompatible. Common chemicals that react with the product are usually listed in the MSDS. Hazardous products of decomposition, including combustion products, are listed.

Section VIII — *First Aid*

First aid procedures are described for each of the normal routes of exposure. It is important that first aid be administered as soon as possible after exposure has occurred. If in any doubt regarding the victim's condition, a physician should be called. In case of emergency call Olin's OCEAN Network (1-800-OLIN-911). OCEAN, which stands for Olin Corporation Emergency Action Network, is accessible 24 hours a day.

Section IX — *Toxicology and Health Information*

The consequences of exposure, if any, by inhalation, skin or eye contact, or ingestion are outlined in this section. The signs, symptoms and effects that the exposure could produce are described so that any exposure would be recognized as quickly as possible and the appropriate action taken. The organs that are more susceptible to attack are referred to as target organs. The effects and damage that exposure could produce on these organs are given together with the symptoms. Some of the terms used that may be less familiar or which may have a specific inference in MSDSs are defined below:

- **Acute Effect:** An adverse effect on a human or animal body resulting from a single exposure with symptoms developing almost immediately or shortly after exposure. The effect is usually of short duration.
- **Chronic Effect:** An adverse effect on a human or animal body resulting from repeated low level exposure, with symptoms that develop slowly over a long period of time or that recur frequently.
- **Corrosive:** A liquid or solid that causes visible destruction or irreversible alterations in human skin tissue.
- **Irritation:** An inflammatory response or reaction of the eye, skin or respiratory system.
- **Allergic Sensitization:** A process whereby on first exposure a substance causes little or no reaction in humans or test animals, but which on repeated exposure may cause a marked response not necessarily limited to the contact site. Skin sensitization is the most common form of sensitization in the industrial setting, although respiratory sensitization is also known to occur.
- **Teratogen:** A substance or agent to which exposure of a pregnant female can result in malformations to the skeleton and or soft tissue of the fetus.
- **Mutagen:** A substance or agent capable of altering the genetic material in a living organism.
- **Carcinogen:** A substance or agent capable of causing or producing cancer in humans or animals. Authorities/organizations that have evaluated whether or not a substance is a carcinogen are the International Agency for Research on Cancer (IARC), the U.S. National Toxicology Program (NTP) and OSHA.

  To evaluate the potential human effects from exposure to hazardous chemicals, studies in laboratory animals are performed. The terms most commonly used to define the results of the studies are as follows:

  — **LD_{50} (Lethal Dose Fifty)** — The dose of a substance expected to cause the death of 50% of an experimental

animal population. This dose may be from oral, dermal or other routes of exposure. The units given for the LD_{50} are usually milligrams per kilogram body weight of the tested animal (mg/kg).

— **LC_{50} (Lethal Concentration Fifty)** — A calculated concentration of a substance in air, exposure to which for a specified length of time is expected to cause the death of 50% of a laboratory animal population. This concentration is usually in units of milligrams per cubic meter of air (mg/m^3) or milligrams per liter of air (mg/l) and is given for some time period (usually one or four hours).

Other terms occasionally used are:

— **LD_{LO} (Lethal Dose Low)** — The lowest dose of a substance introduced by any route other than inhalation reported to have caused death in humans or animals.

— **LC_{LO} (Lethal Concentration Low)** — The lowest concentration of a substance in air that has been reported to have caused death in humans or animals.

— **TD_{LO} (Toxic Dose Low)** — The lowest dose of a substance to which humans or animals have been exposed and reported to produce a toxic effect other than cancer.

Based on these values, an estimate of human health effects potential is obtained.

Section X — *Transportation Information*

In the event the material is regulated as hazardous by the Department of Transportation (DOT), the Hazardous Materials Regulations as described in the Code of Federal Regulations, 49 Chapter 1 subchapter C are outlined in this section. In the event of an emergency, CHEMTREC (Chemical Transportation Emergency Center) should be contacted.

CHEMTREC is a national center established by the Chemical Manufacturer Association (CMA) in Washington, DC, to relay pertinent emergency information concerning specific chemicals on request. CHEMTREC has a 24-hour toll-free telephone number (1-800-424-9300), intended primarily for use by those who respond to chemical transportation emergencies.

Section XI — *Spill and Leak Procedures*

During cleanup of spills or leaks, it may be necessary to use extra personal protective equipment as compared to normal operations. Recommendations for equipment use additional to what is described in Section V are given.

Procedural recommendations relative to air, land and water are described.

Section XII — *Waste Disposal*

This section gives guidelines for disposing of a product if it becomes a waste. Recommendations are based upon the physical state and hazardous properties of the material. If the material is designated as hazardous by 40 CFR Part 261, it must be disposed of in a permitted hazardous waste treatment, storage, or disposal facility in accordance with local, state, and Federal regulations. If the material is non-hazardous, recommendations for disposal are made depending on the physical state and known characteristics of the material.

Section XIII — *Additional Regulatory Information*

This section contains information relevant to compliance with other Federal and/or state laws such as TSCA, FIFRA and FDA.

Section XIV — *Additional Information*

Any relevant additional information is given in this section.

Section XV — *Major References*

This section lists some of the major references that have been consulted in preparing the Material Safety Data Sheet.

Olin CORPORATION

120 LONG RIDGE ROAD, P.O. BOX 1355, STAMFORD, CT 06904-1355

(pg 1 of 2)

REV. 1 STANNOUS CHLORIDE C00-0239

Stannous Chloride

McGean-Rohco, Inc.

1250 Terminal Tower, Cleveland, Ohio 44113 216/621-6425

MATERIAL SAFETY DATA SHEET

Product Name: Tru-Plate Universal Plating Accelerator 7040, 7041	Emergency Phone No.: 216/441-4900
Plant Address: 2910 Harvard Avenue Cleveland, OH 44198	Chemtrec Phone No.: 800/424-9300
Prepared By: TSCA Coordinator — Issue Date: 10/85	Revised Date: NA

INGREDIENTS AND HAZARDOUS COMPONENTS

Material	%	TLV	C.A.S. #	Suspect Carcinogen
Stannous Chloride	20	2.0 MG/M3	7772-99-8	NA

PHYSICAL DATA

Boiling Point: NA	Freezing Point: NA	Specific Gravity: UK	pH: 1% solution approx. 2.5
Vapor Pressure at 20° C: NA	Vapor Density (Air = 1): NA	% Volatiles by Volume: NA	Odor: slight aromatic
Evaporation Rate (Butyl Acetate = 1) NA		Solubility in Water: moderate	
Appearance and Form: Tannish powdery mixture.			

FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA	Flammable Limits in Air: % By Volume — Upper: NA — Lower:
Test Method: NA	
Extinguishing Media: Water, dry chemical.	
Special Fire Fighting Procedures: Avoid contact with skin and eyes. Avoid inhalation of fu If necessary, use self-contained breathing apparatus and protective clothing.	
Unusual Fire and Explosion Hazards: Irritating fumes may develop when product is heated.	
DOT Classification: Not regulated except for ORM-B air shipments.	Note: UK = Unknown NA = Not Appl

TRW-02383

0908-3764

STANNOUS CHLORIDE (Pg 2 of 2)

Universal Plating Accelerator 7040, 7041

HEALTH HAZARD DATA

Effects of Overexposure and Primary Entries to Body: May cause skin and eye irritation. Inhalation of fumes or dust may be irritating to the respiratory tract.

Emergency and First Aid Procedures:
Flush affected area thoroughly with clean water. For eye contact, flush thoroughly with water and get medical attention.

REACTIVITY DATA

☒ Stable ☐ Unstable Conditions to Avoid:

Incompatability — Materials to Avoid:
Avoid contact with oxidizers. Keep dry; material is hydroscopic.

Hazardous Decomposition Products:
Oxides of tin.

Hazardous Polymerization: ☐ May Occur ☒ Will Not Occur

SPILL OR LEAK PROCEDURES

Spills:
Sweep up and transfer to waste treating operation.

Waste Disposal Methods:
Material may be hazardous to aquatic life. Follow all federal, state and local requirements for treatment and disposal of tin metal containing and acidic wastes.

SPECIAL PROTECTION INFORMATION

Respirator:
Use NIOSH approved dust respirator.

Ventilation:
Mechanical - Sufficient to maintain below TLV.

Gloves:	Eye and Face:	Other:
Plastic or rubber	Goggles	Protective clothing to prevent skin contact.

Handling and Storage: Store to prevent physical damage to container. Store in a cool, dry area. Keep container closed when not in use.

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

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TRW-02384

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PC

0908-3765

Material Safety Data Sheet

Manufacturer's Name: Plating Systems & Technologies, Inc.
317 North Mechanic Street
Jackson, Michigan 49201

Telephone: 517-783-4776 (24 Hour)

Section 1 -Identification

Trade Name: Starter Concentrate Liquid
Product Code: 206
Chemical Name and Synonyms: Mixture
Chemical Family: Mixture
Formula: Proprietary

Section 2 - Hazardous Ingredients

Identity	CAS Number	Percent	TLV

This product contains no hazardous ingredients

Section 3 - Supplier Notification under Section 313

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372:

CAS Number	Chemical Name	Percent By Weight

This product contains no ingredients subject to said reporting.

Section 4 - Physical Data

Boiling Point: 221° F. Specific Gravity: 1.09
Vapor Pressure (water = 1) approximately 1
Percent Volatile: approximately 62% by volume
Vapor Density (Air = 1): 1.0
Evaporation Rate: (Water = 1) Approximately 0.5
Solubility In Water: Miscible in all proportions
Appearance and Odor: Light yellow to amber slightly viscous liquid with little detectable odor

Section 5 - Fire and Explosion Hazard Data

Flash Point: not flammable Flammable Limits: Lel: n/a Uel:n/a
Extinguishing Media: Not required
Special Fire Fighting Procedures: Not required

Unusual Fire and Explosion Hazards: None.

Section 6 - Health Hazard Data

Threshold Limit Value: Not applicable

Primary Routes of Exposure: Through exposed skin and eyes or through inhalation

Effects of Overexposure: Repeated inhalation of mists may cause slight irritation of the upper respiratory tracts.

Emergency First Aid Procedures: Wash exposed skin with soap and water. In the event of eye contact, flush with water as required.

Section 7 - Reactivity Data

Stability: (Stable or Unstable): Stable
Conditions to Avoid: Not Applicable
Incompatibility (Materials to Avoid): None commonly encountered.
Hazardous Decomposition Products: None.
Hazardous Polymerization: Will not occur
Conditions to Avoid: Not applicable

Section 8 - Spill or Leak Procedures

Steps to be Taken in Case Material is Released or Spilled:
Either wash or absord with absorbent material, depending upon the circumstances of the spill.

Waste Disposal Method: Dispose of in accordance with all applicable federal, state, and local regulations. If uncontaminated with any other material, this product may be discharged to the sewer or disposed of as trash.

Section 9 - Special Protection Information

Respiratory Protection: Not required
Ventilation: Local Exhaust: Not required Special: Not required
Mechanical (General): Not required
Other: Not required
Protective Gloves: Gloves recommneded
Eye Protection: Chemical Safety Goggles
Other Protective Equipment: Not required

Section 10 - Special Precautions

Precautions to be Taken In Handling and Storing: Be careful not to puncture container. Attend to all spills immediately.

Other Precautions: None

Section 11 - Transportation Data

D.O.T. : Cleaning Compound, Liquid (Non-hazardous)
Reportable Quantity: None
Freight Classification: Not hazardous

Section 12 - NFPA Hazard Ratings

Reactivity: 0 Fire/Flammability: 0 Health/Toxicity: 03
4: Extreme; 3: High; 2: Moderate; 1: Slight; 0: Insignificant

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Prepared by: Thomas H. Rochester
Original Date: January 19, 1989
Reviewed and Revised, January 30, 1990

JESSOP STEEL COMPANY — WASHINGTON, PENNSYLVANIA 15301

MATERIAL SAFETY DATA SHEET

Date: September 1, 1989
Supersedes MSDS Dated: 11/11/85

SECTION I

MANUFACTURER'S NAME: JESSOP STEEL COMPANY	EMERGENCY TELEPHONE NO.: (412) 222-4000
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE): 500 Green Street, Washington, Pennsylvania 15301	
PRODUCT NAME: Tool Steels	CHEMICAL FAMILY: Steel
GRADES: Carbon (Water Hardening), Cold Work Die, Cold Work (Air Hardening), High Speed, Hot Work, Mold, Oil Hardening, Shock Resisting, Special Purpose, Armor Plate	

SECTION II - CHEMICAL COMPONENTS

	CAS NUMBER	RANGE %	ACGIH TLV	OSHA PEL
Iron (limits for iron oxide fume)	1309-37-1	50-98	5 mg/m^3	10 mg/m^3
Tungsten	7440-33-7	0-19	5 mg/m^3	5 mg/m^3
Chromium	7440-47-3	0-14	0.5 mg/m^3	1 mg/m^3
Cobalt	7440-48-4	0-12	0.05 mg/m^3	0.05 mg/m^3
Molybdenum (limits for dust)	7439-98-7	0-9	10 mg/m^3	10 mg/m^3
Nickel	7440-02-0	0-5	1 mg/m^3	1 mg/m^3
Vanadium (limits for dust)	1314-62-1	0-5	.05 mg/m^3	.05 mg/m^3
(limits for fume)			.05 mg/m^3	.05 mg/m^3
Manganese (limits for dust)	7439-96-5	0-3	5 mg/m^3	5 mg/m^3
(limits for fume)			1 mg/m^3	1 mg/m^3
Silicon (limits for dust)	7440-21-3	0-3	10 mg/m^3	10 mg/m^3
Carbon (as carbon black)	1333-86-4	0-3	3.5 mg/m^3	3.5 mg/m^3

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H_2O = 1)	8
VAPOR PRESSURE (MM HG.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (_____ = 1)	N/A
SOLUBILITY IN WATER	N/A	MELTING POINT	2600-2800F
APPEARANCE & ODOR	Metallic and odorless solid		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	N/A	FLAMMABLE LIMITS N/A	LEL	UEL
EXTINGUISHING MEDIA	N/A			
SPECIAL FIRE FIGHTING PROCEDURES	N/A			
Unusual Fire Explosion Hazards	N/A			
National Fire Protection Association Rating (NFPA)				
Health: 2	Flammability: 0	Reactivity: 0		

N/A = NOT APPLICABLE

TRW-02388

0908-3769

SECTION V - HEALTH HAZARD DATA

(X) MAJOR EXPOSURE HAZARD: INHALATION [X] SKIN CONTACT [ ] SKIN ABSORPTION [ ] INGESTION [ ]

NOTE: Steel products in the natural state do not present an inhalation, injection, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may result in the following effects if exposures exceed permissible limits: Symptoms: ACUTE: Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever." Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after exposure. Dermatitis due to sensitization may occur in some individuals. CHRONIC: Excessive and repeated overexposure of nickel and chromium can cause various forms of dertmatitis, inflamation and/or ulceration of upper respiratory tract. Both chromium and nickel have been associated with upper respiratory cancer. Excessive and repeated overexposure of iron fumes can cause siderosis. Excessive and prolonged inhalation of manganese fumes can cause bronchitis, pneumonitis, lack of coordination. Excessive and prolonged overexposure of cobalt may cause an asthma-like disease with cough and dyspnea.

EMERGENCY FIRST AID PROCEDURES In case of excessive exposure, remove to fresh air, administer oxygen and seek physician's assistance.

SECTION VI - REACTIVITY DATA

STABLE	UNSTABLE	CONDITIONS TO AVOID
[X]	[ ]	N/A

INCOMPATIBILITY (MATERIALS TO AVOID) N/A

DECOMPOSITION PRODUCTS N/A

HAZARDOUS POLYMERZATION		CONDITIONS TO AVOID
	MAY OCCUR [ ]	N/A
	WILL NOT OCCUR [X]	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED N/A

WASTE DISPOSAL METHOD
Dispose of in accordance with federal, state and local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE N/A

SECTION VIII - PERSONNEL PROTECTION INFORMATION

RESPIRATORY PROTECTION
For welding, burning, grinding, and cutting operations, local exhaust ventilation should be provided. If fumes or dusts cannot be controlled with exhaust ventilation, an appropriate NIOSH-approved respirator should be used to prevent excessive inhalation exposure.

GLOVES
Gloves may be necessary to prevent skin sensitization and dermatitis.

EYE PROTECTION
Approved safety glasses or goggles should be worn when working with dusty metals.

PREPARED BY

Jessop Steel Company

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JESSOP STEEL COMPANY — WASHINGTON, PENNSYLVANIA 15301

MATERIAL SAFETY DATA SHEET

Date: September 1, 1989
Supersedes MSDS Dated: 11/11/85

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
JESSOP STEEL COMPANY	(412) 222-4000
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE) 500 Green Street, Washington, Pennsylvania 15301	
PRODUCT NAME: Non-Magnetic Steels	CHEMICAL FAMILY Steel
GRADES 9, 200 and 200N	

SECTION II · CHEMICAL COMPONENTS

	C.A.S. NUMBER	RANGE %	ACGIH TLV	OSHA PEL
Iron (limits for iron oxide fume)	1309-37-1	70-85	5 mg/m^3	10 mg/m^3
Manganese (limits for dust)	7439-96-5	11-16	5 mg/m^3	5 mg/m^3
(limits for fume)			1 mg/m^3	1 mg/m^3
Nickel	7440-02-0	3-8	1 mg/m^3	1 mg/m^3
Chromium	7440-47-3	0-5	0.5 mg/m^3	1 mg/m^3
Silicon (limits for dust)	7440-21-3	0-1	10 mg/m^3	10 mg/m^3

SECTION III · PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H_2O · 1)	8
VAPOR PRESSURE (MM HG.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (_____ = 1)	N/A
SOLUBILITY IN WATER	N/A	MELTING POINT	2600-2800F
APPEARANCE & ODOR	Metallic and odorless solid		

SECTION IV · FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	N/A	FLAMMABLE LIMITS	LEL	UEL
EXTINGUISHING MEDIA	N/A			
SPECIAL FIRE FIGHTING PROCEDURES	N/A			
Unusual Fire Explosion Hazards	N/A			
National Fire Protection Association Rating (NFAA)				
Health: 2 Flammability: 0 Reactivity: 0				

N/A = NOT APPLICABLE

TRW-02390

0908-3771

SECTION V - HEALTH HAZARD DATA

(X) MAJOR EXPOSURE HAZARD: INHALATION [X] SKIN CONTACT [ ] SKIN ABSORPTION [ ] INGESTION [ ]

NOTE: Steel products in the natural state do not present an inhalation, injection, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may result in the following effects if exposures exceed permissible limits:

SYMPTOMS: ACUTE: Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever." Symptoms consists of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after exposure. Dermatitis due to sensitization may occur in some individuals.

CHRONIC: Excessive and repeated overexposure of nickel and chromium can cause various forms of dermatitis, inflamation and/or ulceration of upper respiratory tract. Both chromium and nickel have been associated with upper respiratory cancer. Excessive and repeated overexposure of iron fumes can cause siderosis. Excessive and prolonged inhalation of manganese fumes can cause bronchitis, pneumonitis, lack of coordination.

EMERGENCY FIRST AID PROCEDURES In case of excessive exposure, remove to fresh air, administer oxygen, and seek physician's assistance.

SECTION VI - REACTIVITY DATA

STABLE	UNSTABLE	CONDITIONS TO AVOID
[X]	[ ]	N/A

INCOMPATIBILITY (MATERIALS TO AVOID): N/A

DECOMPOSITION PRODUCTS: N/A

HAZARDOUS POLYMERZATION			CONDITIONS TO AVOID
	MAY OCCUR	[ ]	N/A
	WILL NOT OCCUR	[X]	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: N/A

WASTE DISPOSAL METHOD: Dispose of in accordance with federal, state and local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: N/A

SECTION VIII - PERSONNEL PROTECTION INFORMATION

RESPIRATORY PROTECTION: For welding, burning, grinding, and cutting operations, local exhaust ventilation should be provided. If fumes or dusts cannot be controlled with exhaust ventilation, an appropriate NIOSH-approved respirator should be used to prevent excessive inhalation exposure.

GLOVES: Gloves may be necessary to prevent skin sensitization and dermatitis.

EYE PROTECTION: Approved safety glasses or goggles should be worn when working with dusty metals.

PREPARED BY

Jessop Steel Company

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JESSOP STEEL COMPANY — WASHINGTON, PENNSYLVANIA 15301

MATERIAL SAFETY DATA SHEET

Date: September 1, 1989
Supersedes MSDS Dated: 2/3/86

SECTION I

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
JESSOP STEEL COMPANY	(412) 222-4000
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE) 500 Green Street, Washington, Pennsylvania 15301	
PRODUCT NAME: Stainless Steels	CHEMICAL FAMILY Steel
GRADES Austenitic, Ferritic, Martensitic, Duplex and Precipitation Hardening Stainless Steels.	

SECTION II · CHEMICAL COMPONENTS

	C.A.S. NUMBER	RANGE %	ACGIH TLV	OSHA PEL
Iron (limits for iron oxide fumes)	1309-37-1	40-89	5 mg/m^3	10 mg/m^3
Nickel	7440-02-0	0-37	1 mg/m^3	1 mg/m^3
Chromium	7440-47-3	10-27	0.5 mg/m^3	1 mg/m^3
Manganese (limits for dust)	7439-96-5	0-16	5 mg/m^3	5 mg/m^3
(limits for fume)			1 mg/m^3	1 mg/m^3
Molybdenum (limits for dust)	7439-98-7	0-5	10 mg/m^3	10 mg/m^3
Copper (limits for fume)	7440-50-8	0-5	0.2 mg/m^3	0.1 mg/m^3
Silicon (limits for dust)	7440-21-3	0-3	10 mg/m^3	10 mg/m^3
Tungsten	7440-33-7	0-2	5 mg/m^3	5 mg/m^3
Aluminum (limits for dust)	7429-90-5	0-2	10 mg/m^3	15 mg/m^3
(limits for welding fumes)			5 mg/m^3	5 mg/m^3

SECTION III · PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H_2O = 1)	8
VAPOR PRESSURE (MM HG.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (_____ = 1)	N/A
SOLUBILITY IN WATER	N/A	MELTING POINT	2600-2800F
APPEARANCE & ODOR	Metallic and odorless solid		

SECTION IV · FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	N/A	FLAMMABLE LIMITS N/A	LEL	UEL
EXTINGUISHING MEDIA	N/A			
SPECIAL FIRE FIGHTING PROCEDURES	N/A			
Unusual Fire Explosion Hazards	N/A			
National Fire Protection Association Rating (NFPA)				
Health: 2 Flammability: 0 Reactivity: 0				

N/A = NOT APPLICABLE

TRW-02392

0908-3773

SECTION V - HEALTH HAZARD DATA

(X) MAJOR EXPOSURE HAZARD: INHALATION [X] SKIN CONTACT [ ] SKIN ABSORPTION [ ] INGESTION [ ]

NOTE: Steel products in the natural state do not present an inhalation, injection, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may result in the following effects if exposures exceed permissible limits: Symptoms: ACUTE: Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever." Symptoms consist of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after exposure. Dermatitis due to sensitization may occur in some individuals. CHRONIC: Excessive and repeated overexposure of nickel and chromium can cause various forms of dermatitis, inflamation and/or ulceration of upper respiratory tract. Both chromium and nickel have been associated with upper respiratory cancer. Excessive and repeated overexposure of iron fumes can cause siderosis. Excessive and prolonged inhalation of manganese fumes can cause bronchitis, pneumonitis, lack of coordination. Copper - pulmonary effects.

EMERGENCY FIRST AID PROCEDURES In case of excessive exposure, remove to fresh air, administer oxygen and seek physician's assistance.

SECTION VI - REACTIVITY DATA

STABLE	UNSTABLE	CONDITIONS TO AVOID
[X]	[ ]	N/A

INCOMPATIBILITY (MATERIALS TO AVOID) N/A

DECOMPOSITION PRODUCTS N/A

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
	MAY OCCUR [ ]	
	WILL NOT OCCUR [X]	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED N/A

WASTE DISPOSAL METHOD Dispose of in accordance with applicable federal, state and local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE N/A

SECTION VIII - PERSONNEL PROTECTION INFORMATION

RESPIRATORY PROTECTION For welding, burning, grinding, and cutting operations, local exhaust ventilation should be provided. If fumes or dusts cannot be controlled with exhaust ventilation, an appropriate NIOSH-approved respirator should be used to prevent excessive inhalation exposure.

GLOVES Gloves may be necessary to prevent skin sensitization and dermatitis.

EYE PROTECTION Approved safety glasses or goggles should be worn when working with dusty metals

PREPARED BY

Jessop Steel Company

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JESSOP STEEL COMPANY — WASHINGTON, PENNSYLVANIA 15301

MATERIAL SAFETY DATA SHEET

Date: September 1, 1989
Supersedes MSDS Dated: 11/11/85

SECTION I

MANUFACTURER'S NAME: JESSOP STEEL COMPANY	EMERGENCY TELEPHONE NO: (412) 222-4000
ADDRESS (NUMBER, STREET, CITY, STATE & ZIP CODE): 500 Green Street, Washington, Pennsylvania 15301	
PRODUCT NAME: Nickel Base Alloys	CHEMICAL FAMILY: Nonferrous Alloys
GRADES: Nickel and Nickel Alloys	

SECTION II - CHEMICAL COMPONENTS

	C.A.S. NUMBER	RANGE %	ACGIH TLV	OSHA PEL
Nickel	7440-02-0	24-99	1 mg/m^3	1 mg/m^3
Iron (limits for iron oxide fume)	1309-37-1	0-50	5 mg/m^3	10 mg/m^3
Copper (limits for fume)	7440-50-8	0-34	0.2 mg/m^3	0.1 mg/m^3
Chromium	7440-47-3	0-33	0.5 mg/m^3	1 mg/m^3
Molybdenum (limits for dust)	7439-98-7	0-30	10 mg/m^3	10 mg/m^3
Columbium	None	0-6	None Listed	None Listed
Tungsten	7440-33-7	0-5	5 mg/m^3	5 mg/m^3
Cobalt	7440-48-4	0-5	0.05 mg/m^3	0.05 mg/m^3
Titanium (limits for dust)	7439-98-7	0-2	10 mg/m^3	10 mg/m^3
Manganese (limits for dust)	7439-96-5	0-2	5 mg/m^3	5 mg/m^3
(limits for fume)			1 mg/m^3	1 mg/m^3
Silicon (limits for dust)	7440-21-3	0-2	10 mg/m^3	10 mg/m^3

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	N/A	SPECIFIC GRAVITY (H_2O = 1)	8
VAPOR PRESSURE (MM HG.)	N/A	PERCENT VOLATILE BY VOLUME (%)	N/A
VAPOR DENSITY (AIR = 1)	N/A	EVAPORATION RATE (_____ = 1)	N/A
SOLUBILITY IN WATER	N/A	MELTING POINT	2600-2800F
APPEARANCE & ODOR	Metallic and odorless solid		

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED)	N/A	FLAMMABLE LIMITS N/A	LEL	UEL
EXTINGUISHING MEDIA	N/A			
SPECIAL FIRE FIGHTING PROCEDURES	N/A			
Unusual Fire Explosion Hazards	N/A			
National Fire Protection Association Rating (NFPA)				
Health: 2 Flammability: 0 Reactivity: 0				

N/A = NOT APPLICABLE

SECTION V - HEALTH HAZARD DATA

(X) MAJOR EXPOSURE HAZARD: INHALATION [X] SKIN CONTACT [ ] SKIN ABSORPTION [ ] INGESTION [ ]

NOTE: Steel products in the natural state do not present an inhalation, injection, or contact hazard. However, operations such as burning, welding, sawing, brazing, or grinding may result in the following effects if exposures exceed permissible limits: Symptoms: ACUTE: Excessive inhalation of fumes from many metals can produce an acute reaction known as "metal fume fever." Symptoms consists of chills and fever (very similar to and easily confused with flu symptoms) which come on a few hours after exposure. Dermatitis due to sensitization may occur in some individuals. CHRONIC: Excessive and repeated overexposure of nickel and chromium can cause various forms of dermatitis, inflamation and/or ulceration of upper respiratory tract. Both chromium and nickel have been associated with upper respiratory cancer. Excessive and repeated overexposure of iron fumes can cause siderosis. Excessive and prolonged inhalation of manganese fumes can cause bronchitis, pneumonitis, lack of coordination. Excessive and prolonged overexposure of cobalt may cause an asthma-like disease with cough and dyspnea. Copper-pulmonary effects.

EMERGENCY FIRST AID PROCEDURES In case of excessive exposure, remove to fresh air, administer oxygen and seek physician's assistance.

SECTION VI - REACTIVITY DATA

STABLE	UNSTABLE	CONDITIONS TO AVOID
[X]	[ ]	N/A

INCOMPATIBILITY (MATERIALS TO AVOID) N/A

DECOMPOSITION PRODUCTS N/A

HAZARDOUS POLYMERZATION		CONDITIONS TO AVOID
	MAY OCCUR [ ]	N/A
	WILL NOT OCCUR [X]	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED N/A

WASTE DISPOSAL METHOD
Dispose of in accordance with federal, state and local regulations.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE N/A

SECTION VIII - PERSONNEL PROTECTION INFORMATION

RESPIRATORY PROTECTION For welding, burning, grinding and cutting operations, local exhaust ventilation should be provided. If fumes or dusts cannot be controlled with exhaust ventilation, an appropriate NIOSH-approved respirator should be used to prevent excessive inhalation exposure.

GLOVES
Gloves may be necessary to prevent skin sensitization and dermatitis.

EYE PROTECTION
Approved safety glasses or goggles should be worn when working with dusty metals.

PREPARED BY:

Jessop Steel Company

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Ryerson
an Inland Steel company

Material Safety Data Sheet
STEEL

I. PRODUCT IDENTIFICATION

Distributor: Joseph T. Ryerson & Son, Inc.
Address: 2621 W. 15th Place
Chicago, Illinois 60608
Chemical Name and Synonyms: STEEL
Chemical Family: Metals
Formula: Not Applicable

Emergency Telephone: (312) 762-2121

II. PRODUCT DESCRIPTION AND HAZARDOUS INGREDIENTS/IDENTITY INFORMATION:
See Chart Inside For Listing

III. PHYSICAL DATA

Melting Point F (C): Greater Than 2800 (1540)
Vapor Pressure: Not Applicable
Vapor Density (Air = 1): Not Applicable
Solubility in Water: Negligible
Specific Gravity (H_2O = 1): Greater Than 7
% Volatile by Volume (%): Not Applicable
Evaporation Rate: Not Applicable
Appearance and Odor: Grayish to silvery odorless sheet, strip, plate, bar, structural shapes, pipe and tubing.

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point F (C): Not Applicable
Extinguishing Media: Use methods applicable to surrounding area.
Flammable Limits: Not Applicable
Unusual Fire and Explosion Hazards: None
Special Fire Fighting Procedures: Use self-contained breathing apparatus for protection against degradation products and fire fighting technique or agent(s) applicable to surrounding materials.

DISCLAIMER

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The information contained in this Material Safety Data Sheet (MSDS) is believed to be correct, but no representations, guarantees or warranties of any kind are made as to its accuracy, suitability for particular applications, hazards connected with the use of the material or the results to be obtained from the use thereof. User assumes all risk and liability of any use, processing or handling of any material. Variations in methods, conditions, equipment used to store, handle or process the material and hazards connected with the use of the material are solely the responsibility of the user and remain at its sole discretion.

As sold, the product described in this MSDS is considered by Ryerson to be an "article" within the meaning of Title 29 of the Code of Federal Regulations, Section 1910.1200 *et seq.* This MSDS is intended to be used solely for the purpose of satisfying informational requests made pursuant to that requirement. It is not intended to preempt, replace or expand the terms contained in Ryerson Conditions of Sale. Compliance with all applicable federal, state and local laws and regulations remains the responsibility of the user, and the user has the responsibility to provide a safe workplace, to examine all aspects of its operation, and to determine if or where precautions,in addition to those described herein, are required.

		METAL	ALLOYING ELEMENTS																METALLIC COATINGS		
	CAS Number	7439-89-6	7439-96-5	7440-44-0	7429-90-5	7440-47-3	[illegible]	[illegible]	[illegible]	[illegible]	7723-14-0	7440-21-3	7704-34-9	7440-42-8	7440-69-9	13494-80-9	7439-92-1	7440-62-2	7440-32-6	7440-66-6	7439-89-6	7429-90-5
PRODUCT DESCRIPTION	AISI GRADE/TRADE NAME	Iron	Manganese	Carbon	Aluminum	Chromium	Copper	Molybdenum	Nickel	Phosphorous	Silicon	Sulfur	Boron	Bismuth	Tellurium	Lead	Vanadium	Titanium	Zinc	Iron	Aluminum
Nonresulfurized Carbon Steel	1005-1095	>95	<1.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5									
Nonresulfurized Carbon Steel: Vanadium Bearing	1005-1095	>95	<1.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5					<0.5				
Nonresulfurized Carbon Steel: Lead Bearing	10L05-10L95	>95	<1.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5					
Nonresulfurized Carbon Steel: Titanium Bearing	1006	>95	<1.0	<0.5	<0.1	< 0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.3						<0.7			
Nonresulfurized Carbon Steel: Bismuth Bearing	1016	>95	<1.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5							
Nonresulfurized Carbon Steel: Tellurium Bearing	1016	>95	<1.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5						
Nonresulfurized Carbon Steel: Bismuth Bearing	1045	>95	<1.2	<0.5	<0.1	< 0.4	<0.2	<0.1	<0.2	<0.3	<0.3	<0.3		<0.3							
Nonresulfurized Carbon Steel: Boron Treated	10B38	>95	<1.0	<0.5	<0.5	< 0.4	<0.5	<0.5	<0.5	<0.2	<0.5	<0.1	<0.1								
Nonresulfurized Carbon Steel: Boron Treated	10B42	>95	<1.0	<0.5	<0.5	< 0.4	<0.5	<0.5	<0.5	<0.2	<0.5	<0.1	<0.1								
Resulfurized Carbon Steel	1106	>95	<1.0	<0.5	<0.5	< 0.1	<0.2	<0.1	<0.1	<0.1	<0.5	<0.2									
Resulfurized Carbon Steel	1110-1151	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2									
Resulfurized Carbon Steel: Bismuth Bearing	1110-1151	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2		<0.5							
Resulfurized Carbon Steel: Tellurium Bearing	1110-1151	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2			<0.2						
Resulfurized Carbon Steel: Vanadium Bearing	1110-1151	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2					<0.5				
Rephosphorized and Resulfurized Carbon Steel: Lead Bearing	11L10-11L51	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2				<0.5					
Resulfurized Carbon Steel: Lead Bearing	11L10-11L51	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2				<0.5					
Resulfurized Carbon Steel: Lead and Tellurium Bearing	11L10-11L51	>95	<1.7	<0.6	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.2			<0.2	<0.5					
Rephosphorized and Resulfurized Carbon Steel: Bismuth Bearing	1211-1215	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4		<0.5							
Rephosphorized and Resulfurized Carbon Steel: Tellurium Bearing	1211-1215	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4			<0.2						
Rephosphorized and Resulfurized Carbon Steel	1211-1215	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4									
Rephosphorized and Resulfurized Carbon Steel: Lead Bearing	12L11-12L15	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4				<0.5					
Nonresulfurized Carbon Steel	1513-1566	>95	<2.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1									
Nonresulfurized Carbon Steel: Vanadium Bearing	1513-1566	>95	<2.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.1					<0.5				
Nonresulfurized Carbon Steel: Vanadium, Titanium and Boron	15B13-15B36	>95	<2.0	<0.5	<0.2	< 0.3	<0.6		<0.3	<0.1	<0.5	<0.1	<0.1				<0.1	<0.1			
Standard Alloy Steel: Manganese	1330-1345	>95	<2.0	<0.5	<0.5	< 0.2	<0.5	<0.2	<0.3	<0.1	<0.5	<0.1									
Standard Alloy Steel: Molybdenum Bearing	4023-4047	>95	<1.0	<0.5	<0.5		<0.5	<0.3		<0.1	<0.3	<0.1									
Standard Alloy Steel: Molybdenum and Chromium	4118-4161	>95	<1.0	<0.7	<0.5	< 1.1	<0.5	<0.5		<0.1	<0.3	<0.1									
Standard Alloy Steel: Tellurium Bearing	4118-4161	>95	<1.0	<0.7	<0.5	< 1.1	<0.5	<0.5		<0.1	<0.3	<0.1			<0.2						
Standard Alloy Steel: Boron Treated	41B18-41B61	>95	<1.0	<0.7	<0.5	< 1.1	<0.5	<0.5		<0.1	<0.3	<0.1	<0.1								
Standard Alloy Steel: Vanadium, Titanium and Boron	41B18-41B61	>95	<1.0	<0.7	<0.5	< 1.1	<0.5	<0.5		<0.1	<0.3	<0.1	<0.1				<0.5	<0.5			
Standard Alloy Steel: Molybdenum, Chromium and Lead	41L18-41L61	>95	<1.0	<0.7	<0.5	< 1.1	<0.5	<0.5		<0.1	<0.3	<0.1				<0.5					
Standard Alloy Steel: Molybdenum, Chromium and Nickel	4320-4340	>95	<1.0	<0.5	<0.5	< 1.0	<0.5	<0.3	<2.0	<0.1	<0.3	<0.1									
Standard Alloy Steel: Molybdenum and Nickel	4617-4626	>95	<0.7	<0.3	<0.5		<0.5	<0.3	<2.0	<0.1	<0.3	<0.1									
Standard Alloy Steel: Boron Treated	50B40-50B60	>95	<1.0	<0.7	<0.5	< 1.0	<0.5			<0.1	<0.3	<0.1	<0.1								
Standard Alloy Steel: Chromium Bearing	5115-5160	>95	<1.0	<0.6	<0.5	< 1.1				<0.1	<0.3	<0.1									
Standard Alloy Steel: Boron Treated	51B60	>95	<1.0	<0.7	<0.5	< 1.0	<0.5			<0.1	<0.3	<0.1	<0.1								
Standard Alloy Steel: Chromium	50100	>95	<0.5	<1.2	<0.5	< 0.7	<0.5	<0.2	<0.3	<0.1	<0.5	<0.1									
Standard Alloy Steel: Chromium	51100	>95	<0.5	<1.2	<0.5	< 0.7	<0.5	<0.2	<0.3	<0.1	<0.5	<0.1									
Standard Alloy Steel: Chromium	52100	>95	<0.5	<1.2	<0.5	< 0.7	<0.5	<0.2	<0.3	<0.1	<0.5	<0.1									
Standard Alloy Steel: Chromium & Vanadium	6118-6150	>95	<1.0	<0.6	<0.5	< 1.2	<0.5	<0.2	<0.3	<0.1	<0.5	<0.1					<0.3				
Standard Alloy Steel: Molybdenum, Chromium and Nickel	8615-8822	>95	<1.0	<0.6	<0.5	< 0.6	<0.5	<0.5	<0.7	<0.1	<0.3	<0.1									
Standard Alloy Steel: Molybdenum, Chromium Nickel and Lead	86L15-86L55	>95	<1.0	<0.6	<0.5	< 0.6	<0.5	<0.5	<0.7	<0.1	<0.3	<0.1				<0.5					
Standard Alloy Steel: Nickel, Chrome & Molybdenum	9310	>92	<0.7	<0.2	<0.5	< 1.5	<0.5	<0.2	<3.6	<0.1	<0.5	<0.1									
Standard Alloy Steel: Boron Treated	94B15-94B30	>93	<1.1	<0.4	<0.5	< 0.6	<0.5	<0.2	<0.7	<0.1	<0.5	<0.1									
Inland ALUMA-TI	ALUMA-TI	>95	<0.7	<0.3	<0.1	< 0.2	<0.2	<0.2	<0.2	<0.2	<0.3	<0.2						<0.7			>98
ALUMINIZED STEEL	ALUMINIZED STEEL	>95	<1.2	<0.3	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5									>98
Inland CAL DI-FORM	CAL DI-FORM	>95	<1.0	<0.2	<0.1	< 0.1	<0.2	<0.1	<0.2	<0.1	<0.3	<0.4					<0.2	<0.1			
Inland CAL HI-FORM	CAL HI-FORM	>97	<1.0	<0.2	<0.1	< 0.1	<0.2	<0.1	<0.2	<0.1	<0.3	<0.4					<0.2	<0.1			
Inland CORTEN A	CORTEN A	>95	<0.7	<0.2	<0.1	< 2.0	<1.0	<0.5	<0.7	<0.2	<1.0	<0.1					<0.2				
Inland CORTEN B	CORTEN B	>95	<1.5	<0.2	<0.1	< 1.0	<0.5	<0.1	<0.5	<0.2	<1.0	<0.1					<0.3				
Inland CORTEN C	CORTEN C	>95	<1.5	<0.2	<0.1	< 1.0	<0.5	<0.1	<0.5	<0.2	<1.0	<0.1					<1.0				
Inland CORTEN W	CORTEN W	>95	<1.0	<0.4	<0.1	< 1.0	<0.5	<0.1	<0.4	<0.2	<0.5	<0.2					<0.2				
Inland DECOR	DECOR	>95	<2.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5							>98		
Inland EZ CUT	EZ CUT	>95	<2.0	<0.3	<0.2	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.4				<0.5					
Inland 4-WAY	4 WAY	>95	<1.0	<0.5	<0.5	< 0.1	<0.2	<0.1	<0.2	<0.2	<0.5	<0.1									
Inland HI-FORM	HI-FORM	>95	<2.0	<0.2	<0.1	< 0.1	<0.2	<0.1	<0.2	<0.1	<0.3	<0.1					<0.2	<0.1			
Inland INAMEL	INAMEL	>95	<0.7	<0.5	<0.1	< 0.2	<0.2	<0.3	<0.2	<0.1	<0.5	<0.1									
Inland INCUT	INCUT	>95	<2.0	<0.2	<0.2	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5		<0.5							
Inland INX	INX	>95	<2.0	<0.4	<0.1	< 0.5	<0.3	<0.5	<0.5	<0.1	<0.4	<0.1					<0.2	<0.1			
Inland INX BISMUTH	INX BISMUTH	>95	<2.0	<0.4	<0.1	< 0.5	<0.3	<0.5	<0.5	<0.1	<0.4	<0.1		<0.2			<0.2	<0.1			
Inland INX LEDLOY	INX LEDLOY	>95	<2.0	<0.4	<0.1	< 0.5	<0.3	<0.5	<0.5	<0.1	<0.4	<0.1				<0.4	<0.2	<0.1			
Inland LEDLOY	LEDLOY	>95	<2.0	<0.7	<0.2	< 0.5	<0.5	<0.5	<0.5	<0.1	<0.5	<0.4				<0.5					
Inland LEDLOY A	LEDLOY A	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4				<0.5					
Inland LEDLOY AN	LEDLOY AN	>95	<1.2	<0.2	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.2	<0.5	<0.4				<0.5					
Inland LEDLOY AX	LEDLOY AX	>95	<1.7	<0.5	<0.5	< 0.5	<0.5	<0.5	<0.2	<0.1	<0.5	<0.4			<0.2	<0.5					
Inland MartINsite	MartINsite	>95	<0.7	<0.5	<0.1	< 0.1	<0.2	<0.1	<0.2	<0.1	<0.5	<0.1	<0.1					<0.1			
PAINT-TITE	PAINT-TITE	>95	<2.0	<0.5	<0.5	< 0.5	<0.3	<0.5	<0.5	<0.5	<0.5	<0.5							>89	>10	
Inland TI-CO Galvanized	TI-CO	>95	<2.0	<1.0	<0.5	< 0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5							>98		
Inland TI-NAMEL	TI-NAMEL	>95	<1.0	<0.2	<0.1	< 0.1	<0.1	<0.1	<0.1	<0.1	<0.2	<0.1						<0.5			
Inland TRI-STEEL	TRI-STEEL	>95	<1.5	<0.5	<0.1	< 0.1	<0.4	<0.5	<0.2	<0.2	<0.4	<0.1					<0.2				
Nonresulfurized Carbon Steel	ASTM A36	>95	<1.2	<0.3	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.2	<0.5	<0.1									
Standard Alloy Steel: Chromium Molybdenum	ASTM A182	>87	<1.0	<0.2	<0.5	<10.1	<0.5	<1.2	<0.5	<0.1	<1.1	<0.1									
Standard Alloy Steel: Chromium Molybdenum	ASTM A182 GR F11	>93	<1.0	<0.2	<0.5	< 1.6	<0.5	<0.7	<0.5	<0.1	<1.1	<0.1									
Nonresulfurized Carbon Steel	ASTMI A283	>95	<1.2	<0.3	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.2	<0.5	<0.1									
Nonresulfurized Carbon Steel	ASTM A285	>95	<1.0	<0.3	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.2	<0.5	<0.1									
Standard Alloy Steel: Chromium Molybdenum	ASTM A387 GR 11	>94	<1.0	<0.2	<0.5	< 1.6	<0.5	<0.7	<0.5	<0.1	<1.0	<0.1									
Standard Alloy Steel: Chromium Molybdenum	ASTM A387 GR 22	>93	<1.0	<0.2	<0.5	< 3.0	<0.5	<1.5	<0.5	<0.1	<1.0	<0.1									
Nonresulfurized Carbon Steel	ASTM A455	>95	<1.5	<0.4	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.1									
Standard Alloy Steel: Nickel Chromium, Boron	ASTM A514	>94	<1.6	<0.3	<0.5	< 1.7	<0.7	<0.7	<2.0	<0.1	<1.0	<0.1	0.1				0.1	0.2			
Nonresulfurized Carbon Steel	ASTM A515	>95	<1.4	<0.4	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.1									
Nonresulfurized Carbon Steel	ASTM A515	>95	<1.4	<0.4	<0.5	< 0.5	<0.5	<0.1	<0.5	<0.1	<0.5	<0.1									
Standard Alloy Steel: Nickel Chromium Boron	ASTM A517	>94	<1.6	<0.3	<0.5	<1.7	<0.7	<0.7	<2.0	<0.1	<1.0	<0.1	0.1				0.1	0.2			

	Aluminum	Bismuth	Boron	Carbon	Chromium	Copper	Iron	Lead	Manganese	Molybdenum	Nickel	Phosphorus	Silicon	Sulfur	Tellurium	Titanium	Vanadium	Zinc
Contaminant and Exposure Limits	As Welding Fume	Not Listed	As Boron Oxide	Not Listed	As Soluble Cr Salts	As Copper Cust	As Iron Oxide Fume	As Inorganic Pb Dust & Fume	As Manganese Dust	As Soluble Mo Compounds	As Metal Ni	As Phosphorus (yellow)	As Nuisance Dust	As Sulfur Dioxide	As Te Compounds	As Ti, Titanium Dioxide	As Vanadium Pentoxide Dust	As Zinc Oxide Dust
(mg/m³)	5		15 10		0.5 0.5(VI)	1 1	10 -	0.05 0.15	5(c) 5(c)	5 5	1 1	0.1 0.1	15 10	13 5	0.1 0.1	15 10	0.5(c) 0.05 resp.	- 10
PEL TLV					As Metal and Insoluble Cr Salts	As Copper Fume	As Fe		As Manganese Fume	As Insoluble Mo Compounds	As Soluble Ni Compounds						As Vanadium Pentoxide Fume	As Zinc Oxide Fume
					1 0.5	0.1 0.2	- 5		5(c) 1	15 10	1 1						0.1(c) 0.05	5 5

TRW-02397

0908-3778

V. HEALTH HAZARD DATA

Applicable Statutory or Recommended Occupational Exposure Limits: No Threshold Limit Value (TLV) or Permissible Exposure Limit (PEL) exists for steel. See chart inside for listing of the individual constituents.

Effects of Overexposure:

Acute - Dust or fume may cause irritation to the eyes, nose, or throat; leave a metallic taste in the mouth; result in metal fume fever; or produce flu-like symptoms.

Chronic - *Aluminum:* May initiate fibrotic changes to lung tissue

Bismuth: No chronic debilitating symptoms indicated from metal

Boron: No chronic debilitating symptoms indicated

Chromium: Skin ulceration, irritative dermatitis, allergic reaction, ulceration of the mucous membranes, perforation of the nasal septum, bronchial carcinoma, adenocarcinoma, mutagen(?) Listed NTPARC and IARC Monographs

Copper: No chronic debilitating symptoms indicated

Iron: Siderosis

Lead: Anemia, urinary dysfunction, metallic taste in mouth, weakness, constipation, nausea, nervous disorder

Manganese: Bronchitis, pneumonitis, lack of coordination

Molybdenum: Morphological changes in the liver, kidneys, and spleen, anemia, diarrhea, bone deformity and growth retardation

Nickel: Inflammation of respiratory tract, pneumoconiosis. Skin sensitizer. Certain nickel compounds can cause cancer. Listed NTPARC and IARC Monographs

Phosphorous: Necrosis of the mandible

Sulfur (as sulfur dioxide): Edema of the lungs

Tellurium: Garlic ordor of breath and perspiration, metallic taste in mouth, dryness of the mouth, inhibition of sweat function, anorexia, nausea

Titanium: No chronic debilitating symptoms indicated

Vanadium: Emphysema, pneumonia

Zinc: Chromosomal anomalies in leukocytes reported. Arthritis, lameness and inflammation of the gastrointestinal tract reported from animal studies

Emergency and First Aid Procedures:

In the event of acute exposure, remove to fresh air, administer oxygen, and seek a physician's assistance.

VI. REACTIVITY DATA

Stability: Considered Stable

Incompatibility: Not incompatible with materials

Hazardous Polymerization: Not Applicable

Hazardous Decomposition Products: Not Applicable

Conditions to Avoid: May liberate metal fumes, metal oxides, or other oxides if exposed to elevated temperatures.

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken in Case Material Is Released or Spilled: Not Applicable

Waste Disposal Method: This material may be reclaimed for reuse.

VIII. SPECIAL PROTECTION INFORMATION

If operations are such that atmospheric levels of contaminants exceed prescribed limits, provide local exhaust ventilation and/or adequate respiratory protection. Consult your regional codes or code of Federal Regulations, Title 29, Part 1910.252, Welding, Cutting and Brazing, 1910.134, Respiratory Protection, and 1910-Subpart Z, Toxic and Hazardous Substances.

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storing: Not Applicable

Other Precautions: Not Applicable

TRW-02398

MATERIAL SAFETY DATA SHEET

I. PRODUCT IDENTIFICATION

Manufacturer's Name:	Uddeholm Corporation
Address:	4902 Tollview Drive Rolling Meadows, IL 60008
Telephone Number:	(708) 577-2220
Emergency Telephone Number:	(708) 577-2220
Date:	January 1992
Product Name:	Tool Steels High Speed Steels Specialty Strip Steels Rods for TIG-welding

II. INGREDIENTS

No permissible exposure limits (PEL) or threshold limit value (TLV) exist for steels. The following values are applicable to component elements:

Element	Weight Percentage	Number	OSHA PEL (mg/m)	ACGIH TLV (mg/m)
Carbon	0-2.25	1333-86-4	3.50 (As carbon black)	3.50 (As carbon black)
Chromium	0-17.00	7440-47-3	1.00	0.50
Iron	80.00-99.00	1309-37-1	10.00 (As iron oxide fume)	5.00 (As iron oxide Fume)
Manganese	0-1.50	7439-96-5	5.00 (Ceiling limit dust)	5.00 (Ceiling limit dust) 1.00 (As fume)
Molybdenum	0-8.00	7439-98-7	5.00 (Soluble Compounds)	5.00 (Soluble compounds)
Nickel	0-2.00	7440-02-0	1.00	0.10 (Soluble compounds)
Silicon	0-2.00	7440-21-3	None	5.00 (Respirable dust)
Sulfur	0-0.20	7446-09-5	None	5.00 (As sulfur dioxide)
Tungsten	0-8.00	7440-33-7	None	1.00 (Soluble compounds)
Vanadium	0-10.00	1314-62-1	0.50 (Ceiling limit dust)	0.05 (As dust)
			0.10 (Ceiling limit fumes)	0.05 (As fume)

Some or various combinations of these components may appear in grades produced. Consult appropriate data sheets or test reports for the specific ordered analysis or contact Uddeholm Corporation.

III. PHYSICAL DATA

Melting Point:	2400-2850°F
Specific Gravity:	7.5-8.5
Boiling Point:	N/A
Solubility in Water:	Insoluble
Vapor Pressure:	N/A
Appearance and Odor:	Solid, odorless metal. Metallic gray or luster except when material is painted.

IV. FIRE AND EXPLOSION DATA

Flash Point:	N/A
Flammability:	Lower Explosive Limit: N/A Upper Explosive Limit: N/A
Extinguishing Media:	N/A
Special Firefighting Procedure:	N/A

V. HEALTH HAZARD DATA

Steel products in the form shipped do not present an inhalation, ingestion or contact hazard. However, operations such as torch cutting, welding and grinding may result in the following effects if exposures exceed the limits listed in Section II, INGREDIENTS.

Effects of overexposure:

Acute: Irritation of eyes, nose or throat, metallic taste in mouth, or metal fume fever. Possible dermatitis.

Chronic: Prolonged over-exposure to alloy dusts or fumes may cause skin, eye, throat or nose irritations, leading to pulmonary diseases. Excessive and repeated inhalation of chromium and nickel fumes or dust may cause severe irritiaiton, ulceration and increased risk of cancer in the respiratory system. Excessive and prolonged inhalation of manganese can cause central nervous system damage resembling a Parkinson-like syndrome.

First Aid: Inhalation - remove to fresh air and get medical attention.

Skin - wash areas well with soap and water.

Eyes - flush well with running water to remove particles and get medical attention.

Ingestion - in the unlikely event that large quantities of metal have been ingested, get medical attention.

VI. REACTIVITY DATA

Stability - Stable

Conditions to avoid - avoid generation of dust which can present a moderate fire and explosion hazard.

Incompatibility - molten metal will react violently with water.

VII. PERSONAL PROTECTION INFORMATION

Use general and local exhaust ventilation to keep airborne concentrations of dusts and fumes below the PEL's and TLV's of Section II. Employees should wear NIOSH or MSHA approved respirators for protection against dust or fumes. Food should not be consumed in the work area.

Full protective clothing should be worn by workers exposed to heavy concentrations of dust. Gloves and barrier creams may be necessary to prevent skin sensitization and dermatitis.

Approved safety glasses with side shields or goggles should be worn during operations creating eye hazards. A welding hood should be worn when welding or burning. Approved steel-toe shoes with metatarsal guards should be worn for foot protection.

VIII. SPILL OR LEAK PROCEDURES

Action to take for spills - N/A
Waste disposal methods - N/A

IX. SPECIAL PRECAUTIONS

Adequate ventilation and/or respiratory protection should be provided if exposure limits in Section II, INGREDIENTS are exceeded.

Use good housekeeping practices to prevent accumulation of dust and fume and keep airborne dust and fume away.

All information, recommendations and suggestions contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, expressed or implied, is made by Uddeholm Corporation with respect to the information provided.

Employers should use this information only as a supplement to other available data. Since the use of these steel products is beyond our control, it is each employer's responsibility to assure the safety and health of their employees. Uddeholm Corporation will not assume liability arising out of use of this product by others.

UDDEHOLM

January 1992

Attn: Plant Manager/Safety Director/Purchasing Agent

SUBJECT: Federal Hazard Communication Standard

Material Safety Data Sheet (MSDS)

Federal Hazard Communication Standard 1910.1200 requires manufacturers to publish Material Safety Data Sheets.

This standard additionally requires manufacturers to furnish a copy of the Material Safety Data Sheet for users of Uddeholm's products. Accordingly, a MSDS is enclosed for your use.

In the event significant revisions to the MSDS become necessary, revised data sheets will be promptly forwarded. If you have any additional questions on the subject, please call or write to the address listed on the Material Safety Data Sheet.

Very truly yours,

UDDEHOLM CORPORATION

Kjell Bengtsson
Technical Manager

KB/jb
Enclosures

Uddeholm Corporation
4902 Tollview Drive
Rolling Meadows, IL 60008-3761

TELEPHONE
708-577-2220

TELEFAX
708-577-8028

HAMICO

HARRY MILLER Corporation

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4TH AND BRISTOL STREETS, PHILADELPHIA, PENNA. 19140 · (215) 324-4000 · CABLE: MILLER · FAX: (215) 324-1258

FAX COVER SHEET

DATE: June 22, 1992

TO: TRW CAMBRIDGE, MA ATTN: "LOIS" FAX # (617) 494-5536	This Transmission consists of _____ pages, including cover sheet. If all pages have not been received, please call (215) 324-4000 A.S.A.P. Thank you.

SPECIAL MESSAGE TO RECIPIENT:

Material Safety Data Sheet on STEELGARD 1505-HT

Best Regards,

Kay O'Reilly

Sender's Name

IMMUNOL · ACTIVOL · STEELGARD · PURGITOL · AQUATEMP · AQUAROLL

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)* STEELGARD 1505-HT

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name
HARRY MILLER CORPORATION

Emergency Telephone Number UNEMIRED 1-800-424-9300
(215) 324-4000

Address *(Number, Street, City, State, and ZIP Code)*
4th & BRISTOL STREETS

Telephone Number for Information
(215) 324-4000

PHILADELPHIA, PA. 19140

Date Prepared
REVISION #1; 9/11/89

Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Mineral Oil (if misted) CAS #64742-46-7	5mg/M^3 TWA	5mg/M^3 TWA	NONE	90-95%
Barium dinonylnaphthalene Sulfonate CAS #61790-48-5	NONE	NONE	0.5 mg/M^3	1-5%

As required by Section 313 of SARA Title III of 1988 and 40 CFR Part 372, this product contains the following items in a reportable quantity.

Barium dinonylnaphthalene Sulfonate CAS #61790-48-5 3%

Section III — Physical/Chemical Characteristics

Boiling Point	>300°F.	Specific Gravity (H_2O = 1)	0.88
Vapor Pressure (mm Hg.)	Unknown	Melting Point	< 0°F.
Vapor Density (AIR = 1)	> 1	Evaporation Rate (Butyl Acetate = 1)	< 1

Solubility in Water
Insoluble

Appearance and Odor
Clear Brown Liquid; Mineral Oil Odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used)	Flammable Limits	LEL	UEL
260°F. (COC)		Unknown	Unknown

Extinguishing Media
Use foam, dry chemicals or carbon dioxide.

Special Fire Fighting Procedures
Cover surface of burning liquid with extinguishing agent. Keep adjacent containers cool with water. Use self contained positive pressure breathing apparatus.

Unusual Fire and Explosion Hazards
NONE

TRW-02404

(Reproduce locally)

0908-3785

Section V — Reactivity Data

Stability			Conditions to Avoid
	Unstable		
	Stable	X	

Incompatibility (*Materials to Avoid*)
Strong oxidizing agents eg., chlorine, oxygen, hypochlorites.

Hazardous Decomposition or Byproducts
If incompletely combusted, fumes, smoke and carbon monoxide and oxides of barium.

Hazardous Polymerization			Conditions to Avoid
	May Occur		
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Irritant (if misted) Skin? Irritant Ingestion? No Hazard

Health Hazards (*Acute and Chronic*)
Eyes - Acute Irritant

Skin - Acute Irritant if overexposed

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure
Eyes - Burning, tearing, reddening; Skin - Irritation possibly leading to dermatitis if prolonged contact occurs; Inhalation - Irritation to respiratory tract.

Medical Conditions Generally Aggravated by Exposure Pre-existing respiratory conditions.

Emergency and First Aid Procedures Skin - Wash well with water. Use barrier cream if irritation occurs.
Eyes - Immediately flush with water for 15 minutes. If irritation persists call a physician.
Inhalation - Remove to fresh air. If irritation persists consult a physician.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Recover free liquid. Return to container. Absorb with inert material. Keep from entering sewers or waterways.

Waste Disposal Method
Haul away according to Federal, State and Local regulations

Precautions to Be Taken in Handling and Storing
Normal Drum storage. Keep container closed.

Other Precautions
Since containers contain product residue, observe all label precautions when empty Do not cut, drill, weld or grind on or near container. Do not reuse unless thoroughly cleaned.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
If exposure exceeds TLV, wear NIOSH approved respirators.

Ventilation		
	Local Exhaust: Normal Ventilation	Special: Not required
	Mechanical (*General*): Not required	Other: Not required

Protective Gloves: Rubber or Neoprene
Eye Protection: Safety Glasses or Goggles

Other Protective Clothing or Equipment
Not required

Work/Hygienic Practices
Wash well after use. Remove contaminated clothing.

TRW-02405

0908-3786

PETERSON STEEL CORPORATION
61 WEST MOUNTAIN ST., WORCESTER, MA 01606 • PHONE Area Code (508) 853-3630

Emergency Phone Number: (508) 853-3630 **Issue Date:** February 27, 1985

MATERIAL SAFETY DATA SHEET

TRADE NAME (Common or Synonym): Carbon and Alloy Steel
CHEMICAL NAME: AISI/SAE 10xx thru 93xx

1. INGREDIENTS

Material or Compound	CAS Number	% Weight	EXPOSURE LIMITS OSHA PEL (mg/m³)	EXPOSURE LIMITS ACHIG-TLV (mg/m³)
Aluminum (Al)	7429-90-5	<0.01 - 0.5	15	10
Bismuth (Bi)	7440-69-9	<0.2 - 0.5	n/a	n/a
Boron (B)	7440-42-8	<0.01 - 1.0	15	10
Carbon (C)	7440-44-0	<0.1 - 1.5	10	10
Chromium (Cr)	7440-47-3	<0.4 - 10	1.0	0.5
Columbium (Cb)	7440-03-1	<0.15 - 0.35	n/a	n/a
Copper (Cu)	7440-50-8	<0.3 - 1.9	1	1
Iron (Fe)	7439-89-6	86.5 - 99.5	10	5
Lead (Pb)	7439-92-1	0.15 - 0.35	0.05	0.05
Manganese (Mn)	7439-96-5	<0.04 - 0.7	5	5
Molybdenum (Mo)	7439-98-7	<0.15 - 1.10	15	10
Nickel (Ni)	7440-02-0	<0.10 - 10	1	1
Phosphorous (P)	7723-14-0	<0.04 - 0.12	0.1	0.1
Silicon (Si)	7740-21-3	<0.15 - 2.0	15	10
Sulfur (S)	7704-34-9	<0.05 - 0.35	13(Sulfur Dioxide)	5(Sulfur Dioxide)
Vanadium (V)	7440-62-2	<0.01 - 0.15	0.5	0.5

NOTE: The above is a summary of elements used in alloying steel. Various grades of steel will contain different combinations of these elements. Trace elements may also be present in minute amounts.

2. PHYSICAL DATA

Material is (at normal conditions):
- ○ LIQUID
- ● SOLID
- ○ GAS
- ○ OTHER

Vapor Density: N/A

Specific Gravity (H2O = 1): Approximately 7

Acidity/Alkalinity pH - N/A

Solubility In Water: N/A

Appearance and Odor: Silvery-Grey, Odorless

Melting Point (approximate): 2800° F

Vapor Pressure (mm Hg @ 20° C): N/A

% Volatile By Volume: N/A

Boiling Point: N/A

3. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:
Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.

Eyes and Face:
Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.

Hands, Arms and Body:
Protective gloves should be worn as required for welding, burning or handling operations.

Other clothing and Equipment:
As required depending upon operations and safety codes.

4. EMERGENCY MEDICAL PROCEDURES

Inhalation:
Remove to fresh air; if condition continues, consult a physician.

Eye Contact:
Flush thoroughly with running water to remove particulate; obtain medical attention.

Skin Contact:
Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.

Ingestion:
If significant amounts of metal are ingested, consult a physician.

5. HEALTH AND SAFETY INFORMATION

HEALTH

Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, brazing, grinding, and machining, which result in elevating the temperature of the product to or above its melting point, or result in the generation of airborne particulates, may present hazards. The major exposure hazard is inhalation. Effects or overexposure to fume and dust are as follows:

Acute:

Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.

Chronic:

Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:

Aluminum:
May initiate fibrotic changes to lung tissue.

Bismuth:
No chronic debilitating symptoms indicated.

Boron:
No chronic debilitating symptoms indicated.

Chromium:
Lesions of the skin and mucous membranes, possible cancer of the nose or lungs-bronchogenic carcinoma.

Copper:
No chronic debilitating symptoms indicated.

Iron:
Siderosis, pulmonary effects.

Lead:
Anemia, urinary dysfunction, weakness, constipation, nausea, nervous disorder.

Manganese:
Bronchitis, pneumonitis, lack of coordination.

Molybdenum:
Respiratory tract irritation, possible liver and kidney damage, bone deformity.

Nickel:
Lesions of the skin and mucous membranes, possible cancer of the nose or lungs-bronchogenic carcinoma.

Phosphorous:
Necrosis of the mandible.

Sulfur:
No chronic debilitating symptoms indicated.

Vanadium:
Emphysema, pneumonia.

Medical Conditions Aggravated by Exposure: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.
Occupational Exposure Limits: See Products Ingredients Section 1. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.

FIRE AND EXPLOSION

Flash Point:
N/A

Auto Ignition Temperature:
N/A

Flammable Limits in Air:
Lower: N/A
Upper: N/A

Extinguishing Media:
For molten metal use dry powder or sand.

Extinguishing Media NOT TO BE USED:
Do not use water on molten metal.

Fire and Explosion Hazards:
Steel products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.

REACTIVITY

Stability:
- ● Stable
- ○ Unstable

Incompatibility (materials to avoid):
Reacts with strong acids to form hydrogen gas.

Conditions to Avoid:
Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.

Hazardous Decomposition Products:
Metallic dust or fumes may be produced during welding, burning, grinding and possible machining.
Refer to ANSI Z49.1.

6. ENVIRONMENTAL

Spill or Leak Procedures:
Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for reuse.

Waste Disposal Method*:
Used or unused product should be disposed of in accordance with Federal, State or local laws and regulations.

*Disposer must comply with Federal, State and local disposal or discharge laws.

7. ADDITIONAL INFORMATION

In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod.

Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.

DISCLAIMER

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

PETERSON STEEL CORPORATION
61 WEST MOUNTAIN ST., WORCESTER, MA 01606 • PHONE Area Code (508) 853-3630

Attn: Safety Coordinator

Re: Revised Material Safety Data Sheets (MSDS)

Dear Customer,

Enclosed is a complete set of revised Material Safety Data Sheets (MSDS) for products you purchase or may purchase from Peterson Steel Corporation. They are provided in compliance with OSHA Hazard Communication Standard (29 CFR 1910.1200) for the safe handling and use of our products.

All of our products are stable and non-hazardous in their as-shipped form. However, hazardous components may be released during your manufacturing process. The enclosed Material Safety Data Sheets outline certain safety and health precautions which your employees should observe when working with these products under conditions in which a potential hazard could be created.

These Material Safety Data Sheets should be retained in your files for the development of your Employee Hazard Communication Program. You will not receive duplicate copies with each order.

Peterson Steel Corporation is committed to providing you with the best available information on the products we distribute to you. Please be sure to call me if you have any questions regarding this matter.

Very truly yours,

Douglas N. Peterson

Douglas N. Peterson
Vice President

DNP/[illegible]

Enclosures (MSDSs)

TRW-02408

0908-3789

PETERSON STEEL CORPORATION
61 WEST MOUNTAIN ST., WORCESTER, MA 01606 • PHONE Area Code (508) 853-3630

Emergency Phone Number: (508) 853-3630 **Issue Date:** February 27, 1985

MATERIAL SAFETY DATA SHEET

TRADE NAME (Common or Synonym): Tool Steels
CHEMICAL NAME: Air Hardening, Oil Hardening, Water Hardening, High Speed

1. INGREDIENTS

Material or Compound	CAS Number	% Weight	EXPOSURE LIMITS OSHA PEL (mg/m³)	ACHIG TLV (mg/m³)
Carbon (C)	7440-44-0	0 - 3	3.5	3.5
Chromium (Cr)	7440-47-3	0 - 14	0.1	0.5
Cobalt (Co)	7440-48-4	0 - 12	0.05	0.05
Iron (Fe)	7439-89-6	50 - 98	10	5
Manganese (Mn)	7439-96-5	0 - 3	5	5
Molybdenum (Mo)	7439-98-7	0 - 9	10	10
Nickel (Ni)	7440-02-0	0 - 5	1	1
Silicon (Si)	7440-21-3	0 - 3	10	10
Tungsten (T)	7440-33-7	0 - 19	5	5
Vanadium (V)	1314-62-1	0 - 5	0.05	0.05

NOTE: The above listing is a summary of the principle elements. Various grades of tool steel will contain varying amounts or combinations of these element. Other elements may also be present in minute amounts.

2. PHYSICAL DATA

Material is (at normal conditions):
- ○ LIQUID
- ● SOLID
- ○ GAS
- ○ OTHER

Vapor Density: N/A

Specific Gravity (H_2O = 1): Approximately 8

Acidity/Alkalinity: pH - N/A

Solubility In Water (% by weight): N/A

Appearance and Odor: Silvery-Grey, Odorless

Melting Point (approximate): 2400 - 2800° F

Vapor Pressure (mm Hg @ 20° C): N/A

% Volatile By Volume: N/A

Boiling Point: N/A

3. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:
Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.

Eyes and Face:
Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.

Hands, Arms and Body:
Protective gloves should be worn as required for welding, burning or handling operations.

Other Clothing and Equipment:
As required depending upon operations and safety codes.

4. EMERGENCY MEDICAL PROCEDURES

Inhalation:
Remove to fresh air; if condition continues, consult a physician.

Eye Contact:
Flush thoroughly with running water to remove particulate; obtain medical attention.

Skin Contact:
Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.

Ingestion:
If significant amounts of metal are ingested, consult a physician.

5. HEALTH AND SAFETY INFORMATION

HEALTH

Tool Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, brazing, grinding, and machining, which result in elevating the temperature of the product to or above its melting point, or result in the generation of airborne particualtes, may present hazards. The major exposure hazard is inhalation. Effects or overexposure to fume and dust are as follows:

Acute:

Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zince and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.

Chronic:

Chonic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:

Aluminum:
May initiate fibrotic changes to lung tissue.

Bismuth:
No chronic debilitating symptoms indicated.

Boron:
No chronic debilitating symptoms indicated.

Chromium:
Lesions of the skin and mucous membranes, possible cancer of the nose or lungs-bronchogenic carcinoma.

Copper:
No chronic debilitating symptoms indicated.

Iron:
Siderosis, pulmonary effects. No chronic debilitating symptoms indicated.

Lead:
Anemia, urinary dysfunction, weakness, constipation, nausea, nervous disorder.

Manganese:
Bronchitis, pneumonitis, lack of coordination.

Molybdenum:
Respiratory tract irritation, possible liver and kidney damage, bone deformity.

Nickel:
Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchgenic carcinoma.

Phosphorous:
Necrosis of the mandible.

Sulfur:
(as Sulfur Dioxide) Edema to the lungs.

Vanadium:
(as Vanadium Pentoxide) Emphysema, pneumonia.

Zinc:
Gastrointestinal inflammation reported in animal studies.

Medical Conditions Aggravated by Exposure: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.
Occupational Exposure Limits: See Products Ingredients Section 1. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.

FIRE AND EXPLOSION

Flash Point:
N/A

Auto Ignition Temperature:
N/A

Flammable Limits in Air:
Lower: N/A
Upper: N/A

Extinguishing Media:
For molten metal use dry powder or sand.

Extinguishing Media NOT TO BE USED:
Do not use water on molten metal.

Fire and Explosion Hazards:
Tool Steel products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.

REACTIVITY

Stability:
- ● Stable
- ○ Unstable

Incompatibility (materials to avoid):
Reacts with strong acids to form hydrogen gas.

Conditions to Avoid:
Tool Steel at temperatures above the melting point may liberate fumes containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.

Hazardous Decomposition Products:
Metallic dust or fumes may be produced during welding, burning, grinding and possible machining. Refer to ANSI Z49.1.

6. ENVIRONMENTAL

Spill or Leak Procedures:
Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for reuse.

Waste Disposal Method*:
Used or unused product should be disposed of in accordance with Federal State or local laws and regulations.

*Disposer must comply with Federal, State and local disposal or discharge laws.

7. ADDITIONAL INFORMATION

In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod.

Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.

DISCLAIMER

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

Steel

THOMPSON
Steel Company Inc.

120 ROYALL STREET • CANTON • MASSACHUSETTS 02021-9121 (617) 828-8800
FAX (617) 828-5082

April 24, 1992

To Our Customers:

Thompson Steel Company is pleased to send you the Material Safety Data Sheets in compliance with OSHA's Hazard Communication Standard (29 CFR 1910.-1200).

Thompson is committed to being and remaining a good corporate citizen with programs in our own plants dedicated to the occupational health and safety of our employees. We are also diligent in protecting the environment of the seven locales in which we operate plants.

Our concern extends to your company and your employees and we endeavor to ship you not only the best Cold Rolled Strip for your application but also a product that is consistent with the best interests of your company and your employees in respect to these considerations of safety and health.

We assure you of our continuing efforts in this regard with the expectation that we will have a long lasting relationship with you in supplying your requirements for Cold Rolled Strip Steel.

We thank you for your cooperation and support in fostering this relationship.

Very truly yours,

THOMPSON STEEL COMPANY, INC.

Brendan K. McCormick

Brendan K. McCormick
President

BKM:sjw

THOMPSON
Steel Company Inc.

March 12, 1992

Dear Customer:

Enclosed are revised Material Safety Data Sheets which will provide you with health, safety and environmental protection information which is appropriate for handling and utilizing the steel product which we supply. These MSDS sheets are provided to meet OSHA requirements.

Thompson Steel Company receives these sheets from our supplier and accepts their contents at face value. Further information may be obtained by contacting our supplier directly. Although all of our steel is not purchased through the same supplier, the information presented in the accompanying MSDS is representative of all the steel which we process and ultimately ship to our customers.

In addition to the MSDS, we are including labels that may be reproduced and placed in appropriate locations to warn employees.

The OSHA Hazard Communication Standard and most other right-to-know legislation consider ingredients of steel as hazardous substances. Consequently, the appropriate MSDS and warning label should be made available to employees working with this material.

Very truly yours,

THOMPSON STEEL COMPANY, INC.

Brendan K. McCormick

Brendan K. McCormick
President

Encs.

U. S. STEEL GROUP
Material Safety Data Sheet
P.O. Box 206, Pittsburgh, PA 15230-0206
Telephone Information:
8:00 am-5:00 pm: (412) 433-6840
Off-Hour Emergencies: (412) 433-5811

This information is taken from sources or based upon data believed to be reliable; however, USX Corporation makes no warranty as to the absolute correctness or sufficiency of any of the following or that additional or other measures may not be required under particular conditions.

PRODUCT INFORMATION

Product/Common Name: Hot or Cold Rolled Carbon Steel Sheet/Strip and Hot Rolled Skelp
CAS No: 65997-19-5
USS Code No: 3C011
Original Issue Date: 8/1/85
Revised: 12/87, 1/90, 1/91
Reference: January, 1992

REGULATORY INFORMATION

U.S. OSHA R-T-K — Contains regulated material
Pennsylvania R-T-K — Contains regulated material
E = Environmental Hazard
E+ = Environmental Hazard any compound this substance
S = Special Hazard Substance
New Jersey R-T-K — Contains regulated material
H = Special Health Hazard Substance
California Prop. 65 — This product contains a material known to the State of California to cause cancer.
SARA 313: MANGANESE
The above materials are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.
WHMIS: (Canadian): D-2-B Product Classification
1991 NIOSH Registry of Toxic Effects of Chemical Substances Reference — 44891, 5557, 25416, 48152, 60758, 9104

Definitions:
PNOC Particulates not otherwise classified
PNOR Particulates not otherwise regulated
STEL Short Term Exposure Limit. A 15-minute Time-Weighted Average Value.

PHYSICAL DATA:

Boiling Point:	Not Applicable
Freezing Point	Not Applicable
Melting Point—Base Metal:	2750°F
Melting Point—Metallic Coating:	Not Applicable
Specific Gravity:	7.85
Vapor Pressure—at 20°C:	Not Applicable
Vapor Density (air = 1):	Not Applicable
Solubility in Water:	Not Soluble
% Volatiles:	Not Applicable
Evaporation Rate:	Not Applicable
pH:	Not Applicable
Oil/Water Dist. Coefficient:	Not Applicable
Odor Threshold Conc.:	Not Applicable
Appearance (Physical State and Color):	Metallic Gray Solid
Odor:	No Odor

FIRE AND EXPLOSION HAZARDS:

Not flammable or combustible. Steel products in the solid state present no fire or explosion hazard and do not contribute to the combustion of other materials.

FIRE AND EXPLOSION DATA

Extinguishing Media: Not Applicable

Special Fire Fighting Instructions: None

Hazardous Combustion Products: Stable under normal conditions of use, storage, and transport. Will react with strong acid to liberate hydrogen. At temperatures above the melting point, may liberate fumes containing oxides of iron and alloying elements.

Oxidizing Material: Does Not Cause or Contribute to Combustion of Other Material by Yielding Oxidizer

INGREDIENTS AND RECOMMENDED OCCUPATIONAL EXPOSURE LIMIT

Ingredient Name	CAS No.	% wt.	TDG Classification	WHMIS Classification	LD50 or LC50 Species/ Route	OSHA PEL	ACGIH TLV
Base Metal							
Iron	1309-37-1	Balance	Not classified	D2B	5.4 gm/kg mouse/oral	Iron Oxide Fume - 10 mg/M³ Total Dust — 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	5 mg/M³ (fume) (PNOC)
Alloying Elements							
Aluminum (E)	7429-90-5	.10 max.	Not classified	D2B	No information	Total Dust - 15 mg/M³ Respirable Fraction & Welding Fume - 5 mg/M³	10 mg/M³ (dust) 5 mg/M³ (welding fume)
Carbon	7440-44-0	.005/.60	Not classified	D2B	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)
Manganese (E/E+)	7439-96-5	.05/1.50	Not classified	D2B	9 gm/kg rat/oral	Dust & Fume - 1 mg/M³ 3 mg/M³ (STEL)	5 mg/M³ (dust) 1 mg/M³ (fume) 3 mg/M³ (STEL) (fume)
Phosphorus (E)	7723-14-0	.15 max.	Not classified	Not classified	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)
Sulfur	7704-34-9	.05 max.	Not classified	Not classified	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)

NOTES:
All commercial metals contain small amounts of various elements in addition to those specified. These small quantities, frequently referred to as "trace" or "residual" elements, generally origin in the raw materials used. Typical levels of commonly involved trace or residual elements that may be encountered in steel products are provided in Annex I so that their potential hazards may be consider

All exposure limits are based on 8-hour time-weighted average values unless stated otherwise. (STEL) denotes "Short-Term Exposure Limit", a 15-minute time-weighted average value.

HEALTH DATA

Primary Routes of Entry:
Inhalation, and skin, if coated.

Effects of Overexposure:

Chronic inhalation of high concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

The inhalation of high concentrations of freshly formed oxide fumes and dusts of Manganese, Copper, Lead and/or Zinc in the respirable particle size range can cause an influenza-like illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever and chills. Continuous exposures to high concentrations of manganese can cause central nervous system disorders and "manganese pneumonia". Fibrosis of lung tissue from manganese exposures has also been reported for products containing manganese only.

Longterm inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

OIL COATING MAY BE USED: Prolonged or repeated contact with unprotected skin may result in skin irritation. Torching or burning operations on steel products with oil coating may produce emissions which can be irritating to the eyes and respiratory tract.

Emergency and First Aid Procedures:

Respiratory: For overexposure to airborne fumes and particulates, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly.

Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication. Seek medical attention.

Skin: If thermal burn has occurred, flush area with cold water. Seek medical attention. For mechanical abrasions, seek medical attention.

Eyes: Flush eyes with large amounts of water to remove particles. Seek medical attention.

Special Protection Information:

Respiratory: NIOSH/MSHA-approved dust and fume respirators should be used to avoid excessive inhalation of particulates. Appropriate respirator selection depends on the magnitude of exposure.

Skin: Protective gloves should be worn as required for welding, burning or handling operations. Oil coating may be used: Wear gloves when handling; do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash hands, and any area of skin after contact, with soap and water or waterless hand cleaner.

Eyes: Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.

Ventilation: Local exhaust ventilation should be provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

Other Protective Equipment: Depending upon the conditions of use and specific work situations, additional protective equipment and/or clothing may be required to control exposures.

Precautions in Handling and Storage: Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Avoid breathing metal fumes and/or dusts.

Spill or Leak Procedures: Not applicable to steel in solid state. Dispose in accordance with state and local regulation.

U. S. STEEL GROUP
A Division of USX Corporation
Material Safety Data Sheet

PRODUCT INFORMATION

Product/Common Name: Hot or Cold Rolled Carbon Steel Sheet/Strip and Hot Rolled Skelp

CAS No.: 65997-19-5

USS Code No.: 3C011

Reference: January, 1992

Health Hazard Data

NOTE: Steel products under normal conditions do not present an inhalation, ingestion, contact health or environmental hazard. However, operations such as burning, welding, sawing, brazing, grinding, and possibly machining, etc., which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, may present health hazards.

Medical Conditions Aggravated by Exposure: Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.

SARA Potential Hazard Categories are:
- Immediate Acute Health Hazard
- Delayed Chronic Health Hazard

Carcinogen Information:
No ingredients of this product are listed by the NTP Annual Report on Carcinogens or have been found to be a potential carcinogen in the IARC Monographs or by OSHA.

Regulatory Information Components

NOTE: The listing of regulations relating to a USS product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

Components:	Regulation
Al	= SARA 313 if > 1.0%; SDWA; RCRA; DOT
Mn	= SARA 313 if > 1.0%
P	= SARA 313 if > 1.0%; CWA; CERCLA; SARA 302; DOT
S	= SARA 302; DOT

Abbreviations

CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CWA	Clean Water Act
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
TDG	Transportation of Dangerous Goods Act
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
TSCA	Toxic Substances Control Act

U. S. STEEL GROUP
Material Safety Data Sheet
P.O. Box 206, Pittsburgh, PA 15230-0206
Telephone Information:
8:00 am-5:00 pm: (412) 433-6840
Off-Hour Emergencies: (412) 433-5811

This information is taken from sources or based upon data believed to be reliable; however, USX Corporation makes no warranty as to the absolute correctness or sufficiency of any of the following or that additional or other measures may not be required under particular conditions.

PRODUCT INFORMATION

Product/Common Name: Hot or Cold Rolled Alloy Steel Sheet/Strip and Hot Rolled Skelp
CAS No: 65997-19-5
USS Code No: 3A011
Original Issue Date: 8/1/85
Revised: 12/87, 1/90, 1/91
Reference: January, 1992

REGULATORY INFORMATION

U.S. OSHA R-T-K — Contains regulated material
Pennsylvania R-T-K — Contains regulated material
E = Environmental Hazard
E+ = Environmental Hazard any compound this substance
S = Special Hazard Substance
New Jersey R-T-K — Contains regulated material
H = Special Health Hazard Substance
California Prop. 65 — This product contains a material known to the State of California to cause cancer.
SARA 313: CHROMIUM, COPPER, MANGANESE, NICKEL
The above materials are subject to SARA 313 reporting requirements. Please also note that if you prepackage or otherwise redistribute this product to industrial customers, SARA 313 requires that a notice be sent to those customers.
WHMIS: (Canadian): D-2A Product Classification
1991 NIOSH Registry of Toxic Effects of Chemical Substances Reference — 44891, 5557, 25416, 26496, 27533, 48152, 49698, 52620, 60758, 79351, 9104, 89324

Definitions:
PNOC Particulates not otherwise classified
PNOR Particulates not otherwise regulated
STEL Short Term Exposure Limit. A 15-minute Time-Weighted Average Value.

PHYSICAL DATA:

Boiling Point:	Not Applicable
Freezing Point	Not Applicable
Melting Point—Base Metal:	2750°F
Melting Point—Metallic Coating:	Not Applicable
Specific Gravity:	7.85
Vapor Pressure—at 20°C:	Not Applicable
Vapor Density (air = 1):	Not Applicable
Solubility in Water:	Not Soluble
% Volatiles:	Not Applicable
Evaporation Rate:	Not Applicable
pH:	Not Applicable
Oil/Water Dist. Coefficient:	Not Applicable
Odor Threshold Conc.:	Not Applicable
Appearance (Physical State and Color):	Metallic Gray Solid
Odor:	No Odor

FIRE AND EXPLOSION HAZARDS:

Not flammable or combustible. Steel products in the solid state present no fire or explosion hazard and do not contribute to the combustion of other materials.

FIRE AND EXPLOSION DATA

Extinguishing Media: Not Applicable

Special Fire Fighting Instructions: None

Hazardous Combustion Products:
Stable under normal conditions of use, storage, and transport. Will react with strong acid to liberate hydrogen. At temperatures above the melting point, may liberate fumes containing oxides of iron and alloying elements.

Oxidizing Material:
Does Not Cause or Contribute to Combustion of Other Material by Yielding Oxidizer

INGREDIENTS AND RECOMMENDED OCCUPATIONAL EXPOSURE LIMIT

Ingredient Name	CAS No.	% wt.	TDG Classification	WHMIS Classification	LD50 or LC50 Species/ Route	OSHA PEL	ACGIH TLV
Base Metal							
Iron	1309-37-1	Balance	Not classified	D2B	5.4 gm/kg mouse/oral	Iron Oxide Fume - 10 mg/M³ Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	5 mg/M³ (fume) (PNOC)
Alloying Elements							
Aluminum (E)	7429-90-5	.10 max.	Not classified	D2B	No information	Total Dust - 15 mg/M³ Respirable Fraction & Welding Fume - 5 mg/M³	10 mg/M³ (dust) 5 mg/M³ (welding fume)
Carbon	7440-44-0	.01/.60	Not classified	D2B	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)
Chromium (S/E+/E/S)	7440-47-3	1.20 max.	6a	D2A	No information	Chromium Compounds (II&III as Cr) .5 mg/M³ Chromium Metal (as Cr) - 1 mg/M³	.5 mg/M³ .05 mg/M³ (Cr VI) water soluble and certain water insolubles
Copper (E/E+)	7440-50-8	1.00 max.	Not classified	D2B	No information	Fume (as Cu) - .1 mg/M³ Dust & Mist (as Cu) - 1 mg/M³	.2 mg/M³ (fume) 1 mg/M³
Manganese (E/E+)	7439-96-5	.05/1.90	Not classified	D2B	9 gm/kg rat/oral	Dust & Fume - 1 mg/M³ 3 mg/M³ (STEL)	5 mg/M³ (dust) 1 mg/M³ (fume) 3 mg/M³ (STEL) (fume)
Molybdenum	7439-98-7	.50 max.	Not classified	D2B	No information	10 mg/M³	10 mg/M³
Nickel (S/E+/E/S)	7440-02-0	2.00 max.	6a	D1A	No information	1 mg/M³	1 mg/M³
Phosphorus (E)	7723-14-0	.15 max.	Not classified	Not classified	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)
Silicon	7440-21-3	1.00 max.	Not classified	D2B	No information	Total Dust - 10 mg/M³ Respirable Fraction - 5 mg/M³	10 mg/M³
Sulfur	7704-34-9	.05 max.	Not classified	Not classified	No information	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)
Vanadium (E)	7440-62-2	.10 max.	6a	D1B	.13 gm/kg mouse/oral	Total Dust - 15 mg/M³ (PNOR) Respirable Fraction - 5 mg/M³ (PNOR)	10 mg/M³ (PNOC)

NOTES:
All commercial metals contain small amounts of various elements in addition to those specified. These small quantities, frequently referred to as "trace" or "residual" elements, generally origina in the raw materials used. Typical levels of commonly involved trace or residual elements that may be encountered in steel products are provided in Annex I so that their potential hazards may be considere
All exposure limits are based on 8-hour time-weighted average values unless stated otherwise. (STEL) denotes "Short-Term Exposure Limit", a 15-minute time-weighted average value.

HEALTH DATA

Primary Routes of Entry:
Inhalation, and skin, if coated.

Effects of Overexposure:

Chronic inhalation of high concentrations of iron oxide fumes or dusts may lead to a benign pneumoconiosis (siderosis). Inhalation of high concentrations of ferric oxide may possibly enhance the risk of lung cancer development in workers exposed to pulmonary carcinogens.

The inhalation of high concentrations of freshly formed oxide fumes and dusts of Manganese, Copper, Lead and/or Zinc in the respirable particle size range can cause an influenza-like illness termed metal fume fever. Typical symptoms last 12 to 48 hours and are characterized by metallic taste in mouth, dryness and irritation of the throat, followed by weakness, muscle pain, fever and chills. Continuous exposures to high concentrations of manganese can cause central nervous system disorders and "manganese pneumonia". Fibrosis of lung tissue from manganese exposures has also been reported for products containing manganese only.

Repeated or prolonged exposure to hexavalent chromium compounds may cause respiratory irritation, nosebleed, ulceration and perforation of the nasal septum. Industrial exposure to certain forms of hexavalent chromium has been related to an increased incidence of lung cancer.

Longterm inhalation exposure to high concentrations (overexposure) to pneumoconiotic agents may act synergistically with inhalation of oxides, fumes or dusts of this product to cause toxic effects.

OIL COATING MAY BE USED: Prolonged or repeated contact with unprotected skin may result in skin irritation. Torching or burning operations on steel products with oil coating may produce emissions which can be irritating to the eyes and respiratory tract.

Emergency and First Aid Procedures:

Respiratory: For overexposure to airborne fumes and particulates, remove exposed person to fresh air. If breathing is difficult or has stopped, administer artificial respiration or oxygen as indicated. Seek medical attention promptly.

Metal fume fever may be treated by bed rest, and administering a pain and fever reducing medication. Seek medical attention.

Skin: If thermal burn has occurred, flush area with cold water. Seek medical attention. For mechanical abrasions, seek medical attention.

Eyes: Flush eyes with large amounts of water to remove particles. Seek medical attention.

Special Protection Information:

Respiratory: NIOSH/MSHA-approved dust and fume respirators should be used to avoid excessive inhalation of particulates. Appropriate respirator selection depends on the magnitude of exposure.

Skin: Protective gloves should be worn as required for welding, burning or handling operations. Oil coating may be used: Wear gloves when handling; do not continue to use gloves or work clothing that has become saturated or soaked through with oil coating. Wash hands, and any area of skin after contact, with soap and water or waterless hand cleaner.

Eyes: Use safety glasses or goggles as required for welding, burning, sawing, brazing, grinding or machining operations.

Ventilation: Local exhaust ventilation should be provided when welding, burning, sawing, brazing, grinding or machining to prevent excessive dust or fume exposure.

Other Protective Equipment: Depending upon the conditions of use and specific work situations, additional protective equipment and/or clothing may be required to control exposures.

Precautions in Handling and Storage: Operations with the potential for generating high concentrations of airborne particulates should be evaluated and controlled as necessary. Avoid breathing metal fumes and/or dusts.

Spill or Leak Procedures: Not applicable to steel in solid state. Dispose in accordance with state and local regulation.

U. S. STEEL GROUP
A Division of USX Corporation
Material Safety Data Sheet

PRODUCT INFORMATION

Product/Common Name: Hot or Cold Rolled Alloy Steel Sheet/Strip and Hot Rolled Skelp

CAS No.: 65997-19-5

USS Code No.: 3A011

Reference: January, 1992

Health Hazard Data

NOTE: Steel products under normal conditions do not present an inhalation, ingestion, contact health or environmental hazard. However, operations such as burning, welding, sawing, brazing, grinding, and possibly machining, etc., which result in elevating the temperature of the product to or above its melting point or result in the generation of airborne particulates, may present health hazards.

Medical Conditions Aggravated by Exposure: Individuals with chronic respiratory disorders (i.e., asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.

SARA Potential Hazard Categories are:
- Immediate Acute Health Hazard
- Delayed Chronic Health Hazard

Carcinogen Information:
Certain chromium and nickel compounds contained in steel products have been listed by the NTP Annual Report on Carcinogens or have been found to be a partial carcinogen in the IARC Monographs or by OSHA.

IARC (Suppl. 1, 29-30, 1979) has determined that there is sufficient evidence of increased lung cancer among workers in the chromate-producing industry and possibly chromium alloy workers. This determination is supported by sufficient evidence for carcinogenicity to animals and positive mutagenicity testing of Cr VI compounds.

IARC (11, 75-112, 1976 & Vol. 23, 1980) has determined that there is at least limited evidence that nickel and certain nickel compounds may be human carcinogens. Several nickel compounds are carcinogenic to laboratory animals by various routes of exposure.

Regulatory Information Components

NOTE: The listing of regulations relating to a USS product may not be complete and should not be solely relied upon for all regulatory compliance responsibilities.

Components:	Regulation
Al	SARA 313 if > 1.0%; SDWA; RCRA; DOT
Cr	SARA 313 if > 0.1%; CWA 304 and 307; SDWA; RCRA; SARA 110; DOT; Calif. Prop. 65
Cu	SARA 313 if > 1.0%
Mn	SARA 313 if > 1.0%
Mo	SDWA
Ni	SARA 313 if > 0.1%; CWA 304 and 307; SDWA; RCRA; DOT; CERCLA; SARA 110
P	SARA 313 if > 1.0%; CWA; CERCLA; SARA 302; DOT
S	SARA 302; DOT
V	SARA 313 if > 1.0%; SDWA

Abbreviations

CAA	Clean Air Act
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CWA	Clean Water Act
DOT	Department of Transportation
IARC	International Agency for Research on Cancer
TDG	Transportation of Dangerous Goods Act
NTP	National Toxicology Program
OSHA	Occupational Safety and Health Administration
RCRA	Resource Conservation Recovery Act
SARA	Superfund Amendments and Reauthorization Act of 1986
SDWA	Safe Drinking Water Act
TSCA	Toxic Substances Control Act

ANNEX I
TYPICAL LEVELS OF TRACE OR RESIDUAL ELEMENTS IN STEELS

ELEMENT		CAS NO.	% WEIGHT
Aluminum	Al	7429-90-5	.002 - .01
Arsenic	As	7440-38-2	.005 - .008
Boron	B	7440-42-8	.0002 - .0004
Cadmium	Cd	7440-43-9	<.001
Calcium	Ca	7440-70-2	.0002
Chromium	Cr	7440-47-3	.02 - .08
Cobalt	Co	7440-48-4	<.005 - .009
Copper	Cu	7440-50-8	.009 - .18
Lead	Pb	7439-92-1	<.001
Molybdenum	Mo	7439-98-7	<.004 - .04
Nickel	Ni	7440-02-0	.011 - .04
Niobium	Nb	7440-03-1	.002 - .005
Silicon	Si	7440-21-3	<.004 - .02
Tin	Sn	7440-31-5	<.004 - .02
Titanium	Ti	7440-32-6	.001 - .004
Vanadium	V	7440-62-2	.001 - .003
Zirconium	Zr	7440-67-7	.002

ANNEX II
RUST PREVENTATIVES AND PROTECTIVE COATINGS

FAIRFIELD WORKS

Cold Rolled Products

Ferrocote 61-HCL-1	Quaker Chemical Corporation
Qwerl 590	Quaker Chemical Corporation
Steelgard 2005	Harry Miller Corporation
Tempershield 27A	Stuart-Ironsides, Inc.

Pickle Line (Pickle & Oil Products)

RPO-50-SL	Quaker Chemical Corporation

Galvanized Products

Ferrocote 61-HCL-1	Quaker Chemical Corporation
Oakite Okemcoat 1	Oakite Products, Inc.

Pipe Products

Best of Life 2000	Best-Of-Life
API High Pressure Modified Thread Compound	Best-Of-Life
G-4416B 48% S/A Pipe Coating	Ball Chemical Company
Kendex OCTG Orange Corrosion Inhibitor	Kendall/Amalie Division Witco Chemical Corporation
Rust Veto 2135 HF	E.F. Houghton and Company
Rust Veto 4214 HF	E.F. Houghton and Company
Resco Alpha Grind RD	Research Solvents & Chemical Co.

FAIRLESS WORKS

Cold Rolled Products

Quaker 61AUS	Quaker Chemical Corporation

Galvanized Products

Vanishing Oil	Engineered Lubricants
Sunkote 1303	Sun Refining & Marketing Co.
Quaker 61AUS	Quaker Chemical Corporation

Electrolytic Tin Products

ATBC Oil	Moreflex Chemical Company

Tin Free Steel Products

Butyl Stearate Oil	Emery Industries
ATBC Oil	Moreflex Chemical Company

Sheet Recoiler

Quaker Prelube	Quaker Chemical Corporation

GARY WORKS

Hot and Cold Rolled Products

Steel Shield PL-910-S	Stuart/Ironsides, Inc.
Nalco 6292	Nalco Chemical Company
Nalco 6295	Nalco Chemical Company
Nalco 581-GW	Nalco Chemical Company
Ferrocote 61-AUS	Quaker Chemical Corporation
Vulcan TMS 5-34	Vulcan Oil Co.
Vulclean MW	Vulcan Oil Co.
Rust Veto #4214	E.F. Houghton & Co.
Rust Veto #344	E.F. Houghton & Co.
Chemtool 650	Chemtool Inc.
Daubert Nox Rust X-III	Daubert Chemical Co.
CRPS-90GW	Vulcan Oil Co.
#820 R.P.	Vulcan Oil Co.
Nalco-HM-40, Hot Mill Rolling	Nalco Chemical Co.

Galvanized Products

Tru-Rinse NO. 10	J.M.E. Chemicals
Tru-Zite 2107-F	J.M.E. Chemicals
Additive "N"	J.M.E. Chemicals
Chem Treat CT-4	Dacar Chemical Co.
Ferrocote EGL-1	Quaker Chemical Corporation
Ferrocote 61-MAL-HCL-1	Quaker Chemical Corporation
Ferrocote 61AUS	Quaker Chemical Corporation

Electrolytic Tin Products

ATBC Oil (Citroflex)	Morflex Chemicals Inc.
BSO Oil (B55 Lubricant)	Pro-Chem Co., Inc.
Chromic Acid	Occidental Chemicals, TG Chemicals and M&T Chemicals
Sodium Bichromate	Occidental Chemicals, TG Chemicals and M&T Chemicals

Tin Finishing

Pro Clean L.G.	Pro-Chem Co., Inc.

LORAIN WORKS

Pipe Products

Clear Alkyd Varnish No. 54C	Ball Chemical Company
Hodson E-Z Cool	Andersen Oil & Chemical Co.

MON VALLEY WORKS
IRVIN PLANT

Hot Rolled Products

Quakerol 91 USX	Quaker Chemical Corporation

Cold Rolled Products

Quakerol 25 IWX Roll	Quaker Chemical Corporation
Qwerl 577 ND	Quaker Chemical Corporation
Ferrocote 61 A-JS	Quaker Chemical Corporation
Quakerol LB	Quaker Chemical Corporation
Steelgard 2005	Harry Miller Corporation
6292 Rust Preventative	Nalco Chemical Corporation
6295 Rust Preventative	Nalco Chemical Corporation
PL 7105A	Metal Lubricants Company

Terne Products

Chem Treat CT-4	Dacar Chemical Co.
Ferrocote 61 A-US	Quaker Chemical Corporation
Chem Treat CT-9	Dacar Chemical Company

Galvanized Products

Chem Treat CT-4	Dacar Chemical Co.
Chem Treat CT-9	Dacar Chemical Co.
Ferrocote 61 A-US	Quaker Chemical Corporation

Galvalume Products

Rustilo DW 924 HF	Castrol Industrial East Inc.
Iridite 9L-6	Witco Chemical Corporation

INDEX
SUPPLIERS OF PROTECTIVE COATINGS

Anderson Oil & Chemical Company
One Brownstone Avenue
Portland, CT 06480

Ball Chemical Company
1486 Butler Plank Road
Glenshaw, PA 15116

Best-Of-Life
1111 West Mockingbird Lane
Dallas, Texas 75247

Castrol Industrial East Inc.
775 Louis Drive
Warminster, PA 18974

Chemtool, Inc.
P.O. Box 538
Crystal Lake, IL 60014

Dacar Chemical Company
Wabash and McCartney Streets
Pittsburgh, PA 15220

Daubert Chemical Co., Inc.
4700 S. Central Ave.
Chicago, IL 60638

DiTech
7270 S. Chicago
Chicago, IL 60014

Emery Industries
P.O. Box 628
Maudlin, SC 29662

Engineered Lubricants, Inc.
P.O. Box 1054
Pittsburgh, PA 15230

E.F. Houghton and Company
P.O. Box 930
Valley Forge, PA 19482

Fritch Lubricants
Sun Refining & Marketing Co.
10 Penn Center
1801 Market Street
Philadelphia, PA 19130

Harry Miller Corp.
4th & Bristol Streets
Philadelphia, PA 19140

J.M.E. Chemicals, Inc.
433 South Vermont Street
Palatine, IL 60067

Kendall/Amalie Division
Witco Chemical Corp.
77 North Kendall Avenue
Bradford, PA 16701

M&T Chemicals Inc.
One Woodbridge Center
Woodbridge, New Jersey 07095

Metal Lubricants Co.
7050 Lothrop Avenue
Harvey, IL 60426

Mill Chemical Corporation
2470 Windy Hill Road
Suite 248
Atlanta, GA 30067

Moreflex Chemical Company
2110 Highpoint Road
Greensboro, NC 27403

Nalco Chemical Company
2901 Butterfield Road
Oak Brook, IL 60521

Oakite Products Inc.
50 Valley Road
Berkeley Heights, NJ 07922

Occidental Chemicals
34555 Chagrin Boulevard
Moreland Hills, Ohio 44022

Pro-Chem Company, Inc.
Ripley and Schneider Streets
Lake Station, IN 46405

Quaker Chemical Corporation
Elm Street
Conshohocken, PA 19428

Research Solvents & Chemical Company
P.O. Drawer 20200
Birmingham, AL 35216

Stuart-Ironside Inc.
7575 Plaza Court
Willowbrook, IL 60521

TG Chemicals
P.O. Box 1745
Pittsburgh, PA 15230

Vulcan Oil Company
5353 Spring Grove Ave.
Cincinnati, Ohio 45217

Witco Chemical Corporation
Witco-Allied Kelite Division
2701 Lake Street
Melrose Park, IL 60160

LABELS
ALLOY STEEL (CODE NOS. 1A001 THROUGH 4A021)

ALLOY STEEL

WARNING! CANCER HAZARD (CONTAINS CHROMIUM AND NICKEL). EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO LUNG OR OTHER ORGANS.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING.

AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS USS CODE NOS. 1A001 THROUGH 4A021 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

LABELS
CARBON STEEL (CODE NOS. 1C001 THROUGH 4C021)

CARBON STEEL

WARNING! EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO LUNG OR OTHER ORGANS.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING.

AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS — USS CODE NOS. 1C001 THROUGH 4C021 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

LABELS

HIGH STRENGTH LOW ALLOY (CODE NOS. 3H011, 3H012, 3H016, 4H020)

HIGH STRENGTH LOW ALLOY

WARNING! EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO LUNG OR OTHER ORGANS.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING.

AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS — USS CODE NOS. 3H011, 3H012, 3H016, 4H020 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

LABELS
CARBON STEEL LEADED (CODE NO. 3C012, 3C014, 3C015, 3H012)

CARBON STEEL-METALLIC COATING

WARNING! CANCER HAZARD (CONTAINS LEAD). EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO KIDNEYS, LUNGS OR OTHER ORGANS. EXPOSURE MAY ALSO CAUSE REPRODUCTIVE DISORDERS THROUGH INHALATION OR INGESTION OF LEAD.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING. AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS — USS CODE NO. 3C012, 3C014, 3C015, 3H012 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

LABELS
CARBON STEEL LEADED (CODE NO. 3C015)

CARBON STEEL-METALLIC COATING

WARNING! CANCER HAZARD (CONTAINS LEAD AND NICKEL). EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO KIDNEYS, LUNGS OR OTHER ORGANS. EXPOSURE MAY ALSO CAUSE REPRODUCTIVE DISORDERS THROUGH INHALATION OR INGESTION OF LEAD.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING. AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS — USS CODE NO. 3C015 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

LABELS
HIGH STRENGTH LOW ALLOY (CONTAINING CHROMIUM AND NICKEL)
(CODE NOS. 1H001, 1H003, 1H004, 4H019)

HIGH STRENGTH LOW ALLOY

(CONTAINING CHROMIUM AND NICKEL)

WARNING! CANCER HAZARD (CONTAINS CHROMIUM AND NICKEL). EXPOSURE TO HIGH CONCENTRATIONS OF DUST OR FUME DURING WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND POSSIBLY MACHINING, ETC., MAY PRODUCE IMMEDIATE OR DELAYED DAMAGE TO LUNG OR OTHER ORGANS.

THIS PRODUCT MAY BE COATED WITH MATERIALS THAT COULD RESULT IN SKIN IRRITATION WITH PROLONGED CONTACT.

PRECAUTIONS: AVOID BREATHING OR INGESTING DUST OR FUME. ADEQUATE VENTILATION IS REQUIRED WHILE WELDING, BURNING, MELTING, CUTTING, BRAZING, GRINDING AND MACHINING.

AVOID SKIN CONTACT IF MATERIAL IS COATED.

FIRST AID: FOR OVEREXPOSURE TO AIRBORNE DUST AND FUME, REMOVE EXPOSED PERSON TO FRESH AIR. IF BREATHING IS DIFFICULT OR HAS STOPPED, ADMINISTER ARTIFICIAL RESPIRATION OR OXYGEN AS INDICATED. SEEK MEDICAL ATTENTION PROMPTLY.

IF PRODUCT IS COATED AND EXCESSIVE SKIN CONTACT OCCURS, WASH WITH SOAP AND WATER. IF IRRITATION DEVELOPS, SEEK MEDICAL ATTENTION.

ADDITIONAL INFORMATION: REFER TO MATERIAL SAFETY DATA SHEETS USS CODE NOS. 1H001, 1H003, 1H004, 4H019 FOR FURTHER INFORMATION.

U. S. Steel Group, a division of USX Corp., PO Box 206 (MSDS), Pittsburgh, PA 15230-0206

Material Safety Data Sheet

May be used to comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200. Standard must be consulted for specific requirements.

U.S. Department of Labor
Occupational Safety and Health Administration
(Non-Mandatory Form)
Form Approved
OMB No. 1218-0072

IDENTITY *(As Used on Label and List)* STEELGARD 1505-HT

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name HARRY MILLER CORPORATION	Emergency Telephone Number (215) 324-4000 CHEMTREC 1-800-424-9300
Address *(Number, Street, City, State, and ZIP Code)* 4th & BRISTOL STREETS	Telephone Number for Information (215) 324-4000
PHILADELPHIA, PA. 19140	Date Prepared REVISION #1; 9/11/89
	Signature of Preparer *(optional)*

Section II — Hazardous Ingredients/Identity Information

Hazardous Components (Specific Chemical Identity; Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% *(optional)*
Mineral Oil (if misted) CAS #64742-46-7	5mg/M^3 TWA	5mg/M^3 TWA	NONE	90-95%
Barium dinonylnaphthalene Sulfonate CAS #61790-48-5	NONE	NONE	0.5 mg/M^3	1-5%

As required by Section 313 of SARA Title III of 1988 and 40 CFR Part 372, this product contains the following items in a reportable quantity.

Barium dinonylnaphthalene Sulfonate CAS #61790-48-5 3%

Section III — Physical/Chemical Characteristics

Boiling Point	>300°F.	Specific Gravity (H_2O = 1)	0.86
Vapor Pressure (mm Hg.)	Unknown	Melting Point	< 0°F.
Vapor Density (AIR = 1)	> 1	Evaporation Rate (Butyl Acetate = 1)	< 1

Solubility in Water
Insoluble

Appearance and Odor
Clear Brown Liquid; Mineral Oil Odor

Section IV — Fire and Explosion Hazard Data

Flash Point (Method Used) 260°F. (COC)	Flammable Limits	LEL Unknown	UEL Unknown

Extinguishing Media
Use foam, dry chemicals or carbon dioxide.

Special Fire Fighting Procedures
Cover surface of burning liquid with extinguishing agent. Keep adjacent containers cool with water. Use self contained positive pressure breathing apparatus.

Unusual Fire and Explosion Hazards
NONE

TRW-02425

Section V — Reactivity Data

Stability	Unstable		Conditions to Avoid
	Stable	X	

Incompatibility (*Materials to Avoid*)
Strong oxidizing agents eg., chlorine, oxygen, hypochlorites.

Hazardous Decomposition or Byproducts
If incompletely combusted, fumes, smoke and carbon monoxide and oxides of barium.

Hazardous Polymerization	May Occur		Conditions to Avoid
	Will Not Occur	X	

Section VI — Health Hazard Data

Route(s) of Entry: Inhalation? Irritant (if misted) Skin? Irritant Ingestion? No Hazard

Health Hazards (*Acute and Chronic*)
Eyes - Acute Irritant

Skin - Acute Irritant if overexposed

Carcinogenicity: NTP? NO IARC Monographs? NO OSHA Regulated? NO

Signs and Symptoms of Exposure
Eyes - Burning, tearing, reddening; Skin - Irritation possibly leading to dermatitis if prolonged contact occurs; Inhalation - Irritation to respiratory tract.

Medical Conditions
Generally Aggravated by Exposure Pre-existing respiratory conditions.

Emergency and First Aid Procedures Skin - Wash well with water. Use barrier cream if irritation occurs.
Eyes - Immediately flush with water for 15 minutes. If irritation persists call a physician.
Inhalation - Remove to fresh air. If irritation persists consult a physician.

Section VII — Precautions for Safe Handling and Use

Steps to Be Taken in Case Material is Released or Spilled
Recover free liquid. Return to container. Absorb with inert material. Keep from entering sewers or waterways.

Waste Disposal Method
Haul away according to Federal, State and Local regulations

Precautions to Be Taken in Handling and Storing
Normal Drum storage. Keep container closed.

Other Precautions
Since containers contain product residue, observe all label precautions when empty Do not cut, drill, weld or grind on or near container. Do not reuse unless thoroughly cleaned.

Section VIII — Control Measures

Respiratory Protection (*Specify Type*)
If exposure exceeds TLV, wear NIOSH approved respirators.

Ventilation	Local Exhaust: Normal Ventilation	Special: Not required
	Mechanical (*General*): Not required	Other: Not required

Protective Gloves	Eye Protection
Rubber or Neoprene	Safety Glasses or Goggles

Other Protective Clothing or Equipment
Not required

Work/Hygienic Practices
Wash well after use. Remove contaminated clothing.

TRW-02426

* U.S.G.P.O.: 1994-691-329/45775

PETERSON STEEL CORPORATION
61 WEST MOUNTAIN ST., WORCESTER, MA 01606 • PHONE Area Code (508) 853-3630

Emergency Phone Number: (508) 853-3630 **Issue Date:** February 27, 1985

MATERIAL SAFETY DATA SHEET

TRADE NAME (Common or Synonym): Stainless Steels
CHEMICAL NAME: AISI/SAE Grades 300 Series, 400 Series, Special Alloys

1. INGREDIENTS

Material or Compound	CAS Number	% Weight	EXPOSURE LIMITS OSHA PEL (mg/m³)	EXPOSURE LIMITS ACGIH TLV (mg/m³)
Aluminum (Al)	7429-90-5	<0.01 - 0.5	15	10
Carbon (C)	7440-44-0	<0.03 - 2.0	10	10
Chromium (Cr)	7440-47-3	<10 - 27	1.0	0.5
Cobalt (Co)	7440-48-4	<0.01 - 0.75	0.1	0.05
Columbium (Cb)	7440-03-1	<0.01 - 1.10	n/a	n/a
Copper (Cu)	7440-50-8	<0 .18 - 4.5	1	1
Iron (Fe)	7439-89-6	38.0 - 86.5	10	5
Manganese (Mn)	7439-96-5	<2 - 10	5	5
Molybdenum (Mo)	7439-98-7	<0.04 - 5	15	10
Nickel (Ni)	7440-02-0	<0.12 - 34	1	1
Phosphorous (P)	7723-14-0	<0.01 - 0.06	0.1	0.1
Selenium (Se)	7782-49-2	<0.01 - 0.3	0.2	0.2
Silicon (Si)	7740-21-3	<0.15 - 2.0	15	10
Sulfur (S)	7704-34-9	<0.01 - 0.06	13 (Sulfur Dioxide)	5 (Sulfur Dioxide)
Tantalum (Ta)	7440-25-7	<0.01 - 1.10	5	5
Titanium (Ti)	7440-32-6	<0.01 - 0.7	15	10

NOTE: The above is a summary of elements used in alloying stainless steels. Various grades of stainless will contain different combinations of these elements. Trace elements may also be present in minute amounts. No permissible exposure limits (PEL) or threshold limit values (TLV) exist for stainless steel. Values shown are applicable to component elements.

2. PHYSICAL DATA

Material is (at normal conditions):
- ○ LIQUID
- ● SOLID
- ○ GAS
- ○ OTHER

Vapor Density: N/A

Specific Gravity (H2O = 1): Approximately 8

Acidity/Alkalinity: pH - N/A

Solubility In Water (% by weight): N/A

Appearance and Odor: Silvery-Grey, Odorless

Melting Point (approximate): 2400 - 2800° F

Vapor Pressure (mm Hg @ 20° C): N/A

% Volatile By Volume: N/A

Boiling Point: N/A

3. PERSONAL PROTECTIVE EQUIPMENT

Respiratory Protection:
Appropriate dust/mist/fume respirator should be used to avoid excessive inhalation of particulates. If exposure limits are reached or exceeded, use NIOSH approved equipment.

Eyes and Face:
Safety glasses should be worn when grinding or cutting. Face shields should be worn when welding or cutting.

Hands, Arms and Body:
Protective gloves should be worn as required for welding, burning or handling operations.

Other Clothing and Equipment:
As required depending upon operations and safety codes.

4. EMERGENCY MEDICAL PROCEDURES

Inhalation:
Remove to fresh air; if condition continues, consult a physician.

Eye Contact:
Flush thoroughly with running water to remove particulate; obtain medical attention.

Skin Contact:
Remove particles by washing thoroughly with soap and water. Seek medical attention if condition persists.

Ingestion:
If significant amounts of metal are ingested, consult a physician.

5. HEALTH AND SAFETY INFORMATION

HEALTH

Stainless Steel products in their solid state present no inhalation, ingestion, or contact health hazard. Operations such as burning, welding, sawing, brazing, grinding, and machining, which result in elevating the temperature of the product to or above its melting point, or result in the generation of airborne particualtes, may present hazards. The major exposure hazard is inhalation. Effects or overexposure to fume and dust are as follows:

Acute:

Excessive inhalation of metallic fumes and dust may result in irritation of eyes, nose and throat. High concentrations of fumes and dust of iron-oxide, manganese, copper, zinc and lead may result in metal fume fever. Typical symptoms last from 12 to 48 hours and consist of a metallic taste in the mouth, dryness and irritation of the throat, chills and fever.

Chronic:

Chronic and prolonged inhalation of high concentrations of fumes or dust of the following elements may lead to the conditions listed opposite the element:

Aluminum:
May initiate fibrotic changes to lung tissue.

Chromium:
Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma.

Cobalt:
Respiratory tract irritation, skin rash.

Columbium/Tantalum:
No chronic debilitating symptoms indicated.

Copper:
No chronic debilitating symptoms indicated.

Iron:
Siderosis, pulmonary effects. No chronic debilitating symptoms indicated.

Manganese:
Bronchitits, pneumonitis, lack of coordination.

Molybdenum:
Respiratory tract irritation, possible liver and kidney damage, bone deformity.

Nickel:
Lesions of the skin and mucous membranes, possibly cancer of the nose or lungs-bronchogenic carcinoma.

Phosphorous:
Necrosis of the mandible.

Selenium:
Nasal and bronchial irritation, gastrointestinal disturbances,

Sulfur:
(As sulfur dioxide) Edema to the lungs.

Medical Conditions Aggravated by Exposure: Individuals with chronic respiratory disorders (i.e.: asthma, chronic bronchitis, emphysema, etc.) may be adversely affected by any fume or airborne particulate matter exposure.

Occupational Exposure Limits: See Products Ingredients Section 1. Chromium and Nickel have been identified by the International Agency for Research on Cancer (IARC) and/or the National Toxicology Program (NTP) as potential cancer causing agents.

FIRE AND EXPLOSION

Flash Point:
N/A

Auto Ignition Temperature:
N/A

Flammable Limits in Air:
Lower: N/A
Upper: N/A

Extinguishing Media:
For molten metal use dry powder or sand.

Extinguishing Media NOT TO BE USED:
Do not use water on molten metal.

Fire and Explosion Hazards:
Stainless Steel products do not present fire or explosion hazards under normal conditions. Fine metal particles such as produced in grinding or sawing can burn. High concentrations of metallic fines in the air may present an explosion hazard.

REACTIVITY

Stability:
- ● Stable
- ○ Unstable

Incompatibility (materials to avoid):
Reacts with strong acids to form hydrogen gas.

Conditions to Avoid:
Stainless Steel at temperatures above the melting point may liverate fume containing oxides of iron and alloying elements. Avoid generation of airborne fume and dust.

Hazardous Decomposition Products:
Metallic dust or fumes may be produced during welding, burning, grinding and possible machining. Refer to ANSI Z49.1.

6. ENVIRONMENTAL

Spill or Leak Procedures:
Fine turnings and small chips should be swept or vacuumed. Scrap metal can be reclaimed for reuse.

Waste Disposal Method*:
Used or unused product should be disposed of in accordance with Federal State or local laws and regulations.

*Disposer must comply with Federal, State and Local disposal or discharge laws.

7. ADDITIONAL INFORMATION

In welding, precautions should be taken for airborne contaminants which may originate from components of the welding rod.

Arc or spark generated when welding or burning could be a source of ignition for combustion and flammable materials.

DISCLAIMER

The information in this MSDS was obtained from sources which we believe are reliable. However, the information is provided without any representation or warranty, express or implied, regarding the accuracy or correctness.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

MATERIAL SAFETY DATA SHEET

METAL INDUSTRIES DIVISION
R. H. MILLER
P.O.BOX 350
HOMER, NY 13077

EMERGENCY PHONE NUMBERS
BUSINESS HRS: 607-749-2652
OTHER HOURS:
CHEMTREC: 800-424-9300

****

PRODUCT IDENTIFICATION

PRODUCT NAME: CAS NO.: NA MIXTURE
STEELSKIN (R) 4-5
SYNONYMS:
METALWORKING COMPOUND
CHEMICAL NAME:
NA
MOLECULAR FORMULA:
NA MIXTURE
CHEMICAL FAMILY: ALKALI

APPROVED
JUL 17 1987
ENVIRONMENTAL ENGINEERING

****

INGREDIENTS-----HAZARD CLASSIFICATIONS

COMPONENTS	CAS NO.	%	COMMENTS
CALCIUM HYDROXIDE	01305-62-0	>1	TWA 5 MG/M3 (ACGIH) LD50 = 7340 MG/KG (ORAL - RAT)
STEARATES		> 1	TWA 10 MG/M3 TOTAL DUST (ACGIH 1986-87)

****

SHIPPING INFORMATION

NOT REGULATED BY THE DEPARTMENT OF TRANSPORTATION.

****

PHYSICAL PROPERTIES

BOILING POINT/RANGE:
NA

MELTING POINT:
NE

FREEZING POINT:
NA

MOLECULAR WEIGHT:
MIXTURE

SPECIFIC GRAVITY(H2O=1):
NE

VAPOR PRESSURE(MM HG):
NIL

VAPOR DENSITY(AIR=1):
NA

SOLUBILITY IN H2O:
NEGLIGIBLE

% VOLATILES BY VOLUME:
NIL

APPEARANCE AND ODOR:
OFF WHITE POWDER, MILD ODOR

****

FIRE AND EXPLOSION DATA

FLASH POINT:
NONE

FLAMMABLE LIMITS:
LOWER: NA UPPER: NA

AUTOIGNITION TEMP.:
NE

EXTINGUISHING MEDIA:
WATER-SPRAY CO2 DRY CHEMICAL FOAM

NA - NOT APPLICABLE NE - NOT ESTABLISHED
(R) - INDICATES REGISTERED TRADEMARK OF PENNWALT CORPORATION

SPECIAL FIRE FIGHTING PROCEDURES: NA

UNUSUAL FIRE AND EXPLOSION HAZARDS:
DUST EXPLOSION
HAZARD

****

REACTIVITY DATA

STABILITY: CONDITIONS CONTRIBUTING TO INSTABILITY: NA
STABLE

INCOMPATIBILITY-AVOID CONTACT WITH:

STRONG ACIDS	STRONG OXIDIZERS

HAZARDOUS DECOMPOSITION THERMAL AND OTHER:
THERMAL - OXIDES OF CARBON.

CONDITIONS TO AVOID:
OPEN FLAMES SPARKS IGNITION SOURCES
USE GOOD HOUSEKEEPING TO MINIMIZE DUST BUILDUP ON OVERHEAD RAFTERS AND PIPES.

****

TOXICITY

ROUTE	ANIMAL	DATA
ORAL	NE	NE
DERMAL	NE	NE
INHALATION	NE	NE

TOXIC EFFECTS

EYE EFFECTS: IRRITANT
SKIN EFFECTS: NA
OTHER TOXIC EFFECTS:
DUSTING MAY CAUSE MINOR IRRITATION TO MUCOUS MEMBRANES.
.
THIS PRODUCT IS NOT, NOR DOES IT CONTAIN, ANY CARCINOGENS AS LISTED BY OSHA, IARC OR NTP.
TARGET ORGAN TOXIN: NA

****

HEALTH HAZARD INFORMATION

PERMISSIBLE EXPOSURE LIMITS
SINCE THIS PRODUCT IS A MIXTURE, THERE IS NO EXPOSURE LIMIT ESTABLISHED FOR IT. HAZARDOUS COMPONENTS AND THEIR ASSOCIATED PERMISSIBLE EXPOSURE LIMITS ARE LISTED IN THE SECTION TITLED 'INGREDIENTS-----HAZARD CLASSIFICATIONS' TO AID YOUR COMPLIANCE WITH SPECIFIC REGULATIONS.

NA - NOT APPLICABLE NE - NOT ESTABLISHED
(R) - INDICATES REGISTERED TRADEMARK OF PENNWALT CORPORATION

EMERGENCY FIRST AID

INGESTION

DO NOT INDUCE VOMITING	GIVE PLENTY OF WATER	GET MEDICAL ATTENTION

DERMAL

WASH WITH SOAP AND WATER

EYE CONTACT

FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES — GET MEDICAL ATTENTION

HOLD EYELIDS OPEN WHILE FLUSHING.

INHALATION

REMOVE TO FRESH AIR

****

SPECIAL PROTECTION INFORMATION

VENTILATION REQUIREMENTS:
CONSULT AN INDUSTRIAL HYGIENIST
OR ENVIRONMENTAL HEALTH SPECIALIST
SUFFICIENT TO MAINTAIN DUST LEVEL BELOW THE SPECIFIED HAZARDOUS INGREDIENT CONCENTRATION LIMIT.

EYE: GOGGLES

HAND (GLOVE TYPE): ANY NON-PERMEABLE TO PRODUCT

RESPIRATOR TYPE:
FILTERS DUST

OTHER PROTECTIVE EQUIPMENT: NA

****

SPECIAL HANDLING AND STORAGE CONDITIONS

WASH THOROUGHLY AFTER HANDLING — DO NOT GET IN EYES, ON SKIN OR CLOTHING — DO NOT BREATHE DUST,VAPOR,MIST,GAS

KEEP CONTAINER CLOSED — KEEP AWAY FROM HEAT SPARKS,AND OPEN FLAMES

EMPTY CONTAINER MAY CONTAIN HAZARDOUS RESIDUES

.
.
.

MINIMUM CONTACT WITH ALL CHEMICALS IS RECOMMENDED AS GOOD POLICY.

NA - NOT APPLICABLE NE - NOT ESTABLISHED
(R) - INDICATES REGISTERED TRADEMARK OF PENNWALT CORPORATION

****

SPILL MANAGEMENT

SWEEP OR SCOOP
UP AND REMOVE

****

DISPOSAL PROCEDURES

LANDFILL

CONSULT FEDERAL, STATE, OR LOCAL AUTHORITIES FOR PROPER DISPOSAL PROCEDURES

****

MSDS PREPARED BY RICHARD A. NEAL

****

THE ABOVE INFORMATION IS ACCURATE TO THE BEST OF OUR KNOWLEDGE. HOWEVER, SINCE DATA, SAFETY STANDARDS, AND GOVERNMENT REGULATIONS ARE SUBJECT TO CHANGE AND THE CONDITIONS OF HANDLING AND USE, OR MISUSE ARE BEYOND OUR CONTROL, PENNWALT MAKES NO WARRANTY, EITHER EXPRESS OR IMPLIED, WITH RESPECT TO THE COMPLETENESS OR CONTINUING ACCURACY OF THE INFORMATION CONTAINED HEREIN AND DISCLAIMS ALL LIABILITY FOR RELIANCE THEREON. USER SHOULD SATISFY HIMSELF THAT HE HAS ALL CURRENT DATA RELEVANT TO HIS PARTICULAR USE.

NA - NOT APPLICABLE NE - NOT ESTABLISHED
(R) - INDICATES REGISTERED TRADEMARK OF PENNWALT CORPORATION

RECEIVED Boiler room

APR 11 1990

ENVIRONMENTAL/SAFETY

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

All Products
Send Spec.

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME [redacted]	EMERGENCY TELEPHONE NO. [redacted]
ADDRESS (Number, Street, City, State, and ZIP Code) ABINGTON EXECUTIVE PARK, CLARKS SUMMIT, PA 18411	
CHEMICAL NAME AND SYNONYMS SODIUM CHLORIDE, SALT, HALITE, SOLAR SALT	TRADE NAME AND SYNONYMS [redacted]
CHEMICAL FAMILY INORGANIC SALT (ALKALI METAL-HALOGEN)	FORMULA NaCl

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS		NONE	BASE METAL		NONE
CATALYST		NONE	ALLOYS		NONE
VEHICLE		NONE	METALLIC COATINGS		NONE
SOLVENTS		NONE	FILLER METAL PLUS COATING OR CORE FLUX		NONE
ADDITIVES		NONE	OTHERS		
OTHERS - NOT CONSIDERED TOXIC -	MLD		I.V. IN RATS 2.5 G/KG.		

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
NOT APPLICABLE		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		2575	SPECIFIC GRAVITY (H_2O=1)	2.165
VAPOR PRESSURE (mm Hg.)	2.4 mm @	746.9°C	PERCENT, VOLATILE BY VOLUME (%)	NONE
VAPOR DENSITY (AIR=1)		NA	EVAPORATION RATE (_____ =1)	NONE
SOLUBILITY IN WATER	60°F	317 GPL		
APPEARANCE AND ODOR	SOLID, WHITE OR OFF-WHITE CRYSTALINE MATERIAL, NO ODOR			

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) NONE	FLAMMABLE LIMITS NONE	Lel	Uel
EXTINGUISHING MEDIA			
SPECIAL FIRE FIGHTING PROCEDURES NOT COMBUSTIBLE			
UNUSUAL FIRE AND EXPLOSION HAZARDS NONE			

TRW-02433

(Continued on reverse side)

0908-3814

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
ORAL LD_{50} IN WHITE RATS 3000 MG/KG.

EFFECTS OF OVEREXPOSURE
O ACUTE SYSTEMIC TOXICITY, NO CHRONIC LOCAL TOXICITY, NO CHRONIC SYSTEMIC TOXICITY, ACUTE LOCAL EXPOSURE AS AN IRRITANT AND THRU INGESTION, EFFECTS REVERSIBLE AFTER EXPOSURE.

EMERGENCY AND FIRST AID PROCEDURES
SKIN-FLUSH WITH WATER; EYES-FLUSH WITH WATER.
INGESTION OF LARGE AMOUNTS (MORE THAN 0.1 POUND) MAY CAUSE VOMITING.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		STORE UNDER DRY CONDITIONS, PREFERABLY
	STABLE	X	BELOW 75% RELATIVE HUMIDITY

INCOMPATABILITY *(Materials to avoid)*
CONCENTRATED ACIDS SUCH AS SULFURIC OR NITRIC

HAZARDOUS DECOMPOSITION PRODUCTS
HYDROCHLORIC ACID

HAZARDOUS POLYMERIZATION			CONDITIONS TO AVOID
	MAY OCCUR		
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
SWEEP UP AND FLUSH WITH WATER. NO SPECIAL HAZARDS CONNECTED WITH LEAKS OR SPILLS.

WASTE DISPOSAL METHOD
DRY LAND FILL OR DISSOLVE IN SUFFICIENT AMOUNTS OF WATER TO MEET EXISTING WATER QUALITY STANDARDS.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION *(Specify type)*
RESPIRATOR UNNECESSARY, BUT MAY BE USED FOR COMFORT.

VENTILATION		
	LOCAL EXHAUST: NOT NECESSARY	SPECIAL
	MECHANICAL *(General)*: CONTROL DUST COLLECTOR MAY BE USED.	OTHER

PROTECTIVE GLOVES	EYE PROTECTION
DESIRABLE BUT NOT REQUIRED	GOGGLES ARE DESIRABLE BUT NOT NECESSARY

OTHER PROTECTIVE EQUIPMENT

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
STORE IN DRY AREA TO AVOID CAKING.

OTHER PRECAUTIONS
NONE

PAGE (2)
GPO 930-840

SUBMITTED: MARCH 1988
BY: SUSAN R. GELB
TITLE: QUALITY ASSURANCE & TECHNICAL MANAGER
PHONE: 717/587-5131 EXT #432
CAS#: 7647-14-5 SODIUM CHLORIDE

Form OSHA-20
Rev. May 72

TRW-02434

0908-3815

FRANK
MORTELLITI

TRW-02435

0908-3816

Chem Lab

S-261 4

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1337

MATERIAL SAFETY DATA SHEET

APPROVED
FEB 18 1987
ENVIRONMENTAL ENGINEERING

SECTION I

MANUFACTURER'S NAME: Brand-Nu Labs	EMERGENCY TELEPHONE NO.: 203 235-7989
ADDRESS (Number, Street, City, State, and ZIP Code): P.O. Box 895 30 Maynard St. Meriden Ct 06450	
CHEMICAL NAME AND SYNONYMS:	TRADE NAME AND SYNONYMS: SULFURIC ACID SOLUTION
CHEMICAL FAMILY: ACIDS	FORMULA: [redacted]

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
SULFURIC ACID	0.5-75	

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)		SPECIFIC GRAVITY (H_2O=1)	1.01-1.55
VAPOR PRESSURE (mm Hg)		PERCENT, VOLATILE BY VOLUME (%)	
VAPOR DENSITY (Air=1)		EVAPORATION RATE (_____=1)	
SOLUBILITY IN WATER	COMPLETE		

APPEARANCE AND ODOR: WATER WHITE LIQUID WITH ACIDIC AROMA

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used)	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA: USE ONLY DRY CHEMICAL ON OR NEAR A SULFURIC ACID FIRE

SPECIAL FIRE FIGHTING PROCEDURES: SULFURIC ACID IS NON FLAMMABLE, BUT IF A FIRE IS NEAR A SULFURIC ACID CONTAINER, USE RESPIRATORY PROTECTION AGAINST FUMES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: REACTS VICIENTLY WITH WATER OR ORGANIC MATERIALS WITH MUCH HEAT.

(Continued on reverse side)

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SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
orl-rat 2140mg/Kg.

EFFECTS OF OVEREXPOSURE
SKIN OR EYE CONTACT CAUSES SEVERE BURNS. IF INGESTED MAY CAUSE SEVERE BURNS TO THE THROAT AND MUCUS MEMBRANES

EMERGENCY AND FIRST AID PROCEDURES
IN CASE OF CONTACT,FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MIN. IF SWALLOWED DO NOT INDUCE VOMITING. GIVE TAP WATER, MILK, OR MILK OF MAGNESIA. CALL A PHYSICIAN.

SECTION VI - REACTIVITY DATA

STABILITY			CONDITIONS TO AVOID
	UNSTABLE		AVOID ADDING WATER TO ACIDS SINCE A LARGE
	STABLE	X	AMOUNT OF HEAT IS GENERATED.

INCOMPATIBILITY (Materials to avoid)

HAZARDOUS DECOMPOSITION PRODUCTS

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
COVER CONTAMINATED SURFACE WITH SODIUM BICARBONATE. MIX AND ADD WATER IF NECESSARY TO MAKE A SLURRY. SCOOP UP SLURRY AND RINCE AREA WITH FRESH WATER.

WASTE DISPOSAL METHOD
DISPOSE THROUGH A WASTE TREATMENT PLANT IF LOCAL REGULATIONS PERMIT.

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)
SELF CONTAINED BREATHING APPARATUS.

VENTILATION				
	LOCAL EXHAUST	X	SPECIAL	
	MECHANICAL (General)	X	OTHER	

PROTECTIVE GLOVES
RUB[illegible] GLOVES

EYE PROTECTION
GOGGLES AND FULL FACE MASK

OTHER PROTECTIVE [illegible]MENT
[illegible] APPROVED WORKING CLOTHS AND RUBBER BOOTS.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
KEEP IN TIGHTLY CLOSED CONTAINER.

OTHER PRECAUTIONS

JANUARY 29, 1986

MATERIAL SAFETY DATA SHEET

STRAT-O-BLACK

SECTION I IDENTIFICATION

Chemical Family - Alkali mixture
Chemical Formula - Proprietary

SECTION II - HAZARDOUS INGREDIENTS

HAZARDOUS COMPONENTS	HAZARDOUS %	TLV (Units)	CAS NO.
Sodium chlorite	< 50	Not established	7758-19-2
Sodium hydroxide	> 50	2 mg/m3	1310-73-2

SECTION III - PHYSICAL DATA

BOILING Point(F).....NA
FREEZING POINT.....NA
VOLATILITY/VOL(%).....NA
MELTING POINT.....NA
VAPOR PRESSURE (mm Hg)....NA
VAPOR DENSITY (Air=1).....NA
SOLUBILITY IN H2O.....Soluble
APPEARANCE/ODOR.....White granular mixture with slight pungent odor.
SPECIFIC GRAVITY (H2O=1)...UK
EVAPORATION RATE.....NA
PH.....5% solution > 12.0

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT.....NA
LOWER FLAME LIMIT.....NA
HIGHER FLAME LIMIT.....NA
EXTINGUISH MEDIA.....Water, foam, CO2, dry chemical or as is necessary for primary cause of fire.

MATERIAL SAFETY DATA SHEET

Stratoblack

SPECIAL FIRE FIGHTING PROCEDURES: Material decomposes above 350 degrees F. Overheated drums may rupture spreading fire. Remove containers from burning area. Use self-contained breathing apparatus. Water solutions of material are corrosive. Wear protective clothing to prevent skin contact.

UNUSUAL FIRE HAZARD.....Material may be ignited by friction, heat or shock. Will react on contact with zinc, aluminum, tin and their alloys producing hydrogen gas.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE.....2 mg/m3 as sodium hydroxide

OVER EXPOSURE EFFECTS.....Skin: May cause severe alkali burns. Eyes: Causes severe damage to eyes. Dust inhalation may cause injury to respiratory tract. Ingestion will burn tissues and may result in severe injury and may be fatal.

FIRST AID PROCEDURES.....For accidental skin and eye contact: Immediately flush affected area with large amounts of clean water for at least 15 minutes. For eye contact, get medical attention. For inhalation of dust, vapor or mist, remove from area to fresh air. For ingestion, give large quantities of milk or water. Do not induce vomiting.

SECTION VI - REACTIVITY DATA

CHEMICAL STABILITY.....Unstable

CONDITIONS TO AVOID.....Moderate explosion hazard if shocked or exposed to heat or flame.

INCOMPATIBLE MATERIALS....Can react on contact with acids, reducing agents, aluminum, tin,zinc and their alloys.

DECOMPOSITION PRODUCTS....CLO2 gas. Considerable heat is liberated when water is added to material.

HAZARDOUS POLYMERIZATION..Will not occur

POLYMERIZATION AVOID.....NA

SECTION VII - SPILL OR LEAK PROCEDURE

FOR SPILL .....Sweep or shovel up and transfer to waste treatment area.

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MATERIAL SAFETY DATA SHEET

Stratoblack

WASTE DISPOSAL METHOD.....Comply with all federal, state and local requirements for dispodal of alkaline solutions and salts. Solutions used for blackening copper alloys may contain quantities of dissolved copper, zinc or other metals.

SECTION VIII - SPECIAL PROTECTION

RESPIRATORY PROTECTION....NIOSH approved dust and/or mist respirator.
VENTILATION.....Local-to maintain level below TLV
PROTECTIVE GLOVES.....Rubber or Plastic
EYE PROTECTION.....Goggles
OTHER PROTECTIVE EQUIPMENTProtective clothing to prevent skin contact.
HANDLING AND STORAGE.....Store in a cool, dry area away from sunlight and heat. Keep container closed when not in use. Store to prevent physical damage to container. Separate from acids, combustible organic materials, reducing materials and reactive metals. Material generates heat when mixed with water. When dissolving, add slowly and carefully in small amounts to cold water.

SECTION IX - SHIPPING INFORMATION

DOT HAZARD CLASS.....Oxidizer
DOT SHIPPING NAME.....Oxidizer, Corrosive Solid NOS
DOT LABEL REQUIRED.....Oxidizer and Corrosive
RQ QUANTITY.....NA
UN NUMBER.....NA
NA #.....NA 9194
PACKAGING SIZE.....100 lb container

FOOT NOTES UK = Unknown NA = Not applicable
< = Less than > = Greater than

REFERENCES MSDS for sodium chlorite and sodium hydroxide

This product safety data sheet is offered solely for your information, consideration and investigation. Enequist Chemical Co., Inc. provides no war ties express or implied and assumes no responsibility for accuracy or completeness of data contained herein.

TRW-02440

0908-3821

TECHNICAL BULLETIN

THE LEA MANUFACTURING COMPANY
237 E. AURORA ST., (BOX 71) WATERBURY, CONN. 06720
TEL: (203) 753-5116

BULLETIN NO.
ST-137

EFFECTIVE DATE
Tentative
SUPERSEDES

STRAT-O-BLACK

IMMERSION BLACK OXIDE FOR COPPER AND COPPER ALLOYS

Strat-O-Black is a dry product which, when mixed with water at the proper concentration and proper temperature, will produce a colored oxide coating on copper and copper alloys. The coatings produced are adherent, stable and black in color. They can be both bright or dull depending on the initial surface of the part. The coatings can be enhanced and further protected by the application of lacquer, wax or oil.

Most alloys containing more than 85% copper can be colored using Strat-O-Black. With lower copper alloys, an activation treatment using Strat-O-Black Activator may be required.

A suggested procedure for the coloring of copper alloys is as follows:

1. Suitably prepare surface; polish for high gloss finish or matte and etch for dull finish
2. Clean thoroughly using appropriate techniques.
3. Rinse in running water
4. Remove any oxide or tarnish by dipping in 10% solution of hydrochloric or sulfuric acid or in 4 oz/gal. solution of sodium cyanide.
5. Rinse thoroughly in running water.
6. Immerse in Strat-O-Black solution, 1-1/2 lbs. per gallon at 210-215° F for 3-10 minutes. Note: For low copper alloys activate first in Strat-O-Black Activator Solution, 1 lb/gal. at 210° F - to boiling for 3 minutes.
7. Rinse thoroughly in running water.
8. Hot water rinse and dry.
9. Lacquer, wax or oil if necessary.

Strat-O-Black and/or Strat-O-Black Activator may also be used at different operating conditions to produce various blackish tones which can be relieved to produce antique finishes.

EQUIPMENT

Strat-O-Black and Strat-O-Black Activator should be used in stainless steel or welded steel tanks. Tanks should be ducted and exhausted. Heating coils should be of steel or stainless steel or the tanks may be gas fired.

WARNING

Strat-O-Black and Strat-O-Black Activator salts contain caustic alkali together with strong oxidizing agents. Solutions containing these materials or the solid salts should not be allowed to come in contact with any organic matter, such as cloth, oil, wood, rubber, paper and sawdust and definitely must not be allowed to come in contact with any chemical reducing agents such as sulphur, phosphorus or sulphides because there may be danger of ignition or explosion. Use clean steel or stainless steel shovels, containers, scoops and stirring rods. Use protective clothing when making additions of salts or when operating both, including face shields and neoprene protective clothing. Keep salts away from fire, heat, sparks or flame.

Olin MATERIAL SAFETY DATA

OCEAN® Network
EMERGENCY PHONE 1-800-OLIN-911

SECTION I - IDENTIFICATION

CHEMICAL NAME & SYNONYMS		
Strescon		
CHEMICAL FAMILY	FORMULA	TRADE NAME
Copper	Mixture	Alloy 195
DESCRIPTION		CAS NO.
Red orange metallic solid		Not assigned

SECTION II - NORMAL HANDLING PROCEDURES

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

Precautions needed for abrasive, melting or other operations generating a dust or fume. Do not get dust or fume in eyes, on skin or on clothing. Do not take internally. Wash hands with soap and water before eating or smoking. Avoid breathing dust or fumes.

PROTECTIVE EQUIPMENT		VENTILATION REQUIREMENTS
Eyes	Dust - goggles	As required to keep airborne concentrations of copper and iron below TLV.
Gloves	Impervious (if necessary)	
Other	NIOSH/MSHA approved high efficiency particulate respirator if excessive dusting/fumes occurs	

SECTION III - HAZARDOUS INGREDIENTS

BASIC MATERIAL	OSHA PEL	LD 50	LC 50	SIGNIFICANT EFFECTS
Copper	Dust 1 mg/m^3	TD_{LO} 120 ug/kg (human)	No data	Inhalation - metal fume fever, respiratory tract irritation
Iron	Fume 10 mg/m^3	No data	No data	Accumulation of dust in lungs (siderosis)

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT METHOD	OSHA CLASSIFICATION	FLAMMABLE EXPLOSIVE LIMITS	LOWER	UPPER
Not Applicable	Non-combustible solid		N/A	N/A

EXTINGUISHING MEDIA

Use extinguishing media suitable for surrounding material

SPECIAL FIRE HAZARD & FIRE FIGHTING PROCEDURES

Use NIOSH/MSHA approved self-contained breathing apparatus where this material is involved in a fire.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE

Copper dust 1 mg/m^3, fume 0.2 mg/m^3, Iron fume 5 mg/m^3 (ACGIH 1985-86)

SYMPTOMS OF OVER EXPOSURE

Dust and fume - sneezing, congestion, metallic taste, nausea, chills, fever

EMERGENCY FIRST-AID PROCEDURES

SKIN	Dust or fume: Wash with soap and water before eating or smoking. If an irritation develops, call a physician.
EYES	Dust or fume: Flush with water for 15 minutes, call a physician.
INGESTION	Dust: Not a likely route of exposure. If ingested, call a physician.
INHALATION	Dust or fume: Remove victim to fresh air, call a physician.

Chemical

CAS No.

TRW-02443

0908-3824

CHEMICAL NAME Alloy 195

SECTION VI - TOXICOLOGY (Product)

ACUTE ORAL LD 50		CARCINOGENICITY	Not known to be carcinogenic
ACUTE ORAL TD_{LO}	Copper 120 mg/kg human	MUTAGENICITY	Not known to be mutagenic
ACUTE DERMAL LD 50	No data	EYE IRRITATION	Dust is irritating
ACUTE INHALATION LC 50	No data	PRIMARY SKIN IRRITATION	Dust may be irritating

PRINCIPAL ROUTES OF ABSORPTION
Inhalation of dust or fume

EFFECTS OF ACUTE EXPOSURE Dust or fume: Skin, eye and mucous membrane irritation, metal fume fever, respiratory tract irritation.

EFFECTS OF CHRONIC EXPOSURE None expected at industrial use levels. Chronic overexposure may cause liver and kidney effects.

SECTION VII - SPILL AND LEAKAGE PROCEDURES (Control Procedures)

ACTION FOR MATERIAL RELEASE OR SPILL

Dust or Fume: Wear NIOSH/MSHA approved high efficiency particulate respirator. Follow OSHA regulations for respirator use (see 29 CFR 1910.134). Wear goggles, coveralls, impervious gloves and boots. Shovel or sweep up and place in an appropriate container. Wash all contaminated clothing before reuse.

In the event of a large spill, use the emergency telephone number shown on the front of this sheet.

TRANSPORTATION EMERGENCY, CONTACT CHEMTREC 800-424-9300

WASTE DISPOSAL METHOD

Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Consult appropriate federal, state and local regulatory agencies to ascertain proper disposal procedures.

SECTION VIII - SHIPPING DATA

D.O.T. CLASS Not regulated

SECTION IX - REACTIVITY DATA

STABLE X UNSTABLE AT ____ °C ____ °F	HAZARDOUS POLYMERIZATION	MAY OCCUR	
		WILL NOT OCCUR X	

CONDITIONS TO AVOID Presence of carbon monoxide during melting

INCOMPATIBILITY (Material to Avoid) Dust and fume - acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS copper fume, iron oxide fume

SECTION X - PHYSICAL DATA

MELTING POINT	1985°F	VAPOR PRESSURE	N.A.	VOLATILES	N.A.
BOILING POINT	No data	SOLUBILITY IN WATER	Insoluble	EVAPORATION RATE	N.A.
SPECIFIC GRAVITY (H_2O = 1) *		pH	N.A.	VAPOR DENSITY (Air = 1)	N.A.
*DENSITY .322 lbs./in.^{3}					

INFORMATION FURNISHED BY: Environmental Hygiene and Toxicology Department (203) 789-5436 DATE March 25, 1986

Department of Environmental Hygiene and Toxicology
(203) 789-5436

Olin CORPORATION
120 Long Ridge Road, Stamford, Connecticut 06904
OCEAN® Network
EMERGENCY PHONE 1-800-OLIN-911

BETZ LABORATORIES, INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047
BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 1-800-877-1940

REAGENT SULFITE INDICATOR CODE 219 EFFECTIVE DATE 02-16-91
MASS. REG # PRINTED: 01-31-92
REVISIONS TO SECTIONS: -;EDIT:APPENDIX

REAGENT APPLICATION : FIELD TEST REAGENT

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC REAGENT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION. FOR MASSACHUSETTS, THE PERCENT OF HAZARDOUS INGREDIENT IN THE FORMULATION IS INDICATED BELOW.

SULFAMIC ACID***(AMIDOSULFONIC ACID);CAS#5329-14-6;CORROSIVE TO EYES; IRRITANT TO SKIN;PEL:NONE;TLV:NONE. (71.0-80.05)

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: NO DATA	ODOR: NONE
FL.PT.(DEG.F): NA	SP.GR.(70F)OR DENSITY: NA
VAPOR PRESSURE(mmHG): NA	VAPOR DENSITY(AIR=1): NA
VISC cps70F: NA	%SOLUBILITY(WATER): 100
EVAP.RATE: <1 ETHER=1	APPEARANCE: WHITE
PHYSICAL STATE: POWDER	FREEZE POINT(DEG.F): NA

-----SECTION 3----------REACTIVITY DATA----------

STABLE. BETZ TANK CLEAN-OUT CATEGORY 'B'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

REAGENT: SULFITE INDICATOR

-----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE
MODERATELY IRRITATING TO THE SKIN

ACUTE EYE EFFECTS ***
CORROSIVE TO THE EYES

ACUTE RESPIRATORY EFFECTS ***
DUSTS CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***
NO EVIDENCE OF POTENTIAL CHRONIC EFFECTS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
INHALATION OF DUSTS MAY CAUSE IRRITATION AND/OR BURNS TO RESPIRATORY TRACT; SKIN CONTACT CAN CAUSE MODERATE IRRITATION TO BURNS(DEPENDENT ON LENGTH OF EXPOSURE)

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DO NOT INDUCE VOMITING.IMMED.CONTACT PHYSICIAN.DILUTE CONTENTS OF STOMACH USING 3-4 GLASSES MILK OR WATER

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
GENERAL-VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.SWEEP UP AND PLACE IN WASTE DISPOSAL CONTAINER.
SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
GENERAL-WATER CONTAMINATED WITH THIS REAGENT MAY BE SENT TO A SANITARY SEWER,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
REAGENT(AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).PROPER FIRE EXTINGUISHING MEDIA:
DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

REAGENT: SULFITE INDICATOR

-----SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION TO MAINTAIN AIR CONTAMINANTS BELOW EXPOSURE LIMITS

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT REAGENT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

AIRTIGHT CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP CONTAINER CLOSED WHEN NOT IN USE.

KEEP DRY

HANDLING INSTRUCTIONS***

NORMAL CHEMICAL HANDLING

****

THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD

****

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: NOT APPLICABLE

...DOT HAZARD/UN#/ER GUIDE# IS: NOT APPLICABLE

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: NONE

...SARA SECTION 312 HAZARD CLASS: IMMEDIATE(ACUTE)

NFPA/HMIS : HEALTH - 3 ; FIRE - 0 ; REACTIVITY - 0 ; SPECIAL - NONE ; PE - B

REV. 1 Sulfuric Acid CSO-0240

McGean-Rohco, Inc.

1250 Terminal Tower, Cleveland, Ohio 44113 216/621-6425

MATERIAL SAFETY DATA SHEET

Product Name: Tru-Plate 0170			Emergency Phone No.: 216/441-4900
Plant Address: 2910 Harvard Avenue		Cleveland, OH 44109	Chemtrec Phone No. 800/424-9300
Prepared By: TSCA Coordinator	Issue Date: 10/85		Revised Date: NA

INGREDIENTS AND HAZARDOUS COMPONENTS

TRW-MOUNTAINSIDE Material
MSDS CODE # CSO-0240
Approved [redacted] for Use
S Allen 11-19-87
Signature Date

REMARKS:
1. Please ensure each involved person is explained potential HAZARD from exposure of this chemical and trained in proper handling and/or use, informed of spill procedure and given protective equipment/clothing prior to his first day of work.
2. Keep copy of this MSDS in work area.

	%	TLV	C.A.S. #	Suspect Carcinogen
Sulfuric Acid	40	1	7664 93-9	NA
		MG/M3		

PHYSICAL DATA

Boiling Point: > 100°C	Freezing Point: UK	Specific Gravity: 1.38	pH: less than 1.0
Vapor Pressure at 20° C: UK	Vapor Density (Air = 1): UK	% Volatiles by Volume: > 50%	Odor: bland-soapy
Evaporation Rate (Butyl Acetate = 1) < 1		Solubility in Water: Complete	
Appearance and Form: Light tan liquid			

FIRE AND EXPLOSION HAZARD DATA

Flash Point: NA	Flammable Limits in Air:
Test Method: NA	% By Volume Upper: NA Lower:
Extinguishing Media: Dry chemical	
Special Fire Fighting Procedures: Liquid is acidic and corrosive; wear suitable protective clothing. Wear self-contained breathing apparatus, if fumes or mists are present.	
Unusual Fire and Explosion Hazards: Contact of solution with metals may generate flammable and explosive hydrogen gas.	
DOT Classification: Corrosive liquid NOS UN 1760	Note: UK = Unknown NA = Not Applicable

TRW-02448

0908-3829

Sulfuric Acid

HEALTH HAZARD DATA

CSO-024D

Effects of Overexposure and Primary Entries to Body:

May cause severe burns to skin, eyes and body tissue on contact. Inhalation of vapors may cause respiratory irritation.

Emergency and First Aid Procedures:

Flush contacted area thoroughly with clean water. Remove contaminated clothing. For eye contact, get medical attention.

REACTIVITY DATA

☒ Stable ☐ Unstable Conditions to Avoid:

Incompatability — Materials to Avoid:

Avoid contact with metals, reducing or oxidizing agents.

Hazardous Decomposition Products:

Extremely high temperatures may liberate sulfur dioxide.

Hazardous Polymerization:

☐ May Occur ☒ Will Not Occur

SPILL OR LEAK PROCEDURES

Spills: Soak up small spills with sand, clay or other suitable absorbent. Neutralize with lime or soda ash. Flush area with water. Comply with all federal, state and local regulations and requirements.

Waste Disposal Methods:

Neutralize and comply with all federal, state and local regulations for waste disposal.

SPECIAL PROTECTION INFORMATION

Respirator:

As required for general work area.

Ventilation:

Mechanical - Sufficient to maintain concentration below TLV.

Gloves:	Eye and Face:	Other:
Rubber	Goggles & Face Shield	Acid resistant clothing to prevent skin & clothing contact.

Handling and Storage: Store container to prevent physical damage. Keep container closed when not in use. Make sure closure is fastened securely before moving container. Material generates heat when mixed with water; do not add water to material in container.

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.

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TRW-02449

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DU PONT

DATA SHEET

SULFURIC ACID AND OLEUM

TECHNICAL

Sulfuric acid (H_2SO_4, Mol. wt 98.08) is a heavy, oily, strong, liquid mineral acid. It is clear and colorless in pure form. Technical grades may be turbid and off-white in appearance. Grades below 100% have a very low vapor pressure and are odorless. The oleums (sulfur trioxide dissolved in sulfuric acid) give off irritating fumes or mist. The Chemical Abstracts Registry No. for sulfuric acid is 7664-93-9 and for oleum is 8014-95-7. Other grades of sulfuric acid and related products are also available from Du Pont.

High Purity Grades

Electrolyte 1.835	Physical properties same as 66 Be Technical grade. Specification available on request.
Electronic Reagent Grade	Refer to Du Pont Data Sheet on Electronic Reagents.

Related Products

Sulfur Trioxide	Refer to Du Pont Data Sheet on Sulfur Trioxide and Storage and Handling Bulletin on Sulfur Trioxide and Oleum.
Mixed Acid	Sulfuric acid is supplied in mixtures with strong nitric acid for nitrating operations.

SPECIFICATIONS AND TYPICAL ANALYSIS

Grade	Gravity, Be @ 15.6 C (60 F) Spec. min.	Gravity, Be @ 15.6 C (60 F) Anal.*	Acidity as H_2SO_4, % Spec. min.	Acidity as H_2SO_4, % Anal.*	Free SO_3, % Spec. min.	Free SO_3, % Anal.*	Iron as Fe, % Spec. max.	Iron as Fe, % Anal.*	N_2 Oxides as NO_3^-, % Spec. max.	N_2 Oxides as NO_3^-, % Anal.*	Arsenic as As, % Spec. max.	Arsenic as As, % Anal.*
Sulfuric Acid												
60	60.0	60.05	77.67	77.7	—	—	0.02	0.006	0.015	0.000 5	0.005	0.000 005
66	66.0	66.03	93.19	93.3	—	—	0.02	0.005	0.002	0.000 5	0.005	0.000 005
66WW**	66.0	66.03	93.19	93.3	—	—	0.005	0.002	0.002	0.000 5	0.005	0.000 005
96%	—	—	96.0	96.1	—	—	—	0.004	—	0.000 5	—	0.000 005
98%	—	—	98.0	98.1	—	—	—	0.004	—	0.001	—	0.000 005
99%	—	—	99.0	99.1	—	—	—	0.004	—	0.001	—	0.000 005
100%	—	—	100.0	100.1	—	—	—	0.004	—	0.001	—	0.000 005
Oleum												
104.5%	—	—	104.5	104.6	20.0	20.5	—	0.003	—	0.001 5	—	0.000 005
106.75%	—	—	106.75	106.85	30.0	30.5	—	0.003	—	0.001 5	—	0.000 005
114.63%	—	—	114.63	114.73	65.0	65.5	—	0.002	—	0.001 5	—	0.000 005

*These columns give typical analyses based on historical production performance. Du Pont does not make any express or implied warranty that future production will demonstrate or continue to possess these typical analyses.

**Water white

NOTICE: SULFURIC ACID AND OLEUM CAUSE SEVERE BURNS.
See Personal Safety and First Aid on Page 3.

The information set forth herein is furnished free of charge and is based on technical data that Du Pont believes to be reliable. It is intended for use by persons having technical skill and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, express or implied, and assume no liability in connection with any use of this information. Nothing herein is to be taken as a license to operate under or a recommendation to infringe any patents.

PHYSICAL PROPERTIES

Strength	Equiv. H_2SO_4	Sp. Gr. 15.6 C (60 F)	Density 15.6 C (60 F) lb/gal	Approximate Freezing Point C	Freezing Point F	Boiling Point C	Boiling Point F	Viscosity cP (mPa·s) 20 C (68 F)	Sp. Heat cal/g·C (Btu/lb·F)
60 Be	77.67	1.706	14.2	-12	10	193	380	17	0.45
66 Be	93.19	1.835	15.3	-35	-31	279	535	22	0.38
96%	96	1.843	15.4	-14	6	308	586	23	0.36
98%	98	1.844	15.4	-2	29	327	621	25	0.35
99%	99	1.842	15.4	4	40	310	590	26	0.34
100%	100	1.839	15.3	11	51	274	526	28	0.34
10% oleum	102.25	1.880	15.7	0	32	173	344	31	0.33
20% oleum	104.50	1.915	16.0	-5	23	142	288	39	0.32
25% oleum	105.62	1.934	16.1	9	48	131	268	42	0.32
30% oleum	106.75	1.952	16.3	19	66	121	250	48	0.32
65% oleum	114.63	1.992	16.6	2	36	58	137	55	0.41

CHEMICAL PROPERTIES

Sulfuric Acid:

- is an active acid with a high boiling point and low degree of volatility. This makes it useful in production of lower boiling acids, pickling of metals, leaching ores, neutralization of basic materials, etc.
- in aqueous solutions, has a high primary ionization to H_30^+ and HSO_4^- ions and a smaller secondary ionization to H_30^+ and $SO_4^=$ ions. In salt formation, both sulfates and bisulfates may be obtained.
- reacts readily with iron and other metals at strengths below 75%, and hydrogen gas is evolved. At higher strengths sulfuric acid is a strong oxidizing agent and reacts with organic and inorganic reducing materials with considerable generation of heat.
- reacts with many organic compounds to form hydrolyzable sulfates. Many organic syntheses depend on formation of these intermediates.
- in its highly concentrated forms (oleums), is used in the manufacture of organic sulfonates for detergents and lubricants.
- is an excellent dehydrating agent. Its high affinity for water makes it very useful in drying other materials. (Sulfuric acid exhibits a high heat of dilution with water, and care must be taken to avoid overheating on mixing with water or aqueous solutions.)
- has special catalytic properties useful in the petroleum and petrochemical industries.

USES AND APPLICATIONS

Manufacture of:

Superphosphate fertilizers
Ammonium sulfate from by-product coke ovens
Sulfate chemicals
Mineral colors
Explosives
Inorganic acids, such as HCl and HF
Phosphates
Alum
Intermediates, dyes and other organic chemicals
Natural and synthetic elastomers
Rayon
Cellophane
Sugar
Starch
Insecticides
Lead
Zinc
Titanium pigments
Synthetic detergents and surfactants
Sulfonated oils
Bleached clays
Nitrated hydrocarbons (with strong nitric acid)

Also used in:

Dyeing, bleaching, carbonizing and mercerizing of textiles
Petroleum refining
Pickling of iron and steel

Bright dipping of nonferrous metals
Pickling and chrome tanning of leather
Sizing and parchmentizing of paper
General dehydrating operations
Refining of animal and vegetable oils
Manufacture of high octane gasoline (as catalyst)
Regeneration of ion-exchange resins
General acidifying or neutralizing operations
Batteries (as electrolyte)

SAFE HANDLING

Dilution

If sulfuric acid is to be diluted, the more concentrated solution should be added slowly to water or to the weaker solution with good agitation. This prevents localized over-heating and spattering due to heat of dilution.

Spills

Spills of acid at 100% strength or less should be flooded with large quantities of water, and the resulting solution should be neutralized with lime or soda ash prior to disposal. Oleum spills are best controlled by absorption in expanded clay, diatomaceous earth, or other non reactive absorbants. Such materials containing the absorbed acid and sulfur trioxide can then be removed from the area for subsequent burial, controlled dilution with water, or neutralized with alkali.

Spillage of sulfuric acid should be given immediate attention to avoid dangers of personnel contact, corrosion of equipment, and possible generation of hazardous gases. Dilute sulfuric acid exhibits a high rate of corrosion on steel, and spills on external tank surfaces and other equipment must be washed off immediately.

Fire and explosion hazard

In case of fire, use water, dry chemical, or carbon dioxide extinguishing methods.

Sulfuric acid is nonflammable, but it is highly reactive and capable of igniting finely divided combustible materials on contact. It reacts violently with water and organic materials with evolution of heat. It is extremely hazardous in contact with many materials, particularly carbides, chlorates, fulminates, nitrates, picrates, powdered metals, and other combustible materials. Sulfuric acid attacks many metals to release flammable hydrogen gas.

Sulfuric acid also reacts with carbonates to generate carbon dioxide gas and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide gases respectively. Thus, there is not only the danger of a violent eruption that could result in acid burns, but also the possibility of generating explosive or poisonous atmospheres which could present additional hazards. For these reasons, sulfuric acid should be used strictly in accordance with the directions of a qualified chemist.

PERSONAL SAFETY AND FIRST AID

For persons handling sulfuric acid or oleum, additional information on safety and safe handling may be found in the storage and handling bulletins prepared by Du Pont. These publications are available from any of the sales offices listed on the back page of this data sheet.

Health Hazards

Concentrated sulfuric acid and oleum are strongly acidic materials which react rapidly with water with evolution of considerable heat. These materials can rapidly dehydrate body tissues and cause severe burns. Respiratory irritation can result from inhalation of fumes or mists. Long term overexposure to vapors or mists may result in damage to teeth.

The U.S. Department of Labor has ruled that an employee's exposure to sulfuric acid mists in any 8-hour work shift of a 40-hour week not exceed a time weighted average of 1 mg/m^3 (29 CFR 1910.1000 Air Contaminants).

Safety Precautions

Do not get sulfuric acid or oleum in eyes, on skin, or on clothing. Wash thoroughly after handling. Avoid breathing vapor and use with adequate ventilation.

Personal protective equipment should be used to protect a worker whenever contact with acid could be encountered.

The minimum protection suggested for operating and maintenance personnel includes: chemical safety goggles, hard hat, safety shoes, long sleeved shirt and trousers of wool, DACRON* polyester, or ORLON* acrylic fiber. A rubber apron and rubber gloves with gauntlets long enough to cover the forearm provide additional protection when there is a possibility of body contact.

In emergencies or in performing work where there is possibility of considerable exposure, a full rubber suit with hood should be worn. Air should be supplied to the hood until absence of fumes in the work area has been established. Standby respiratory equipment should be easily accessible in all areas where sulfuric acid or oleum is handled (unloading stations, storage areas, etc.):

Safety Showers—Water should be supplied to the shower in a 2-inch line (minimum pressure 30 psig) through a quick-opening valve which will stay open. Both the valve (actuated by a handle at hip level) and a 0.25-inch weep hole directly above the valve should be located below the frost line and surrounded by crushed rock or gravel to provide drainage.

*Reg. U.S. Pat. & Tm. Off., Du Pont Company

Water Hydrant and Hose—Some means of flushing spills with large volumes of water under slight pressure should be provided.

Eye Wash Fountain—A drinking fountain or hose with a gentle flow of cool tap water are suitable means for gently flushing the eyes.

First Aid

In case of contact, *immediately* flush skin or eyes with plenty of water for at least 15-minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

Persons inhaling vapors from oleum or mists of sulfuric acid should be removed to fresh air immediately. Oxygen has been found useful in the treatment of inhalation exposures. It should be administered by a person trained in oxygen administration.

PACKAGES

Du Pont ships sulfuric acid and oleum technical in tank cars, tank trucks and barges. Grades of 98% and higher are also available in drums.

DOT Hazard Classification: Corrosive Material.

Due to changing governmental regulations, such as those of the Department of Transportation, Department of Labor, U.S. Enviromental Protection Agency and the Food and Drug Administration, references herein to governmental regulations may be superseded. The user should consult and follow the current governmental regulations, such as Hazard Classification, Labeling, Food Use Clearances, Worker Exposure Limitations and Waste Disposal Procedures for the up-to-date requirements for the products described in this literature.

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6250 Fairview Rd., P.O. Box 30517
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CHICAGO IL 60631
O'Hare Plaza, Suite 760
5725 E. River Rd.
312-635-1220

CLEVELAND OH (Suburban)
6100 Rockside Woods Boulevard
Suite 255
Independence, OH 44131-2380
216-447-0868

HOUSTON TX 77056
Suite 1620, Post Oak Tower
713-877-8859

NEW YORK NY 10118
Rm 1129, Empire State Bldg.
350 Fifth Ave.
212-971-4000

PHILADELPHIA PA (Suburban)
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Wynnewood, PA 19096
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DU PONT

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0908-3834

BETZ LABORATORIES, INC.
4636 SOMERTON ROAD, TREVOSE, PA. 19047
BETZ MATERIAL SAFETY DATA SHEET

24 HOUR EMERGENCY TELEPHONE (HEALTH OR ACCIDENT) 1-800-877-1940

REAGENT **SULFURIC ACID N/50** CODE 202 EFFECTIVE DATE 02-16-91
MASS. REG # PRINTED: 01-31-92
REVISIONS TO SECTIONS: -;EDIT APPENDIX

REAGENT APPLICATION : FIELD TEST REAGENT

-----SECTION 1----------HAZARDOUS INGREDIENTS----------

INFORMATION ON PHYSICAL HAZARDS, HEALTH HAZARDS, PEL'S AND TLV'S FOR SPECIFIC REAGENT INGREDIENTS AS REQUIRED BY THE OSHA HAZARD COMMUNICATIONS STANDARD IS LISTED. REFER TO SECTION 4 (PAGE 2) FOR OUR ASSESSMENT OF THE POTENTIAL ACUTE AND CHRONIC HAZARDS OF THIS FORMULATION. FOR MASSACHUSETTS, THE PERCENT OF HAZARDOUS INGREDIENT IN THE FORMULATION IS INDICATED BELOW.

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY OSHA REGULATIONS.

-----SECTION 2----------TYPICAL PHYSICAL DATA----------

PH: AS IS (APPROX.) 2.0	ODOR: NONE
FL.PT.(DEG.F): >200 SETA(CC)	SP.GR.(70F)OR DENSITY: 1.0
VAPOR PRESSURE(mmHG): ND	VAPOR DENSITY(AIR=1): ND
VISC cps70F: ND	%SOLUBILITY(WATER): 100
EVAP.RATE: <1 ETHER=1	APPEARANCE: COLORLESS
PHYSICAL STATE: LIQUID	FREEZE POINT(DEG.F): ND

-----SECTION 3----------REACTIVITY DATA----------

STABLE. BETZ TANK CLEAN-OUT CATEGORY 'A'

THERMAL DECOMPOSITION (DESTRUCTIVE FIRES) YIELDS ELEMENTAL OXIDES.

0908-3835

TRW-02454

REAGENT: SULFURIC ACID N/50

-----SECTION 4----------HEALTH HAZARD EFFECTS----------

ACUTE SKIN EFFECTS *** PRIMARY ROUTE OF EXPOSURE
NON-HAZARDOUS TO SKIN

ACUTE EYE EFFECTS ***
MODERATELY IRRITATING TO THE EYES

ACUTE RESPIRATORY EFFECTS ***
MISTS/AEROSOLS MAY CAUSE IRRITATION TO UPPER RESPIRATORY TRACT

CHRONIC EFFECTS OF OVEREXPOSURE***
PROLONGED OR REPEATED CONTACT MAY CAUSE PRIMARY IRRITANT DERMATITIS.

MEDICAL CONDITIONS AGGRAVATED ***
NOT KNOWN

SYMPTOMS OF EXPOSURE ***
MAY CAUSE EYE,SKIN,AND/OR RESPIRATORY TRACT IRRITATION.

-----SECTION 5----------FIRST AID INSTRUCTIONS----------

SKIN CONTACT***
REMOVE CONTAMINATED CLOTHING.WASH EXPOSED AREA WITH A LARGE QUANTITY OF SOAP SOLUTION OR WATER FOR 15 MINUTES

EYE CONTACT***
IMMEDIATELY FLUSH EYES WITH WATER FOR 15 MINUTES.IMMEDIATELY CONTACT A PHYSICIAN FOR ADDITIONAL TREATMENT

INHALATION EXPOSURE***
REMOVE VICTIM FROM CONTAMINATED AREA TO FRESH AIR.APPLY APPROPRIATE FIRST AID TREATMENT AS NECESSARY

INGESTION***
GENERAL-DO NOT FEED ANYTHING BY MOUTH TO AN UNCONSCIOUS OR CONVULSIVE VICTIM
SPECIFIC- DILUTE CONTENTS OF STOMACH.INDUCE VOMITING BY ONE OF THE STANDARD METHODS.IMMEDIATELY CONTACT A PHYSICIAN

-----SECTION 6----------SPILL,DISPOSAL AND FIRE INSTRUCTIONS---------

SPILL INSTRUCTIONS***
GENERAL-VENTILATE AREA,USE SPECIFIED PROTECTIVE EQUIPMENT.CONTAIN AND ABSORB ON ABSORBENT MATERIAL.PLACE IN WASTE DISPOSAL CONTAINER. THE WASTE CHARACTERISTICS OF THE ABSORBED MATERIAL,OR ANY CONTAMINATED SOIL,SHOULD BE DETERMINED IN ACCORDANCE WITH RCRA REGULATIONS.
SPECIFIC- FLUSH AREA WITH WATER. WET AREA MAY BE SLIPPERY. SPREAD SAND/GRIT.

DISPOSAL INSTRUCTIONS***
GENERAL-WATER CONTAMINATED WITH THIS REAGENT MAY BE SENT TO A SANITARY SEWER,IN ACCORDANCE WITH ANY LOCAL AGREEMENT,A TREATMENT FACILITY OR DISCHARGED UNDER A NPDES PERMIT
REAGENT(AS IS)- INCINERATE OR BURY IN APPROVED LANDFILL

FIRE EXTINGUISHING INSTRUCTIONS***
FIREFIGHTERS SHOULD WEAR POSITIVE PRESSURE SELF-CONTAINED BREATHING APPARATUS(FULL FACE-PIECE TYPE).PROPER FIRE EXTINGUISHING MEDIA:
DRY CHEMICAL,CARBON DIOXIDE,FOAM OR WATER

REAGENT SULFURIC ACID N/50

-----SECTION 7----------SPECIAL PROTECTIVE EQUIPMENT----------

USE PROTECTIVE EQUIPMENT IN ACCORDANCE WITH 29CFR SECTION 1910.132-134. USE RESPIRATORS WITHIN USE LIMITATIONS OR ELSE USE SUPPLIED AIR RESPIRATORS.

VENTILATION PROTECTION***

ADEQUATE VENTILATION

RECOMMENDED RESPIRATORY PROTECTION***

IF VENTILATION IS INADEQUATE OR SIGNIFICANT REAGENT EXPOSURE IS LIKELY, USE A RESPIRATOR WITH DUST/MIST FILTERS.

RECOMMENDED SKIN PROTECTION***

RUBBER GLOVES

WASH OFF AFTER EACH USE.REPLACE AS NECESSARY

RECOMMENDED EYE PROTECTION***

SPLASH PROOF CHEMICAL GOGGLES

-----SECTION 8----------STORAGE AND HANDLING PRECAUTIONS----------

STORAGE INSTRUCTIONS***

KEEP CONTAINER CLOSED WHEN NOT IN USE.

DO NOT FREEZE IF FROZEN,THAW AND MIX COMPLETELY PRIOR TO USE

HANDLING INSTRUCTIONS***

ACIDIC DO NOT MIX WITH ALKALINE MATERIAL.

****

THIS MSDS WAS WRITTEN TO COMPLY WITH THE OSHA HAZARD COMMUNICATION STANDARD

****

APPENDIX: REGULATORY INFORMATION

THE CONTENT OF THIS APPENDIX REPRESENTS INFORMATION KNOWN TO BETZ ON THE EFFECTIVE DATE OF THIS MSDS. THIS INFORMATION IS BELIEVED TO BE ACCURATE. ANY CHANGES IN REGULATIONS WILL RESULT IN UPDATED VERSIONS OF THIS DOCUMENT.

...TSCA: ALL COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

...REPORTABLE QUANTITY(RQ) FOR UNDILUTED PRODUCT:

NOT APPLICABLE

...RCRA: IF THIS PRODUCT IS DISCARDED AS A WASTE,THE RCRA HAZARDOUS WASTE IDENTIFICATION NUMBER IS: D002=CORROSIVE

...DOT HAZARD/UN#/ER GUIDE# IS: NOT APPLICABLE

...CALIFORNIA SAFE DRINKING WATER ACT (PROPOSITION 65) MATERIALS: NONE

...SARA SECTION 302 CHEMICALS: NONE

...SARA SECTION 313 CHEMICALS: NONE

...SARA SECTION 312 HAZARD CLASS: DELAYED(CHRONIC)

NFPA/HMIS : HEALTH - 1 ; FIRE - 0 ; REACTIVITY - 0 ; SPECIAL - ACID ; PE - B

CYANAMID

MATERIAL SAFETY DATA

MSDS NO. 0243-02
CAS NO. 007664-93-9
DATE: 08/06/82

PRODUCT IDENTIFICATION

TRADE NAME:	**Sulfuric Acid,60 degree Be',66 degree Be', 98-100%**
SYNONYMS:	Sulfuric acid; oil of vitriol
CHEMICAL FAMILY:	Inorganic acid
MOLECULAR FORMULA:	H2S04
MOLECULAR WGT.:	98.00

WARNING

CAUSES SEVERE BURNS OF EYES AND SKIN

HAZARDOUS INGREDIENTS

COMPONENT	CAS. NO.	%	TWA/CEILING	REFERENCE
Sulfuric acid	007664-93-9	80-100	1 mg/M3	OSHA

NFPA HAZARD RATING

Fire 0
Health 3 2 Reactivity
W
Special

FIRE: Materials that will not burn.
HEALTH: Materials which on short exposure could cause serious temporary or residual injury even though prompt medical treatment were given.
REACTIVITY: Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Also materials which may react violently with water or which may form potentially explosive mixtures with water.

HEALTH HAZARD INFORMATION

EFFECTS OF OVEREXPOSURE:

Ingestion of Sulfuric Acid can cause mucous membrane burns, abdominal pain, respiratory distress (secondary to epiglottal edema) shock, renal failure and lesions or perforations of the esophagus and gastrointestinal tract. Concentrated solutions are extremely corrosive and may cause severe skin burns. Repeated contact with dilute solutions may cause skin irritation and dermatitis. Severe damage to the eyes can occur very rapidly and concentrated solutions may cause totally irreversible damage, complete corneal opacity or perforation of the globe. Inhalation of low concentrations of vapors can cause irritation of the respiratory tract. Overexposure to higher concentrations cause bronchoconstriction and laryngeal spasm or laryngeal edema.

FIRST AID:

If Sulfuric Acid is swallowed, immediately administer large quantities of water to dilute the acid. Do not induce vomiting. Obtain medical attention without delay. In case of skin contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Refer to a physician. Do not reuse clothing without laundering. In case of eye contact, immediately irrigate with plenty of water for at least 15 minutes. Get medical attention immediately. If vapor of Sulfuric Acid is inhaled, remove to fresh air. If not breathing, give artificial respiration, preferably

EMERGENCY PHONE: 201/835-3100

mouth-to-mouth. If breathing is difficulty, give oxygen under positive pressure. Call a physician without delay.

EXPOSURE CONTROL METHODS

Utilize a closed system process where feasible. Where a closed system is not used, good enclosure and local exhaust ventilation should be provided to minimize exposure. Eyewash fountain and safety shower must be readily available in close proximity to all points of potential contact. Where concentrations are below the PEL, no respiratory protection is required. For spills or leaks, such protection may be necessary. Where exposures exceed PEL, use respirator approved by NIOSH for the material and level of exposure. See "GUIDE TO INDUSTRIAL RESPIRATORY PROTECTION" (NIOSH). Material causes eye or skin burns or severe irritation on contact. A full facepiece respirator will provide eye and face protection. Wear the following as necessary where significant skin contact could occur; impervious pants or knee high boots, rain suit, impervious gloves, hard hat and rubber foot wear. For operations where eye or face contact can occur wear respiratory protection outlined above, (full facepiece) or chemical splash proof goggles and faceshield.

A3
Cont'd

FIRE AND EXPLOSION HAZARD INFORMATION	FLASH POINT:	Not Applicable
	FLAMMABLE LIMITS (% BY VOL):	Not Applicable
	AUTOIGNITION TEMP:	Not Available
	DECOMPOSITION TEMP:	Not Available
	FIRE FIGHTING:	Sulfuric acid will not burn, but is capable of igniting finely divided combustible materials on contact. May react violently with organic materials and water with the evolution of heat. Fires involving a small amount of combustibles may be smothered by dry chemical. Use water on combustibles burning in vicinity of acid but use care as water applied to the acid results in severe generation of heat and may cause boiling and splattering. Wear self-contained, positive pressure breathing apparatus and full firefighting protective clothing. See Exposure Control Methods for special protective clothing.
REACTIVITY DATA	STABILITY:	Stable
	CONDITIONS TO AVOID:	None known
	POLYMERIZATION:	Will Not Occur
	CONDITIONS TO AVOID:	None known
	INCOMPATIBLE MATERIALS:	Water, many metals, and strong alkali materials. Contact with carbides, chlorates, fulminates, nitrates, or picrates may cause violent reaction/explosion or form unstable compounds. Contact with organic materials, particularly organic acids, acetates and anhydrides may result in highly exothermic reaction. Contact with metal may release explosive hydrogen gas. Contact with finely divided organic material may cause fire.
	HAZARDOUS DECOMPOSITION PRODUCTS:	Thermal decomposition or combustion may produce sulfur trioxide and/or sulfur dioxide. Toxic and explosive hydrogen sulfide may be formed under certain conditions.
PHYSICAL PROPERTIES	APPEARANCE AND ODOR:	Clear to slightly cloudy, oily liquid; odorless to slightly pungent odor
	BOILING POINT:	640 F (338 C)
	MELTING POINT:	Sulfuric Acid 98%: 37.4 F; 3.0 C Sulfuric Acid 100%: 51.0 F; 10.49 C
	VAPOR PRESSURE:	Variable function of temperature and concentration
	SPECIFIC GRAVITY:	1.4-1.8
	VAPOR DENSITY:	Not Available
	% VOLATILE (BY VOL):	0-20 (water by weight)
	OCTANOL/H_2O PARTITION COEF.:	Not Applicable
	pH:	Variable function of temperature and concentration; (0.01 N =2.1; 0.10 N =1.2; 1.0 N =0.3)
	SATURATION IN AIR (BY VOL):	Not Available

	EVAPORATION RATE:	Not Available
	SOLUBILITY IN WATER:	Complete

SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Where exposure level is not known, wear NIOSH approved positive pressure self-contained respirator. Where exposure level is known, wear NIOSH approved respirator suitable for level of exposure. Wear the same protective equipment as in Exposure Control Methods, except acid hood and suit should be worn when spraying or splashing can occur. Dilute spill cautiously with 5 or 6 volumes of water and neutralize gradually with soda ash or lime. Do not allow unneutralized acid to get into sewers containing sulfides, because of the danger of evolving hydrogen sulfide gas. For further information on Sulfuric Acid, consult the American Cyanamid brochure PRT 225.

WASTE DISPOSAL

Disposal must be made in accordance with applicable governmental regulations.

SPECIAL PRECAUTIONS

HANDLING AND STORAGE/OTHER:

Sulfuric acid attacks many metals, releasing flammable hydrogen gas. Extremely hazardous in contact with many materials, particularly explosives. Hydrogen gas can accumulate in metal tanks containing acid. Do not smoke or have other sources of ignition around open drums or tanks containing acid. When diluting, always add acid to water. Never add water to acid. Protect against physical damage to containers and contact with incompatible materials. Do not strike tank fitings with tools or other hard objects.

Marvin A. Friedman

Marvin A. Friedman, Ph.D., Director of Toxicology and Product Safety

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DU PONT

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

NAME
Sulfuric Acid, 77 to 100%

GRADE
60° Tech., 66° Tech.,
1.835 Electrolyte, 98% Tech.,
99% Tech., 100% Tech.

CAS REGISTRY NO.
7664-93-9

CAS NAME
Sulfuric Acid

I.D. NOS./CODES
NIOSH Registry No.: WS5600000

MANUFACTURER/DISTRIBUTOR
E. I. du Pont de Nemours & Co. (Inc.)

ADDRESS
Wilmington, DE 19898

CHEMICAL FAMILY
Mineral Acid

FORMULA
H_2SO_4

TSCA INVENTORY STATUS
Reported/Included

SARA/TITLE III STATUS
See ADDITIONAL INFORMATION and HAZARDOUS COMPONENTS sections

PRODUCT INFORMATION PHONE
(800) 441-9442

MEDICAL EMERGENCY PHONE
(800) 441-3637

TRANSPORTATION EMERGENCY PHONE
CHEMTREC (800) 424-9300

PHYSICAL DATA

BOILING POINT, 760 mmHg
193°C to 327°C (380°F to 621°F)
See page 2 for specific grades

SPECIFIC GRAVITY
1.70 to 1.85
See page 2

VAPOR DENSITY
3.4

pH INFORMATION
<1

FORM
Liquid

COLOR
Colorless to light gray

MELTING POINT
-35°C to 11°C (-31°F to 51°F)
See page 2

VAPOR PRESSURE
<0.3 mmHg at 25°C (77°F)
<0.6 mmHg at 38°C (100°F)

SOLUBILITY IN WATER
100%

EVAPORATION RATE (Butyl Acetate = 1)
<1

APPEARANCE
Oily; clear to turbid

ODOR
Odorless

H-10925 Date: 10/88

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

TRW-02461

0908-3842

PHYSICAL PROPERTIES (FROM PAGE 1)

Grade		Boiling Point °C	Boiling Point °F	Melting Point °C	Melting Point °F	Specific Gravity
60°	Technical	193	380	-12	10	1.706
66°	Technical	279	535	-35	-31	1.835
1.835	Electrolyte	279	535	-35	-31	1.835
98%	Technical	327	621	-2	29	1.844
99%	Technical	310	590	4	40	1.842
100%	Technical	274	526	11	51	1.839

HAZARDOUS COMPONENTS

MATERIAL(S)	CAS NO.			APPROXIMATE %
Sulfuric Acid*	7664-93-9	60°	Technical	77.7
		66°	Technical	93.2
		1.835	Electrolyte	93.2
		98%	Technical	98.0
		99%	Technical	99.0
		100%	Technical	100

*Regulated as a Toxic Chemical under Section 313 of Title III/SARA, and 40 CFR Part 372.

NONHAZARDOUS COMPONENT

Water	7732-18-5	0-22

HAZARDOUS REACTIVITY

INSTABILITY
Stable, but reacts violently with water and organic materials with evolution of heat.

INCOMPATIBILITY
Vigorous reactions occur with water; alkaline solutions; metals; metal powders; carbides; chlorates; fulminates; nitrates; picrates; strong oxidizing, reducing, or combustible organic materials. Hazardous gases are evolved on contact with chemicals such as cyanides, sulfides, and carbides.

DECOMPOSITION
Releases sulfur dioxide at extremely high temperatures.

POLYMERIZATION
Will not occur.

TRW-02462

0908-3843

FIRE AND EXPLOSION DATA

FLASH POINT
Will not burn.

FLAMMABLE LIMITS IN AIR, % BY VOL.
LOWER Not applicable.
UPPER Not applicable.

AUTOIGNITION TEMPERATURE
Not applicable.

AUTODECOMPOSITION TEMPERATURE
Not available.

FIRE AND EXPLOSION HAZARDS
Reacts with most metals, especially when dilute, to give flammable, potentially explosive hydrogen gas.

EXTINGUISHING MEDIA
Use media as appropriate for combustibles in area. Use water spray to cool containers exposed to fire; do not get water inside containers.

SPECIAL FIREFIGHTING INSTRUCTIONS
Evacuate personnel to a safe area. Keep personnel removed and upwind of fire. Generates heat upon addition of water, with possible spattering. Wear full protective clothing. Runoff from fire control may cause pollution. Neutralize runoff with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas. Wear self-contained breathing apparatus (SCBA) if fumes or mists are present.

HEALTH HAZARD INFORMATION

PRINCIPAL HEALTH HAZARDS (Including Significant Routes, Effects, Symptoms of Overexposure, and Medical Conditions Aggravated by Exposure)

Causes severe burns to eyes, skin and all body tissues. Inhalation of mist may cause lung damage.

Inhalation 1-hour LC_{50}: 347 ppm in rats
Oral LD_{50}: 2140 mg/kg in rats

The concentrated compound is corrosive to the skin and the eye of animals. By ingestion it is moderately toxic in animals causing corrosion of mucosal surfaces. Toxic effects described in animals from single exposures by inhalation include respiratory irritation. Animal testing indicates that this compound does not have the potential to produce carcinogenic, mutagenic, embryotoxic, or reproductive effects.

Human health effects of overexposure to the liquid by skin or eye contact may cause eye corrosion with corneal or conjunctival ulceration; or skin burns or ulceration. Ingestion of the liquid may cause severe burns to the mucous membranes of the mouth and esophagus. Repeated or prolonged contact with mists may cause eye irritation with discomfort, tearing, or blurring of vision; or skin irritation with discomfort or rash. Human health effects of overexposure by inhalation may include irritation of the upper respiratory passages or erosion of dental surfaces. Higher exposures by inhalation may lead to temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath; or possibly modest initial symptoms, followed in hours by severe shortness of breath, requiring prompt medical attention.

Although two epidemiology studies did suggest a possible association between sulfuric acid exposure and respiratory tract tumors, conclusions from these studies are very limited because of significant deficiencies. In one study for example, only a small number of workers was sampled, and there was exposure to other materials including diethyl sulfate, an IARC and NTP carcinogen. In the other study there was exposure to other acids, plus the smoking histories of the workers were ignored in the development of the study conclusion. Based on the overall weight of evidence from all human and chronic animal studies, we conclude that no causal relationship between sulfuric acid exposure and respiratory tract tumors has been shown.

Individuals with preexisting diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures.

CARCINOGENICITY

Not listed as a carcinogen by IARC, NTP, OSHA, or ACGIH.

EXPOSURE LIMITS [PEL (OSHA), TLV (ACGIH), AEL (DU PONT), ETC.]

OSHA 8-hour Time Weighted Average (TWA) and ACGIH TLV(R)-TWA are 1 mg/m^3 (ACGIH STEL = 3 mg/m^3). The Du Pont AEL 8 and 12-hour TWA is 1 mg/m^3.

SAFETY PRECAUTIONS

Do not get in eyes, on skin, on clothing.
Avoid breathing vapor or mists.
Keep containers closed.
Do not add water to contents while in container because of violent reaction.
Wash thoroughly after handling.

FIRST AID

In case of contact: immediately (within seconds) flush the skin or eyes with plenty of water (preferably cold water) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

While the patient is being transported to a medical facility, apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissues.

Note to Physician: Continued washing of the affected area with cold or iced water will be helpful in removing the last traces of sulfuric acid. Creams or ointments should not be applied before or during the washing phase of the treatment.

If inhaled: Remove to fresh air immediately and have patient lie down and remain quiet. Apply artificial respiration if breathing has stopped. Give oxygen if breathing is difficult. Call a physician.

If swallowed: Do not induce vomiting. Give large quantities of water. Call a physician. Do not give carbonates. Never give anything by mouth to an unconscious person.

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PROTECTION INFORMATION

GENERALLY APPLICABLE CONTROL MEASURES
Good general ventilation should be provided to keep vapor and mist concentrations below the exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Have available and wear as appropriate for exposure conditions when handling containers or operating equipment containing sulfuric acid: chemical splash goggles; full-length face shield/chemical splash goggle combination; acid-proof gauntlet gloves, apron, and boots; long sleeve wool, acrylic, or polyester clothing; acid-proof suit and hood; and OSHA permissible respiratory protection. In case of emergency or where there is a strong possibility of considerable exposure, wear a complete acid suit with hood, boots, and gloves. If acid vapor or mist are present and exposure limits may be exceeded, wear OSHA permissible respiratory protection.

DISPOSAL INFORMATION

AQUATIC TOXICITY
The 48-hour TLm in flounder is 100-300 ppm.

SPILL, LEAK OR RELEASE
Stop flow if possible. Review "Fire and Explosion Hazards" and "Safety Precautions" before proceeding with clean up. Use appropriate protective equipment during clean up. Soak up small spills with dry sand, clay, or diatomaceous earth. Dike large spills and cautiously dilute, neutralize with lime or soda ash, and transfer to waste water treatment system. Prevent liquid from entering sewers, waterways, or low areas. Comply with Federal, State, and local regulations on reporting releases. Superfund reportable discharge is 1000 lbs.

HE

WASTE DISPOSAL
Cleaned-up material is a RCRA Hazardous Waste. Do not flush to surface water or sanitary sewer system. Comply with Federal, State, and local regulations. If approved, neutralize and transfer to waste treatment system.

SHIPPING INFORMATION

DOT (172.101)

PROPER SHIPPING NAME
Sulfuric Acid

HAZARD CLASS
Corrosive Material

UN NO.
1830

DOT LABEL(S)
Corrosive

DOT PLACARD (TT/TC)
Corrosive

DOT/IMO (172.102)

PROPER SHIPPING NAME
Sulphuric Acid

HAZARD CLASS
Corrosive Material, 8

UN NO.
1830

PACKAGING GROUP II

TRW-02465

0908-3846

SHIPPING INFORMATION (cont'd)

REPORTABLE QUANTITY
1000 lb/454 kg

SHIPPING CONTAINERS
Tank cars, tank trucks, 55 gallon stainless steel drums.

ADDITIONAL INFORMATION AND REFERENCES

STORAGE CONDITIONS
Keep out of sun and away from heat, sparks, and flame. Keep container tightly closed and (drum) closure up to prevent leakage. Loosen closure carefully. Relieve internal pressure when received and at least weekly thereafter. Do not use pressure to empty. Be sure closure is securely fastened before moving container. Do not wash out container or use it for other purposes; replace closure after each withdrawal and return it with empty container.

NPCA - HMIS RATINGS

Health (Acute)	3
Flammability	0
Reactivity	2
Personal Protection	-

NFPA RATINGS

Health	3
Flammability	0
Reactivity	2
Unusual Hazards	W

Personal Protection rating to be supplied by user depending on use conditions.

SARA/TITLE III HAZARD CATEGORIES AND LISTS

Product Hazard Categories:

Chronic Health	- Yes
Acute Health	- Yes
Fire Hazard	- No
Pressure Hazard	- No
Reactivity Hazard	- Yes

Lists:

Extremely Hazardous Substance	- Yes
CERCLA Hazardous Substance	- Yes
Toxic Chemical	- Yes

For further information, see Du Pont Sulfuric Acid "Storage and Handling Bulletin."

DATE OF LATEST REVISION/REVIEW: 10/88

PERSON RESPONSIBLE FOR MSDS:
J. C. WATTS
Du Pont Co.
Chemicals & Pigments Department
Chestnut Run Plaza
P.O. Box 80709
Wilmington, DE 19880-0709
(302) 999-4946

118547C

TRW-02466

DU PONT
REG. U.S. PAT. & TM. OFF.

0908-3847

Sulfuric Acid Reagent

MSDS Sheets

AXTON-CROSS COMPANY

P. O. BOX 6529 INDUSTRIAL CHEMICALS 508-429-6766

CROSS STREET
HOLLISTON, MASSACHUSETTS 01746

31 JAN 1992

Trw Fastener Div.
265 Third St
Cambridge, MA 02142

Dear Sir/Madam:

Enclosed are the following Material Safety Data Sheets:

PRODUCT		REQUESTED BY
83347	SULFURIC ACID [redacted]	MR. ELLERY CADELL

If you are not directly responsible for the distribution of these M.S.D.S.'s or the information they contain, please forward them to the appropriate person.

Sincerely,

Axton Cross

TRW-02467

0908-3848

DEC 13 1991

DU PONT

MSDS MATERIAL SAFETY DATA SHEET

Du Pont Chemicals

4950CR | Revised 15-Aug-91 | Printed 16-Oct-91

Sulfuric Acid, 77 to 100%

MATERIAL IDENTIFICATION

Corporate Number	DU000051	
Manufacturer/Distributor	Du Pont 1007 Market Street Wilmington, DE 19898	DISTRIBUTED BY AXTON CROSS
Phone Numbers	Product Information Transport Emergency Medical Emergency	1-800-441-9442 CHEMTREC: 1-800-424-9300 1-800-441-3637
Grade	77 to 100 % TECHNICAL	
Chemical Family	MINERAL ACID	
CAS Name	SULFURIC ACID	
CAS Number	7664-93-9	
Formula	H2SO4	
Molecular Weight	98.08	
TSCA Inventory Status	Reported/Included	
NFPA Ratings	Health: 3 Flammability: 0 Reactivity: 2 Water Reactive	
NPCA-HMIS Ratings	Health: 3 Flammability: 0 Reactivity: 2 Personal Protection rating to be supplied by user depending on use conditions.	

COMPONENTS

Material	CAS Number	Percent
*SULFURIC ACID	7664-93-9	

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0908-3849

ENVIR. DEPT
RECEIVED
JUN - 1 1992
FROM Purch
DEI

TRW-02468

Printed on Recycled Paper

COMPONENTS (continued)

60 DEG TECHNICAL		77.7
66 DEG TECHNICAL		93.2
1.835 ELECTROLYTE		93.2
98% TECHNICAL		98
99% TECHNICAL		99
100% TECHNICAL		100
WATER	7732-18-5	0-22

* Regulated as a Toxic Chemical under Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR part 372.

PHYSICAL DATA

Boiling Point	193 to 327°C (380 to 621°F) at 760 mm Hg.
Vapor Pressure	<0.3 mm Hg at 25°C (77°F) <0.6 mm Hg at 38°C (100°F)
Vapor Density	3.4
Melting Point	-35 to 11°C (-31 to 51°F)
Evaporation Rate	Less than 1
Water Solubility	100 WT %
pH	Less than 1
Odor	Odorless
Form	Oily; clear to turbid liquid
Color	Colorless to light gray

GRADE	BOILING PT. DEG C	BOILING PT. DEG F	MELTING PT. DEG C	MELTING PT. DEG F	SPECIFIC GRAVITY
60 DEG TECHNICAL	193	380	-12	10	1.706
66 DEG TECHNICAL	279	535	-35	-31	1.835
1.835 ELECTROLYTE	279	535	-35	-31	1.835
98% TECHNICAL	327	621	-2	29	1.844
99% TECHNICAL	310	590	4	40	1.842
100% TECHNICAL	274	526	11	51	1.839

(continued)

HAZARDOUS REACTIVITY

Instability	Stable, but reacts violently with water and organic materials with evolution of heat.
Decomposition	Releases sulfur dioxide at extremely high temperatures.
Polymerization	Polymerization will not occur.

Incompatibility : Vigorous reactions with water; alkaline solutions; metals, metal powder; carbides; chlorates; fuminates; nitrates; picrates; strong oxidizing, reducing, or combustible organic materials. Hazardous gases are evolved on contact with chemicals such as cyanides, sulfides, and carbides.

FIRE AND EXPLOSION DATA

Flash Point	Will not burn
Fire and Explosion Hazards	Reacts with most metals, especially when dilute, to give flammable, potentially explosive hydrogen gas. Follow appropriate National Fire Protection Association (NFPA) codes.
Extinguishing Media	Use media appropriate for surrounding material. Use water spray to cool containers exposed to fire; do not get water inside containers.
Special Fire Fighting Instructions	Evacuate personnel to a safe area. Keep personnel removed and upwind of fire. Generates heat upon addition of water, with possible spattering. Wear full protective clothing. Runoff from fire control may cause pollution. Neutralize run-off with lime, soda ash, etc., to prevent corrosion of metals and formation of hydrogen gas. Wear self-contained breathing apparatus if fumes or mists are present.

HEALTH HAZARD INFORMATION

Causes severe burns to eyes, skin, and all body tissue. Eye damage may be permanent. Destruction of tissue may result from direct chemical reaction with tissue, from thermal burns, and from dehydration (removal of water) of the tissue.

ANIMAL DATA:

Inhalation 1-hour LC50: 347 ppm in rats
Oral LD50 : 2140 mg/kg in rats

The concentrated compound is corrosive to the skin and eyes of animals. By ingestion it is moderately toxic in animals causing corrosion of mucosal surfaces. Toxic effects described in animals from single exposures by inhalation include respiratory irritation. Animal testing indicates that this compound does not have carcinogenic, mutagenic,

(continued)

0908-3851 TRW-02470

embryotoxic, or reproductive effects.

HUMAN HEALTH EFFECTS:

Human health effects of overexposure to the liquid by skin or eye contact may cause eye corrosion with corneal or conjunctival ulceration; or skin burns or ulceration. Ingestion of the liquid may cause severe burns to the mucous membranes of the mouth and esophagus. Repeated or prolonged contact with mists may cause eye irritation with discomfort, tearing or blurring of vision; or skin irritation with discomfort or rash. Human health effects of overexposure by inhalation may include irritation of the upper respiratory passages; or erosion of dental surfaces. Higher exposures by inhalation may lead to temporary lung irritation effects with cough, discomfort, difficulty breathing, or shortness of breath; or possibly modest initial symptoms followed in hours by severe shortness of breath, requiring prompt medical attention.

Although two epidemiology studies did suggest a possible association between sulfuric acid exposure and respiratory tract tumors, conclusions from these studies are very limited because of significant deficiencies. In one study, for example, only a small number of workers were sampled, and there was exposure to other materials including diethyl sulfate, an IARC and NTP carcinogen. In the other study there was exposure to other acids, plus the smoking histories of the workers were ignored in the development of the study conclusion. Based on the overall weight of evidence from all human and chronic animal studies, we conclude that no causal relationship between sulfuric acid exposure and respiratory tract tumors has been shown.

Individuals with preexisting diseases of the lungs may have increased susceptibility to the toxicity of excessive exposures.

Carcinogenicity	None of the components in this material is listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.
Exposure Limits	
Sulfuric Acid, 77 to 100%	
AEL * (Du Pont)	1 mg/m3 - 8 & 12 Hr. TWA
TLV (ACGIH)	1 mg/m3 - 8 Hr TWA STEL: 3 mg/m3
PEL (OSHA)	1 mg/m3 - 8 Hr TWA

* AEL is Du Pont's Acceptable Exposure Limit. Where governmentally imposed occupational exposure limits which are lower than the AEL are in effect, such limits shall take precedence.

Safety Precautions	Avoid breathing vapors or mist. Do not get in eyes, on skin, or on clothing. Wash thoroughly after handling. Keep containers closed. Do not add water to contents while in container because of violent reaction.

(continued)

FIRST AID

INHALATION
If inhaled, remove to fresh air immediately and have patient lie down and remain quiet. Apply artificial respiration if breathing has stopped. Give oxygen if breathing is difficult. Call a physician.

INGESTION
If swallowed, do not induce vomiting. Give large quantities of water. Call a physician. Do not neutralize the acid. Never give anything by mouth to an unconscious person.

SKIN OR EYE CONTACT
In case of contact, immediately (within seconds) flush eyes or skin with plenty of water (preferably cold water) for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

While the patient is being transported to a medical facility apply compresses of iced water. If medical treatment must be delayed, immerse the affected area in iced water. If immersion is not practical, compresses of iced water can be applied. Avoid freezing tissues.

Notes to Physician	Continued washing of the affected area with cold or iced water will be helpful in removing the last traces of sulfuric acid. Creams or ointments should not be applied before or during the washing phase of the treatment.

PROTECTION INFORMATION

Generally Applicable Control Measures and Precautions	Good general ventilation should be provided to keep vapor and mist concentrations below the exposure limits.
Personal Protective Equipment	Have available and wear as appropriate for exposure conditions when handling containers or operating equipment containing sulfuric acid: chemical splash goggles; full-length face shield/chemical splash goggle combination; acid-proof gauntlet gloves, apron, and boots; long sleeve wool, acrylic, or polyester clothing; acid proof suit and hood; and appropriate NIOSH/MSHA respiratory protection. In case of emergency or where there is a strong possibility of considerable exposure, wear a complete acid suit with hood, boots, and gloves. If acid vapor or mist are present and exposure limits may be exceeded, wear appropriate NOISH/MSHA respiratory protection.

DISPOSAL INFORMATION

Aquatic Toxicity	The 48-hour TLm in flounder is 100-300 ppm.

(continued)

DISPOSAL INFORMATION (continued)

Spill, Leak, or Release	NOTE: Review FIRE AND EXPLOSION HAZARDS and SAFETY PRECAUTIONS before proceeding with clean up. Use appropriate PERSONAL PROTECTIVE EQUIPMENT during clean up. Superfund reportable discharge = 1000 lbs. Stop flow if possible. Review "Fire and Explosion Hazards" and "Safety Precautions" before proceeding with clean up. Use appropriate protective equipment during clean up. Soak up small spills with dry sand, clay or diatomaceous earth. Dike large spills, and cautiously dilute and neutralize with lime or soda ash, and transfer to waste water treatment system. Prevent liquid from entering sewers, waterways, or low areas. Comply with Federal, State, and local regulations on reporting releases. The EPA reportable discharge is 1000 lbs.
Waste Disposal	Cleaned-up material may be a RCRA Hazardous Waste on disposal. Do not flush to surface water or sanitary sewer system. Comply with Federal, State, and local regulations. If approved, neutralize and transfer to waste treatment system.

SHIPPING INFORMATION

DOT	
Proper Shipping Name	SULFURIC ACID*
Hazard Class	CORROSIVE MATERIAL
UN/NA No.	UN 1830
DOT Labels(s)	CORROSIVE
DOT Placard	CORROSIVE
DOT/IMO	
Proper Shipping Name	SULPHURIC ACID
Hazard Class	CORROSIVE MATERIAL, 8
UN No.	1830
Special Information	IMO LABEL: CORROSIVE
Packaging Group	II
Reportable Quantity	1000 lbs.
Shipping Containers	Tank Car Tank Truck Steel Drums - 55-gallon stainless steel *If material is shipped in quantities greater than 1000 lbs. per container, the Proper Shipping Name is RQ SULFURIC ACID.

(continued)

STORAGE CONDITIONS

Keep out of sun and away from heat, sparks, and flame. Keep container tightly closed and (drum) closure up to prevent leakage. Loosen closure carefully. Relieve internal pressure when received and at least weekly thereafter. Do not use pressure to empty. Be sure closure is securely fastened before moving container. Do not wash out container or use it for other purposes; replace closure after each withdrawal and return it with empty container.

TITLE III HAZARD CLASSIFICATIONS

Acute	Yes
Chronic	Yes
Fire	No
Reactivity	Yes
Pressure	No

LISTS:

Extremely Hazardous Substance	-Yes
CERCLA Hazardous Substance	-Yes
Toxic Chemical	-Yes

ADDITIONAL INFORMATION AND REFERENCES

For further information, see Du Pont Sulfuric Acid "Storage and Handling Bulletin".

The data in this Material Safety Data Sheet relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Responsibility for MSDS:

W. J. Brock
Du Pont Chemicals
P. O. Box 80709, Chestnut Run
Wilmington, DE 19880-0709
302-999-4946

# indicates updated section.

End of MSDS

0908-3855

Lab

[redacted]

M A T E R I A L S A F E T Y D A T A S H E E T

[redacted]

CHEMTREC # (800) 424-9300 -- NATIONAL RESPONSE CENTER # (800) 424-8802

EFFECTIVE: 05/01/89 ISSUED: 05/17/89

J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: [redacted]S
COMMON SYNONYMS: N/A
CHEMICAL FAMILY: VOLUMETRIC SOLUTIONS AND CONCENTRATES
FORMULA: H2SO4 IN H2O
FORMULA WT.: 98.08
CAS NO.: 7664-93-9
NIOSH/RTECS NO.: WS5600000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 5642,5641

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	3	SEVERE (CORROSIVE)

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

DANGER

CAUSES BURNS. HARMFUL IF SWALLOWED OR INHALED.
DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF SPILL, NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SULFURIC ACID	7664-93-9	0.1-5	1 MG/M3	1 MG/M3
WATER	7732-18-5	>95	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: N/A

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: N/A (H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: >95 (21 C)

pH: 1.0 (0.1M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. ODORLESS.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

NFPA 704M RATING: 3-0-2

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINGUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

UNUSUAL FIRE & EXPLOSION HAZARDS
REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR.

TOXIC GASES PRODUCED
SULFUR DIOXIDE, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1 MG/M3

LV IS FOR SULFURIC ACID.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3

PEL IS FOR SULFURIC ACID.

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR SULFURIC ACID	2140	MG/KG
INHALATION-2HR MOUSE LC50 FOR SULFURIC ACID	320	MG/M3
INHALATION-2HR RAT LC50 FOR SULFURIC ACID	510	MG/M3
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: SEVERE IRRITATION OR BURNS OF RESPIRATORY SYSTEM, PULMONARY EDEMA, LUNG INFLAMMATION

SKIN CONTACT: SEVERE IRRITATION OR BURNS

EYE CONTACT: SEVERE IRRITATION OR BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NAUSEA, VOMITING, SEVERE BURNS TO MOUTH, THROAT, AND STOMACH, KIDNEY DISFUNCTION

CHRONIC EFFECTS: LUNG DAMAGE

TARGET ORGANS
RESPIRATORY SYSTEM, LUNGS, EYES, SKIN, TEETH, KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
RESPIRATORY SYSTEM DISEASE

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFUR ACID (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFURIC ACID (RQ = 1000 LBS)
TOXIC CHEMICALS:	YES	CONTAINS SULFURIC ACID
GENERIC CLASS:		C16
TSCA INVENTORY:	YES	

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

INCOMPATIBLES: MOST COMMON METALS, STRONG REDUCING AGENTS, STRONG BASES, CARBONATES, SULFIDES, CYANIDES, STRONG OXIDIZING AGENTS, ORGANIC MATERIALS, COMBUSTIBLE MATERIALS, CARBIDES

DECOMPOSITION PRODUCTS: OXIDES OF SULFUR, HYDROGEN

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR TEAM# "LOW NA+" ACID NEUTRALIZERS ARE RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

CONTINUED ON PAGE: 6

SECTION VII - SPILL & DISPOSAL PROCEDURES (CONTINUED)

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES AND FACE SHIELD, UNIFORM, PROTECTIVE SUIT, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: WHITE (CORROSIVE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. STORE IN CORROSION-PROOF AREA. ISOLATE FROM INCOMPATIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: SULFURIC ACID, SOLUTION
HAZARD CLASS: CORROSIVE MATERIAL (LIQUID)
UN/NA: UN1830 REPORTABLE QUANTITY: 1000 LBS.
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.272

CONTINUED ON PAGE: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: SULPHURIC ACID, LESS THAN 51% ACID
HAZARD CLASS: 8 I.M.O. PAGE: 8220
UN: UN1830 MARINE POLLUTANTS: NO PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.102; PART 176; IMO

AIR (I.C.A.O.)

PROPER SHIPPING NAME: SULPHURIC ACID, LESS THAN 51% ACID
HAZARD CLASS: 8
UN: UN1830 PACKAGING GROUP: II
LABELS: CORROSIVE
REGULATORY REFERENCES: 49CFR 172.101; 173.6; PART 175; ICAO/IATA

U.S. CUSTOMS HARMONIZATION NUMBER: 28070000001

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

THE INFORMATION IN THIS MATERIAL SAFETY DATA SHEET MEETS THE REQUIREMENTS OF THE UNITED STATES OCCUPATIONAL SAFETY AND HEALTH ACT AND REGULATIONS PROMULGATED THEREUNDER (29 CFR 1910.1200 ET. SEQ.) AND THE CANADIAN WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. THIS DOCUMENT IS INTENDED ONLY AS A GUIDE TO THE APPROPRIATE PRECAUTIONARY HANDLING OF THE MATERIAL BY A PERSON TRAINED IN, OR SUPERVISED BY A PERSON TRAINED IN, CHEMICAL HANDLING. THE USER IS RESPONSIBLE FOR DETERMINING THE PRECAUTIONS AND DANGERS OF THIS CHEMICAL FOR HIS OR HER PARTICULAR APPLICATION. DEPENDING ON USAGE, PROTECTIVE CLOTHING INCLUDING EYE AND FACE GUARDS AND RESPIRATORS MUST BE USED TO AVOID CONTACT WITH MATERIAL OR BREATHING CHEMICAL VAPORS/FUMES.
EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND

CONTINUED ON PAGE: 8

==========

EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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APPROVED BY QUALITY ASSURANCE DEPARTMENT.

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J.T.BAKER INC., 222 RED SCHOOL LANE, PHILLIPSBURG, NJ 08865

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME: SULFURIC ACID, VOLUMETRIC SOLUTION
COMMON SYNONYMS: N/A
CHEMICAL FAMILY: VOLUMETRIC SOLUTIONS AND CONCENTRATES
FORMULA: H_2SO_4 IN H_2O
FORMULA WT.: 98.08
CAS NO.: 7664-93-9
NIOSH/RTECS NO.: WS5600000
PRODUCT USE: LABORATORY REAGENT
PRODUCT CODES: 5693,5690,5692,5641,5642

PRECAUTIONARY LABELING

BAKER SAF-T-DATA* SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	0	NONE
REACTIVITY	-	1	SLIGHT
CONTACT	-	2	MODERATE

LABORATORY PROTECTIVE EQUIPMENT

GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES

U.S. PRECAUTIONARY LABELING

WARNING

CAUSES IRRITATION. MAY CAUSE BURNS. HARMFUL IF SWALLOWED OR INHALED. DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTE HANDLING. IN CASE OF SPILL, NEUTRALIZE WITH SODA ASH OR LIME AND PLACE IN DRY CONTAINER.

INTERNATIONAL LABELING

AVOID CONTACT WITH EYES. AFTER CONTACT WITH SKIN, WASH IMMEDIATELY WITH PLENTY OF WATER. KEEP CONTAINER TIGHTLY CLOSED.

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

CONTINUED ON PAGE: 2

SECTION II - COMPONENTS

COMPONENT	CAS NO.	WEIGHT %	OSHA/PEL	ACGIH/TLV
SULFURIC ACID	7664-93-9	0.1-5	1 MG/M3	1 MG/M3
WATER	7732-18-5	>95	N/E	N/E

SECTION III - PHYSICAL DATA

BOILING POINT: N/A

VAPOR PRESSURE (MMHG): N/A

MELTING POINT: N/A

VAPOR DENSITY (AIR=1): N/A

SPECIFIC GRAVITY: N/A
(H2O=1)

EVAPORATION RATE: N/A

SOLUBILITY(H2O): COMPLETE (100%)

% VOLATILES BY VOLUME: >95
(21 C)

pH: 1.0 (0.05M SOLUTION)

ODOR THRESHOLD (P.P.M.): N/A

PHYSICAL STATE: LIQUID

COEFFICIENT WATER/OIL DISTRIBUTION: N/A

APPEARANCE & ODOR: CLEAR, COLORLESS LIQUID. ODORLESS.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP): N/A

AUTOIGNITION TEMPERATURE: N/A

FLAMMABLE LIMITS: UPPER - N/A LOWER - N/A

FIRE EXTINQUISHING MEDIA
USE EXTINGUISHING MEDIA APPROPRIATE FOR SURROUNDING FIRE.

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE.

CONTINUED ON PAGE: 3

SECTION IV - FIRE AND EXPLOSION HAZARD DATA (CONTINUED)

UNUSUAL FIRE & EXPLOSION HAZARDS
REACTS WITH MOST METALS TO PRODUCE HYDROGEN GAS, WHICH CAN FORM AN EXPLOSIVE MIXTURE WITH AIR.

TOXIC GASES PRODUCED
SULFUR DIOXIDE, HYDROGEN

EXPLOSION DATA-SENSITIVITY TO MECHANICAL IMPACT
NONE IDENTIFIED.

EXPLOSION DATA-SENSITIVITY TO STATIC DISCHARGE
NONE IDENTIFIED.

SECTION V - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 1 MG/M3

/ IS FOR SULFURIC ACID.

SHORT-TERM EXPOSURE LIMIT (STEL): NOT ESTABLISHED

PERMISSIBLE EXPOSURE LIMIT (PEL): 1 MG/M3

PEL IS FOR SULFURIC ACID.

TOXICITY OF COMPONENTS

ORAL RAT LD50 FOR SULFURIC ACID	2140	MG/KG
INHALATION-2HR MOUSE LC50 FOR SULFURIC ACID	320	MG/M3
INHALATION-2HR RAT LC50 FOR SULFURIC ACID	510	MG/M3
INTRAPERITONEAL MOUSE LD50 FOR WATER	190	G/KG
INTRAVENOUS MOUSE LD50 FOR WATER	25	G/KG

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

CARCINOGENICITY
NONE IDENTIFIED.

REPRODUCTIVE EFFECTS
NONE IDENTIFIED.

CONTINUED ON PAGE: 4

SECTION V - HEALTH HAZARD DATA (CONTINUED)

EFFECTS OF OVEREXPOSURE

INHALATION: SEVERE IRRITATION OR BURNS OF RESPIRATORY SYSTEM, PULMONARY EDEMA, LUNG INFLAMMATION

SKIN CONTACT: SEVERE IRRITATION OR BURNS

EYE CONTACT: SEVERE IRRITATION OR BURNS

SKIN ABSORPTION: NONE IDENTIFIED

INGESTION: NAUSEA, VOMITING, BURNS TO MOUTH, THROAT, AND STOMACH, KIDNEY DISFUNCTION

CHRONIC EFFECTS: LUNG DAMAGE

TARGET ORGANS
RESPIRATORY SYSTEM, LUNGS, EYES, SKIN, TEETH, KIDNEYS

JICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
RESPIRATORY SYSTEM DISEASE

PRIMARY ROUTES OF ENTRY
INHALATION, INGESTION, EYE CONTACT, SKIN CONTACT

EMERGENCY AND FIRST AID PROCEDURES

INGESTION: CALL A PHYSICIAN. IF SWALLOWED, DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE LARGE AMOUNTS OF WATER.

INHALATION: IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.

SKIN CONTACT: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. WASH CLOTHING BEFORE RE-USE.

EYE CONTACT: IN CASE OF EYE CONTACT, IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

CONTINUED ON PAGE: 5

SECTION V - HEALTH HAZARD DATA (CONTINUED)

SARA/TITLE III HAZARD CATEGORIES AND LISTS

ACUTE: YES CHRONIC: YES FLAMMABILITY: NO PRESSURE: NO REACTIVITY: NO

EXTREMELY HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFUR ACID (RQ = 1,000 LBS, TPQ = 1,000 LBS)
CERCLA HAZARDOUS SUBSTANCE:	YES	CONTAINS SULFURIC ACID (RQ = 1000 LBS)
SARA 313 TOXIC CHEMICALS:	YES	CONTAINS SULFURIC ACID
GENERIC CLASS:		C16
TSCA INVENTORY:	YES	

SECTION VI - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: NONE DOCUMENTED

INCOMPATIBLES: MOST COMMON METALS, STRONG REDUCING AGENTS, STRONG BASES, CARBONATES, SULFIDES, CYANIDES, STRONG OXIDIZING AGENTS, ORGANIC MATERIALS, COMBUSTIBLE MATERIALS, CARBIDES

DECOMPOSITION PRODUCTS: OXIDES OF SULFUR, HYDROGEN

SECTION VII - SPILL & DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. VENTILATE AREA. NEUTRALIZE SPILL WITH SODA ASH OR LIME. WITH CLEAN SHOVEL, CAREFULLY PLACE MATERIAL INTO CLEAN, DRY CONTAINER AND COVER; REMOVE FROM AREA. FLUSH SPILL AREA WITH WATER.

J. T. BAKER NEUTRASORB(R) OR TEAM(R) 'LOW NA+' ACID NEUTRALIZERS ARE FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

CONTINUED ON PAGE: 6

SECTION VII - SPILL & DISPOSAL PROCEDURES (CONTINUED)

EPA HAZARDOUS WASTE NUMBER: D002 (CORROSIVE WASTE)

SECTION VIII - INDUSTRIAL PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. IF AIRBORNE CONCENTRATION EXCEEDS TLV, A SELF-CONTAINED BREATHING APPARATUS IS ADVISED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NEOPRENE GLOVES ARE RECOMMENDED.

SECTION IX - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA* STORAGE COLOR CODE: ORANGE (GENERAL STORAGE)

STORAGE REQUIREMENTS
KEEP CONTAINER TIGHTLY CLOSED. SUITABLE FOR ANY GENERAL CHEMICAL STORAGE AREA. ISOLATE FROM INCOMPATIBLE MATERIALS.

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
REPORTABLE QUANTITY: 1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)
MARINE POLLUTANTS: NO

CONTINUED ON PAGE: 7

SECTION X - TRANSPORTATION DATA AND ADDITIONAL INFORMATION (CONTINUED)

AIR (I.C.A.O.)

PROPER SHIPPING NAME: CHEMICALS, N.O.S. (NON-REGULATED)

U.S. CUSTOMS HARMONIZATION NUMBER: 2807000001

N/A = NOT APPLICABLE OR NOT AVAILABLE
N/E = NOT ESTABLISHED

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EXPOSURE TO THIS PRODUCT MAY HAVE SERIOUS ADVERSE HEALTH EFFECTS. THIS CHEMICAL MAY INTERACT WITH OTHER SUBSTANCES. SINCE THE POTENTIAL USES ARE SO VARIED, BAKER CANNOT WARN OF ALL OF THE POTENTIAL DANGERS OF USE OR INTERACTION WITH OTHER CHEMICALS OR MATERIALS. BAKER WARRANTS THAT THE CHEMICAL MEETS THE SPECIFICATIONS SET FORTH ON THE LABEL.
BAKER DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
THE USER SHOULD RECOGNIZE THAT THIS PRODUCT CAN CAUSE SEVERE INJURY AND EVEN DEATH, ESPECIALLY IF IMPROPERLY HANDLED OR THE KNOWN DANGERS OF USE ARE NOT HEEDED. READ ALL PRECAUTIONARY INFORMATION. AS NEW DOCUMENTED GENERAL SAFETY INFORMATION BECOMES AVAILABLE, BAKER WILL PERIODICALLY REVISE THIS MATERIAL SAFETY DATA SHEET. IF YOU HAVE ANY QUESTIONS, PLEASE CALL CUSTOMER SERVICE (1-800-JTBAKER) FOR ASSISTANCE.

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APPROVED BY QUALITY ASSURANCE DEPARTMENT.

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Material Safety Data Bulletin

ISSUED BY
SUNNEN PRODUCTS COMPANY
7910 MANCHESTER AVENUE
ST LOUIS, MISSOURI 63143

Product Identification

MANUFACTURER SUNNEN PRODUCTS COMPANY	EMERGENCY TELEPHONE NUMBER Day/781-2100 Night/same
ADDRESS (NUMBER AND STREET) 7910 MANCHESTER ROAD	
CITY, STATE AND ZIP CODE ST. LOUIS, MISSOURI 63143	
CHEMICAL NAMES AND SYNONYMS	OTHER TRADE NAMES (AND SYNONYMS) SUNNEN MB-30 HONING OIL
CHEMICAL FAMILY REFINED PETROLEUM AND ANIMAL FATS	DESCRIPTIVE FORMULA

Chemical and Physical Properties

APPEARANCE DARK BROWN MOBILE LIQUID	VISCOSITY @ 100°F, SUS 105
SPECIFIC GRAVITY 0.90	VISCOSITY @ 210°F, SUS
BOILING POINT, °F 260°C-327°C with Oxidative Decomposition	SOLUBILITY: Negligible pH: NA
VAPOR PRESSURE, mm Hg NIL @ 20°C	

Hazardous Ingredients (from Tables 2-1, Z2 and Z3, 29 C.F.R. 1910.1000)

NAME	% BY WT.	THRESHOLD LIMIT VALUE (TLV)	
		ppm	mg/m³
None			

We believe all information given in this form is accurate and is offered in good faith, but without guarantee. Since conditions of use and suitability of this product for particular uses are beyond our control, all risks of use of the product covered herein are assumed by the user and we EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE AND SUITABILITY OF THE PRODUCT COVERED IN THIS FORM. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending license under valid patents.

Other Ingredients

NAME	% BY WT.	THRESHOLD LIMIT VALUE (TLV)	
		ppm	mg/m³
Petroleum oil (C.A.S. 8002-05-09)	58.9	1000*	5
Lard Oil (C.A.S. 8016-28-2)	16.0		
Sulfurized Lard Oil (C.A.S.61790-49-6)	25.0		
Benzotriazole (C.A.S. 95-14-7)	0.1		
Same as for mineral oil mists			

Fire and Explosion Hazard

FLASH POINT (METHOD USED)	FLAMMABLE LIMITS ▶	LEL	UEL
57°C (C.O.C.)		40	80

EXTINGUISHING MEDIA

CO_2, Foam, Dry Chemical

SPECIAL FIRE FIGHTING PROCEDURE

Same as for petroleum. Burns to form SO_2.

UNUSUAL FIRE AND EXPLOSION HAZARDS

None

Health Hazard Data

THRESHOLD LIMIT VALUE (NOT REQUIRED FOR MIXTURES)

N.A.

EFFECTS OF OVEREXPOSURE

Unknown. Product toxicity is very low and overexposure is not expected to be a problem. Possible oil dermititis in sensitive individuals.

Emergency First Aid Procedures

EYE CONTACT

Flush immediately with water. Seek medical attention promptly following exposure.

SKIN CONTACT

Wash contact areas with soap and water

TRW-02491

INHALATION

Remove from further exposure. If unconsciousness occurs, seek immediate medical assistance and call a physician. If breathing has stopped, begin mouth to mouth resuscitation

Emergency and First Aid Procedures (continued)

INGESTION

Contact poison control center. Consult physician prior to inducing vomiting. Since product is of low toxicity, emesis should not be induced unless large quantities (1 pint or 1/2 liter for an adult) are ingested and then under guidance of a physician.

Reactivity Data

STABILITY (THERMAL, LIGHT, ETC.)

	CONDITIONS TO AVOID
☒ STABLE ☐ UNSTABLE	Strong oxidizing conditions

INCOMPATIBILITY (MATERIALS TO AVOID)

Strong oxidizers

HAZARDOUS DECOMPOSITION PRODUCTS

SO_2, CO

HAZARDOUS POLYMERIZATION

	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	

Special Protection Information

EYE PROTECTION

No special protection required. Use of safety glasses is recommended.

SKIN PROTECTION

No special protection; however, good personal hygiene practices should always be followed

RESPIRATORY PROTECTION

No special requirements under ordinary conditions of use

VENTILATION

No special requirements. Use with normal, adequate ventilation

OTHER

Special Precautions

HANDLING AND STORING

Drums stored out-of-doors should be tipped so as to shed water.
Drums should be heated to at least 10°C (50°F) prior to transfer of contents.
Contents may separate upon exposure to cold (<10°C).

oxicological Data

CUTE

AL TOXICITY

LD_{50}- > 5.0 grams/kg body weight (rats)

RMAL TOXICITY

LD_{50}- N.A.

ALATION TOXICITY

LC_{50}- N.A.

YE IRRITATION

Non-irritating per 16 C.F.R. 1500.42. No corneal opacity, iritis or moderate conjunctival irritation scored by Draize technique at 1,2,3 days. (rabbits)

KIN IRRITATION

Non-irritating per 16 C.F.R. 1500.3(c)(4). Primary irritation index <2 (albino rabbit)

ORMATION SUPPLIED BY Jim Helm

E Manager, Materials Research DATE 7/1/82

SUNNEN

ROGERS HOOPER
FIELD SERVICE ENGINEER

SUNNEN PRODUCTS COMPANY
7910 MANCHESTER AVE. · ST. LOUIS, MO. 63143
ST. LOUIS (314) 781-2100
BOSTON ANSWERING SERVICE (617) 267-4656

TELEPHONE: 781-2100
AREA CODE 314

RECEIVED
JUL 29 1985
CAMBRIDGE OPERATIONS

SUNNEN® PRODUCTS COMPANY
Industrial Honing Machines · Automotive Shop Equipment
7910 MANCHESTER AVENUE, ST. LOUIS, MISSOURI 63143

July 24, 1985

Mr. Dennis F. Borsuk
Enviornmental Manager
Fasteners Division
T R W Assemblies & Fasteners
31 Ames Street
Cambridge, Massachusetts 02142

Dear Mr. Borsuk:

Thank you for your recent letter. As requested, we are pleased to send you a Material Safety Data Sheet on our MB-30 Honing Oil.

If you have any questions, please don't hesitate to contact our Field Engineer for your area, Rogers Hooper, or me. Rogers' card is attached for your convenience.

Sincerely,

Tom Hawkins

Tom Hawkins
Industrial Division

TH/kg
Enclosures
#10

PRODUCT #CE-1671

MATERIAL SAFETY DATA SHEET

(Approved by U. S. Department of Labor "Essentially Similar" to Form OSHA-20)

1. Manufacturer's Name: Sun Petroleum Products Company
   Address (number, street): 1600 Halnut Street
   (City, state, zip code): Philadelphia, PA 19103
   Emergency Telephone Number: (215) 485-1121
   Information Supplied by: Preston W. Lilley
   Date: 3/76 Title: Associate Industrial Hygienist
   Revision #2

Product Trade Name: Sunoco Hay Lubricant 80
Chemical Name & Synonyms:
Chemical Family: Petroleum Hydrocarbon Formula:
National Fire Protection Association 704M Signal (or estimate)
Health 0 Fire 1 Reactivity 0 Specific Hazard:

HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)	MATERIAL	%	TLV (Units)
Naphthenic oils	93.5	5mg/m^3	Tackiness additive	1	Not Listed
Sulfurized extreme pressure additive	5.5	5mg/m^3 (EST)			

PHYSICAL DATA

a. Boiling point (°F): Wide range
b. Vapor pressure (mm Hg): Nil @ 77°F
c. Vapor density (Air = 1): >5
d. Solubility in water (%): nil
e. Specific gravity (H_2O = 1): 0.93
f. Per cent volatile by volume:
g. Evaporation rate (Ethyl Ether = 1): 1000+
h. Appearance & odor: Dark amber fluid lube oil odor.

FIRE AND EXPLOSION HAZARD DATA

a. Flash point (state method, °F): 325 C.O.C. Minimum
b. Ignition temperature (°F): 690 Estimated
c. Flammable limits in air, LEL: Not UEL: Determined
d. Extinguishing media: Water Fog, CO_2, Dry Chemical and Foam
e. Special fire fighting procedures: Wear self-contained breathing gear in confined spaces.
f. Unusual fire and explosion hazards:

HEALTH HAZARD DATA

a. Physiological Properties:

1. Acute oral toxicity (LD_{50} if available): [Essentially non-toxic] Estimated Lethal dose fatal to 50% of test rats is in excess of 25 grams per kilogram of body weight.
2. Local effects to eyes: Mild transient irritation.
3. Local effects to skin: Slight irritation with prolonged contact.
4. Sensitizing effects: None known.
5. Dermal absorption (LD_{50} if available): Estimated dermal lethal dose 50 is in excess of 8 grams per kilogram of rabbit b weight.
6. Inhalation effects (LC_{50} if available): None expected to 25 milligrams per cubic meter of air.

b. Emergency and First Aid Procedures:

1. Ingestion: Give liquids if conscious; induce vomiting if indicated. Obtain physician.
2. Eye Contact: Flush out with water for 15 minutes. If irritation persists, consult physician.
3. Skin Contact: Wash off with soap and water until no odor remains.
4. Inhalation: Remove victim to fresh air.

Other Health Data: Remove contaminated clothing and launder before reuse.

VI. REACTIVITY DATA

a. Stability: Stable X Unstable ____ Conditions to avoid: ____

b. Incompatible Materials: Strong oxidizers may ignite this material.

c. Hazardous Decomposition Products: Carbon monoxide, asphyxiants plus sulfur dioxide.

d. Hazardous Polymerization: May occur ____ Will not occur X Conditions to avoid: ____

II. SPILL OR LEAK PROCEDURES

a. Steps to be taken for spill or leak: Absorb on a suitable medium.

b. Waste disposal methods: Incinerate

II. SPECIAL PROTECTION INFORMATION

a. Respiratory protection (Specify type) requirements: NIOSH approval required on any respiratory equipment used.

b. Ventilation requirements (local exhaust, general dilution, special): As needed to maintain safe exposure levels.

c. Protective gloves required: Recommended when prolonged skin contact cannot be avoided.

d. Eye protection required: Recommended in the event of splashes.

e. Other required equipment: ____

X. SPECIAL PRECAUTIONS

a. Precautionary label required? If yes, please attach. No.

b. Precautions to be taken in handling and storing: Handle as above and store as a Class III B Liquid per N.F.P.A. or OSHA.

c. Other precautions: ____

MATERIAL SAFETY DATA SHEET

Dept # 366

SUN PETROLEUM PRODUCTS COMPANY

A Division of Sun Oil Company of Pennsylvania

THIS PRODUCT SAFETY INFORMATION IS PROVIDED PERIODICALLY TO ASSIST OUR CUSTOMERS IN ASSESSING COMPLIANCE WITH HEALTH/SAFETY/ENVIRONMENTAL REGULATIONS. PLEASE FORWARD THIS TO YOUR MANAGER OF SAFETY AND HEALTH.

SUN CODE 3432CC

SECTION 1 IDENTIFICATION

NAME SUNQUENCH 1032

SYNONYMS

REV. DATE 06/04/8

CAS REGISTRY NO.

CAS NAME NO CLASSIFICATION - MIXTURE

MR PRESTON LILLEY
EEHS DEPARTMENT
PO BOX 11435
MARCUS HOOK, PA 19061

CHEMICAL FAMILY BLEND

SUN REFINING AND MARKETING COMPANY
1801 MARKET STREET - TEN PENN CENTER - 18TH FLOOR
PHILA., PENNSYLVANIA 19103

INFORMATION SUPPLIED BY AND PHONE PRESTON LILLEY (215) 447-1852

SECTION 2 INGREDIENTS

MATERIAL(S)
SOLVENT REFINED AND HYDROTREATED LIGHT PARAFFINIC DISTILLATE OIL, CAS NO. 64741895; HIGH BOILING DEASPHALTI RESIDUUM; AND A BARIUM SULFONATE PRODUCT TYPICALLY CONTAINS NO. 0.18% BARIUM.

SECTION 3 PHYSICAL DATA

BOILING POINT: 760 mm Hg WIDE RANGE °F. °C

MELTING POINT: N/A °F. °C

SPECIFIC GRAVITY: (H_2O=1) 0.86

PACKING DENSITY: (WHEN APPLICABLE) Kg/m³ N/A

VAPOR PRESSURE: (mm Hg AT 20°C) 0.0008

VAPOR DENSITY: (AIR = 1) 5+

SOLUBILITY IN H_2O: (% BY VOL.) NIL

% VOLATILES BY VOL.: NIL

EVAPORATION RATE: (ETHYL ETHER = 1) 1000X SLOWER

pH INFORMATION: pH N/A @ g/l H_2

OCTANOL/WATER PARTITION COEFFICIENT:

APPEARANCE AND ODOR: DARK AMBER FLUID. SLIGHT ODOR.

ODOR THRESHOLD (ppm)

SECTION 4 FIRE AND EXPLOSION DATA (CONT. ON PAGE 2)

FLASH POINT: 345 MINIMUM COC °F. °C.

AUTOIGNITION TEMPERATURE: 650 ESTIMATED °F. °C.

NFPA CLASSIFICATION

HEALTH 0 FIRE 1 REACTIVITY 0

SPECIFIC HAZARD

HAZARD RATING

LEAST 0 SLIGHT 1 MODERATE 2 HIGH 3 EXTREME 4

FLAMMABLE LIMITS IN AIR

LOWER EXPLOSIVE LEVEL (LEL) NOT DETERMINED % V

UPPER EXPLOSIVE LEVEL (UEL) NOT DETERMINED % V

FIRE AND EXPLOSION HAZARDS

SUN CODE 3432CC

TRW-02498

0908-3879

EXTINGUISHING MEDIA

WATER FOG. CHEMICAL FOAM. DRY CHEMICAL. CO2.

SPECIAL FIRE FIGHTING INSTRUCTIONS

WEAR SELF-CONTAINED BREATHING GEAR WHEN FIRE FIGHTIN
IN CONFINED SPACES.

SECTION 5 HEALTH HAZARD INFORMATION

EXPOSURE LIMITS

8 HR. TIME WEIGHTED PERMISSIBLE EXPOSURE 5.0 MG/M3. GOVERNMENT REGULATION.

ROUTES OF EXPOSURE AND EFFECTS

INHALATION
NONE EXPECTED TO 25 MILLIGRAMS OIL MIST PER CUBIC METER OF AIR.

SKIN
PRACTICALLY NON-TOXIC BY SKIN ABSORPTION. MILD IRRITATION WITH PROLONGED OR REPEATED CONTACT.

EYE
MILD IRRITATION.

INGESTION
LD50 IN RATS: 15+ GM/KG. PULMONARY ASPIRATION HAZARD IF SWALLOWED AND VOMITING OCCURS.

FIRST AID

INHALATION NONE NORMALLY REQUIRED.

SKIN
WASH WITH SOAP AND WATER. WASH CLOTHING BEFORE REUSE.

EYE
FLUSH WITH WATER.

INGESTION
IF SWALLOWED, DO NOT INDUCE VOMITING. OBTAIN PHYSICIAN IMMEDIATELY. DO NOT GIVE LIQUIDS. SMALL AMOUNTS WHI
MAY ACCIDENTALLY ENTER THE MOUTH SHOULD BE RINSED OUT UNTIL NO TASTE OF THIS PRODUCT REMAINS.

SECTION 6 REACTIVITY DATA (CONT. ON PAGE 3)

STABILITY	INCOMPATIBLE MATERIALS	HAZARDOUS DECOMPOSITION PRODUCTS
STABLE.	INCOMPATIBLE WITH STRONG OXIDIZERS.	CARBON MONOXIDE, TRACE SULFUR OXIDES, ASPHYXIANTS.

TRW-02499

0908-3880

POLYMERIZATION

POLYMERIZATION WILL NOT OCCUR.

SECTION 7 PROTECTION INFORMATION

VENTILATION

VENTILATE AS NEEDED TO MAINTAIN COMPLIANCE WITH WORKPLACE ENVIRONMENTAL EXPOSURE LIMIT.

PERSONAL PROTECTIVE EQUIPMENT

EYE NO UNUSUAL PRECAUTIONS.

GLOVES RECOMMENDED WHEN PROLONGED SKIN CONTACT CANNOT BE AVOIDED.

RESPIRATOR NO UNUSUAL PRECAUTIONS.

OTHER

SECTION 8 DISPOSAL PROCEDURES

AQUATIC TOXICITY

SPILL, LEAK OR RELEASE

CLEAN UP USING AN OIL ABSORBENT. NO UNUSUAL HAZARD.

WASTE DISPOSAL

FEDERAL, STATE AND LOCAL REGULATIONS COVER DISPOSAL OF CHEMICAL WASTE.

SECTION 9 SPECIAL PRECAUTIONS

STORAGE AND HANDLING CONDITIONS

STORAGE PER NFPA CLASS III B LIQUID.

SECTION 10 PRECAUTIONARY LABEL (IF APPLICABLE)

TEXACO
INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET

2 32

NOTE: NO REPRESENTATION IS MADE AS TO THE ACCURACY OF THE INFORMATION HEREIN. SEE PAGE 7 FOR CONDITIONS UNDER WHICH DATA ARE FURNISHED.

Trade Name and Synonyms
00846 SULTEX D

Manufacturer's Name
Texaco

Emergency Telephone No.
(914) 831-3400 ext. 204

Address
P.O. Box 509 Beacon, NY 12508

Chemical Name and/or Family or Description
Cutting Oils

THIS PRODUCT IS CLASSIFIED AS:
_____ CARCINOGENIC BY OSHA, IARC, OR NTP . X NOT CARCINOGENIC

WARNING STATEMENT:
CAUTION! AVOID BREATHING VAPOR OR MIST

OCCUPATIONAL CONTROL PROCEDURES

Protective Equipment (Type)

Eyes: Chemical type goggles or face shield optional.

Skin: Exposed employes should exercise reasonable personal cleanliness; this includes cleansing exposed skin areas several times daily with soap and water, and laundering or dry cleaning soiled work clothing at least weekly.

Inhalation: If vapor, mist or dust is generated in excess of permissible concentrations (see pg.4) use respirator approved by MSHA or NIOSH.

Ventilation: Adequate to meet component permissible concentrations.

Permissible Concentrations:

Air: None established for product; refer to page 4 for component permissible concentrations.

EMERGENCY AND FIRST AID PROCEDURES

First Aid

Eyes: As with most foreign materials, should eye contact occur, flush eyes with plenty of water.

Skin: Wash exposed areas with soap and water.

Ingestion: None considered necessary.

Inhalation: If irritation or drowsiness occurs, remove to fresh air.

Other Instructions: None.

N.D. - Not Determined
< - Less Than
N.A. - Not Applicable
> - Greater Than

0908-3882

TRW-02501

PHYSIOLOGICAL EFFECTS:

Code No. 00846

Effects of Exposure

Acute:

Eyes: Believed to be minimally irritating.

Skin: Believed to be minimally irritating.

Respiratory System: Vapors or mist in excess of permissible concentrations (pg4) may cause irritation (nose/throat), headache, nausea, and drowsiness.

Chronic: N.D.

Other: –

Sensitization Properties:

Skin: Yes ___ No ___ Unknown X Respiratory: Yes ___ No ___ Unknown X

Median Lethal Dose (LD_{50} LC_{50})(Species)

Oral: Believed to be >5 g/kg (rat); practically non-toxic

Inhalation: N.D.

Dermal: Believed to be >3 g/kg (rabbit); practically non-toxic

Other: N. D.

Irritation Index, Estimation of Irritation (Species)

Skin: Believed to be <0.5/8.0 (rabbit); no appreciable effect

Eyes: Believed to be <15/110 (rabbit); no appreciable effect

Symptoms of Exposure: None expected other than possible minimal irritation

FIRE PROTECTION INFORMATION

Ignition Temp. °F. N.D. Flash Point °F. (Method) 350°F (COC)

Flammable Limits (%) Lower N.D. Upper N.D.

Products Evolved When Subjected to Heat or Combustion:

Carbon monoxide, carbon dioxide, aldehydes and ketones, combustion products of nitrogen and sulfur.

Recommended Fire Extinguishing Agents And Special Procedures:

According to the National Fire Protection Association Guide, use water spray, dry chemical, foam, or carbon dioxide.

Water or foam may cause frothing. Use water to cool fire-exposed containers. If a leak or spill has not ignited, use water spray to disperse the vapors and to provide protection for persons attempting to stop the leak.

Unusual or Explosive Hazards:

None.

N.D. – Not Determined N.A. – Not Applicable

< – Less Than > – Greater Than

0908-3883

TRW-02502

ENVIRONMENTAL PROTECTION

Code No. 00846

Waste Disposal Method:
Under RCRA, it is the responsibility of the user of products to determine, at the time of disposal, whether product meets RCRA criteria for hazardous waste. This is because product uses, transformations, mixture, processes, etc. may render the resulting material hazardous. (See Remarks for Waste Classification.)

Procedures in Case of Breakage or Leakage: (Transportation Spills Call CHEMTREC (800) 424-9300)
Contain spill if possible. Wipe up or absorb on suitable material and shovel up.

Remarks:
Waste Classification: Product has been evaluated for RCRA characteristics and does not meet criteria of a hazardous waste if discarded in its purchased form.

PRECAUTIONS

CAUTION! AVOID BREATHING VAPOR OR MIST

Requirements for Transportation, Handling and Storage:
Minimum feasible handling temperatures should be maintained. Periods of exposure to high temperatures should be minimized. Water contamination should be avoided.

DOT Proper Shipping Name: N.A.
DOT Hazard Class (if applicable): N.A.

CHEMICAL AND PHYSICAL PROPERTIES

Boiling Point (°F) N.D. Vapor Pressure N.D. (mmHg)

Specific Gravity .8816 (H_2O=1) Vapor Density N.D. (Air=1)

Appearance and Odor Black liquid

pH of undiluted product N.A. Solubility Neg.

Percent Volatile by Volume N.D. Evaporation N.D. ( )=1

Viscosity 32.0 cSt @ 40°C Other –

Hazardous Polymerizations _____ Occur X Do not occur

The Material Reacts Violently With: (If others is checked below, see additional comments on page 6 for futher details)

Air	Water	Heat	Strong Oxidizers	Others	None of These
			X		

N.D. – Not Determined N.A. – Not Applicable
< – Less Than > – Greater Than

0908-3884

TRW-02503

COMPOSITION

Code No. 00846

Chemical/Common Name	CAS No.	Exposure Limit	Range in %
Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	5mg/m3 ACGIH (MIST) 5mg/m3 OSHA (MIST) 10mg/m3 STEL (MIST)	80.00 - 94.99
Sulfurized olefin	72162153	NONE ESTABLISHED	4.00 - 10.99

Evaluation of this product indicates that it is hazardous according to OSHA Appendix A criteria and/or our hazard criteria.

SARA TITLE III

I. Title III Section 302/304 Extremely Hazardous Substance

Component	CAS No.	%	RQ (Lbs)	TPQ (Lbs)
NONE				

II. CERCLA Section 102(a) Hazardous Substance

Component	CAS No.	%	RQ (Lbs)
NONE			

III. Title III Section 311 Hazard Categorization

Acute	Chronic	Fire	Pressure	Reactive	Not Applicable
					X

IV. Title III Section 313 Toxic Chemicals

Component	CAS No.	%
NONE		

TRW-02504

0908-3885

PRODUCT SHIPPING LABEL

Code No. 00846

00846 SULTEX D

CAUTION! AVOID BREATHING VAPOR OR MIST

Chemical/Common Name	CAS No.	Range in %
Solvent-dewaxed heavy paraffinic petroleum distillates	64742650	80.00 - 94.99
Sulfurized olefin	72162153	4.00 - 10.99

Evaluation of this product indicates that it is hazardous according to OSHA Appendix A criteria and/or our hazard criteria.
Not classified as a hazardous material by DOT definition.

HMIS

Health	: 0	Reactivity	: 0
Flammability	: 1	Special	: -

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame or heat. Keep container closed and drum bungs in place.

HEALTH EMERGENCY TELEPHONE: (914) 831-3400 (EXT. 204)

Texaco
2000 Westchester Avenue
White Plains, New York 10650

For Additional Information Concerning:

Fuels/Lubricants/Antifreezes
call (914) 831-3400 (EXT.204)
Chemicals
call (512) 459-6543
Transportation Spills
call CHEMTREC (800) 424-9300

0908-3886

TRW-02505

ADDITIONAL COMMENTS

Code No. 00846

STATE OF MICHIGAN CRITICAL MATERIALS ACT (REVISED 1988)
No critical materials present.

Certain applications such as metal working can generate oil mists. According to ACGIH "Documentation of Threshold Limit Values and Biological Exposure Indices" (5th Edition, 1986), there has been a striking lack of reported cases of illness in workers exposed to oil mists. In addition, studies of oil mists in laboratory animals at levels of 50mg/m3 for 18 months did not reveal adverse effects. However, oil fumes resulting from partially heat decomposed oils can be formed in metal working operations. These fumes are expected to be irritating. Therefore, the Occupational Control Procedures and the Permissible Airborne Concentrations specified in this MSDS should be followed.
WHMIS Classification: Not Regulated

To determine applicability or effect of any law or regulation with respect to the product, users should consult his legal advisor or the appropriate government agency. Texaco does not undertake to furnish advice on such matters.

By M. J. Von Allmen Title Mgr. Product Safety Programs
Date 09-26-89 ☐ New ☒ Revised, Supersedes 06-21-89

N.D. - Not Determined N.A. - Not Applicable
< - Less Than > - Greater Than

TRW-02506

0908-3887

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE. IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT AS PART OF TEXACO'S PRODUCT SAFETY PROGRAM. IT IS NOT INTENDED TO CONSTITUTE PERFORMANCE INFORMATION CONCERNING THE PRODUCT. NO EXPRESS WARRANTY, OR IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE IS MADE WITH RESPECT TO THE PRODUCT OR THE INFORMATION CONTAINED HEREIN. DATA SHEETS ARE AVAILABLE FOR ALL TEXACO PRODUCTS. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL TEXACO PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE AND YOU ARE ENCOURAGED AND REQUESTED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

EXPLANATION OF THE INDUSTRIAL HYGIENE, TOXICOLOGY, AND MATERIAL SAFETY DATA SHEET

PRODUCT INFORMATION

Trade Name and Synonyms

Refer to the code number and name under which the product is marketed and the common commercial name of the product.

Manufacturer's Name and Address

Self explanatory.

Chemical Name and/or Family or Description

Refer to chemical, generic, or descriptive name of single elements and compounds.

OCCUPATIONAL CONTROL PROCEDURES

(Consult your Industrial Hygienist or Occupational Health Specialist.)

Protective Equipment

Type of protective equipment that is necessary for the safe handling and use of this product.

Ventilation

Normal means adequate to maintain permissible concentrations.
Ventilation: type, i.e. local exhaust, mechanical, etc.

Permissible Concentrations

Indicates worker exposure limits, such as the Threshold Limit Value (TLV) as established by the American Conference of Governmental Industrial Hygienists or standards, promulgated by the Occupational Safety and Health Administration (e.g., PEL).

TLV–Time Weighted Average (TWA) is the concentration in air averaged over an 8 hour daily exposure.

TLV–Ceiling (C) is the ceiling limit on concentration that should not be exceeded during any part of the working day.

"Skin" Notation (ACGIH) indicates that dermal absorption can contribute to overall exposure following direct contact or exposure to airborne material.

Permissible Exposure Level (PEL) is the time weighted concentration in air averaged over an 8 hour daily exposure.

EMERGENCY AND FIRST AID PROCEDURES

Administer first aid and emergency procedures in case of eye and/or skin contact, ingestion and inhalation.

PHYSIOLOGICAL EFFECTS

Acute Exposures (Eye, Skin, Respiratory System)

Refers to the most common effects that would be expected to occur from direct contact with the product.

Chronic

Refers to the effects that are most likely to occur from repeated or prolonged exposure.

Sensitizer

Means a substance which will cause on or in normal living tissue, through an allergic or photodynamic process, a hypersensitivity which becomes evident on reapplication of, or exposure to, the same substance.

Median Lethal Dose or Concentration (LD50,LC50)

Refers to that dose or concentration of the material which will produce death in 50 per cent of the animals. For inhalation, exposure time is indicated.

Irritation Index

Refers to an empirical score (Draize Method) for eye and skin irritation when tested by the method described. If numbers are not available, an estimated score indicates whether or not the material is an irritant.

FIRE PROTECTION INFORMATION

Ignition Temperature

Refers to the temperature in degrees Fahrenheit, at which a liquid will give off enough flammable vapor to ignite and burn continuously for 5 seconds.

Flash Point (Method used)

Refers to the temperature in degrees Fahrenheit, at which a liquid will give off enough flammable vapor to ignite.

Flammable Limits

Refers to the range of gas or vapor concentration (percent by volume in air) which will burn or explode if an ignition source is present. Lower means the lower flammable limit and upper means the upper flammable limit given in percent.

Products Evolved When Subjected to Heat or Combustion.

The products evolved when this material is subjected to heat or combustion. Includes temperature at which oxidation or other forms of degradation occurs.

Recommended Fire Extinguishing Agents and Special Procedures

Specifies the fire fighting agents that should be used to extinguish fires. If unusual fire hazards are involved or special procedures indicated, this is specified.

Unsusual Fire or Explosive Hazards

Specifies hazards to personnel in case of fire, explosive danger.

ENVIRONMENTAL PROTECTION

Specifies how this product may be disposed.

Indicates precautions necessary in the event that leakage or breakage occurs. Included are (a) clean-up procedures, (b) personal protective equipment if necessary, (c) hazards that may be created, i.e. fire, explosion, etc.

PRECAUTIONS

Label that is required or recommended.

Requirements for Transportation, Handling and Storage

Specifies handling and storage procedures. Gives ICC, DOT, or other regulations related to safety and health for transportation.

CHEMICAL AND PHYSICAL PROPERTIES

Boiling Point (or Range)

in degrees Fahrenheit or Celsius Boiling Point at 760 mmHg.
Vapor Pressure

Pressure exerted when a solid or liquid is in equilibrium with its own vapor.

Specific Gravity

The ratio of the density of the product to the density of water.

Vapor Density

The ratio of the density of the vapor at saturation concentration (20 degrees Celsius or 68 degrees Fahrenheit) to the density of air at 760 mmHg.

Appearance and Odor

Refers to the general characterization of the material, e.g. powder, colorless liquid, aromatic odor, etc.

pH

Refers to the degree of acidity or basicity of the material in a specific concentration.

pH1-5 - STRONGLY ACIDIC
pH5-7 - WEAKLY ACIDIC
pH7-9 - WEAKLY BASIC
pH9-14 - STRONGLY BASIC

Solubility

Refers to the solubility of a material by weight in water at room temperature. The term negligible, less than 0.1 %; slight, 0.1 to 1%; moderate, 1 to 10%; appreciable, 10% or greater. Gives solubility in organic solvents where appropriate.

Percent Volatile By Volume

Refers to the amount volatilized at 20 degrees Celsius or 68 degrees Fahrenheit when allowed to evaporate.

Evaporation

Gives the rate of evaporation compared to a standard

Viscosity

Measure of flow characteristics in Kinematic viscosity in Centistokes.

Hazardous Polymerization

Hazardous polymerization is that reaction which takes place at a rate which produces large amounts of energy. Indicates whether it may or may not occur and under what storage conditions.

Does the Material React Violently

Indicates whether the material will react violently, releasing large amounts of energy when exposed under conditions listed.

Composition

Components of the product as required by OSHA (1910.1200) and one or more state Right to Know laws.

Texaco
2000 Westchester Avenue
White Plains, New York 10650
Phone (914) 831-3400 (Beacon)

11143088930

TEXACO
P.O. BOX 509
BEACON, NEW YORK 12508
914-831-3400

November 28, 1989

TRW CAR DIVISION

31 AMES ST
CAMBRIDGE MA 02192

Dear Customer:

Enclosed is a Material Safety Data Sheet (MSDS) for the Texaco product you recently purchased. The MSDS is provided under Texaco's policy of communicating to our customers health, safety, and environmental protection information necessary for the safe handling and use of our products. We strongly urge that you distribute this information so that those persons having contact with this product are fully advised of the information contained in it; your firm's health and safety personnel should be similarly advised.

Please note that our MSDS includes a section for information required under Title III of the Superfund Amendments and Reauthorization Act (SARA) of 1986, including the identification of Section 313 Toxic Chemicals. Your receipt of this MSDS fulfills our supplier notification obligation under SARA Section 313 (40 CFR 372.45).

Material Safety Data Sheets are routinely mailed to our customers with the initial purchase of this product in every calendar year. However, any significant changes in health, safety or environmental protection information will be promptly forwarded to you. We strongly advise that you maintain records of any internal distribution so that you may forward updated sheets to the appropriate personnel.

If you resell or distribute this product you must by law furnish a copy of the MSDS and appropriate warning label to your customers, advising them of their obligations to communicate the information provided here.

(over)

Texaco's hazard communication program is of vital importance to us; please feel free to contact me directly about any concern you may have regarding health, safety, and environmental aspects of any Texaco product.

Very truly yours,

Mary Jane Von Allmen

Mary Jane Von Allmen
Manager, Product Safety Programs

CMC:als
Enclosure

Attention: Health and Safety Officer
Material Safety Data Sheet

TRW CAR DIVISION

31 AMES ST
CAMBRIDGE MA 02192

0908-3892

TRW-02511

#14500

McGean-Rohco, Inc.

1250 Terminal Tower, Cleveland, Ohio 44113, 216/621-6425

MATERIAL SAFETY DATA SHEET

Product Name:	Super Draw Lubricant BC-201-V		Emergency Phone No.: *313/872-1800
Plant Address:	38521 Schoolcraft Avenue, Livonia, MI 48150		Chemtrec Phone No. 800/424-9300
Prepared By:	M. Arthur Detrisac	Issue Date:	Revised Date: 8-19-86 (4-1-90)

INGREDIENTS AND HAZARDOUS COMPONENTS

Material	%	TLV	C.A.S. #	Suspect Carcinogen
Diethanolamine SARA 313 Chemical	10-11	3 ppm	111-42 2	No

PHYSICAL DATA

Boiling Point: Over 212°F	Freezing Point: Below 32°F	Specific Gravity: 1.01	pH: 8-9
Vapor Pressure at 20° C: UK	Vapor Density (Air = 1): UK	% Volatiles by Volume: None	Odor: Bland
Evaporation Rate (Butyl Acetate = 1) NA		Solubility in Water: Appreciable	
Appearance and Form: Brown Liquid			

FIRE AND EXPLOSION HAZARD DATA

Flash Point: None to Boil	Flammable Limits in Air: % By Volume Upper: NA Lower:
Test Method: TCC	
Extinguishing Media: Carbon Dioxide, Foam, Water.	
Special Fire Fighting Procedures: In enclosed areas, self contained respirators should be used.	
Unusual Fire and Explosion Hazards: None	
DOT Classification: Not Regulated	Note: UK = Unknown NA = Not Applicable

* AFTER 5:00 PM, CALL EITHER 559-2775 OR 455-6587

TRW-02512

0908-3893

HEALTH HAZARD DATA

Effects of Overexposure and Primary Entries to Body:
Mild skin and eye irritant.

Emergency and First Aid Procedures:
Wash eyes and skin with water.
Remove contaminated clothing and launder before reuse.

REACTIVITY DATA

[X] Stable [ ] Unstable Conditions to Avoid:

Incompatability — Materials to Avoid:
None

Hazardous Decomposition Products:
Carbon Dioxide, Carbon Monoxide, Ammonia or Pyrolysis.

Hazardous Polymerization:
[ ] May Occur [X] Will Not Occur

SPILL OR LEAK PROCEDURES

Spills:
Mop up and place in steel container.

Waste Disposal Methods:
Concentrate may be incinerated. Water dilutions may be waste treated, do not add to waste systems for copper or nickel.

DISPOSER MUST COMPLY WITH FEDERAL, STATE, AND LOCAL DISPOSAL LAWS.

SPECIAL PROTECTION INFORMATION

Respirator: None

Ventilation: None

Gloves:	Eye and Face:	Other:
Neoprene	Safety Glasses	None

Handling and Storage:
Store indoors in cool dry area.

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.
McGEAN-ROHCO, INC. PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

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McGean-Rohco, Inc.
2910 Harvard Avenue, P.O. Box 09087, Cleveland, OH 44109, 216/441-4900

MARCH 19, 1990

TRW FASTENERS DIVISION
TRW CONTROLS & FAST. GRP.
195 BINNEY STREET
CAMBRIDGE, MA 02142

ATTENTION: MSDS ADMINISTRATOR

DEAR SIR/MADAM:

ENCLOSED ARE MATERIAL SAFETY DATA SHEET(S) (MSDS) WHICH PROVIDE INFORMATION ON THE PRODUCT(S) LISTED BELOW WHICH YOU HAVE RECENTLY PURCHASED. THE MATERIAL SAFETY DATA SHEET(S) HAVE EITHER BEEN REVISED SINCE YOU LAST RECEIVED THEM OR ARE FOR NEW PRODUCT(S) WHICH YOU HAVE RECENTLY PURCHASED.

SINCE YOU MAY REDIRECT THE PRODUCT(S) TO MORE THAN ONE PLACE WITHIN YOUR LOCATION, PLEASE MAKE SURE THAT YOUR DISTRIBUTION OF THE MSDS(S) IS MADE IN COMPLIANCE WITH FEDERAL AND LOCAL RULES AND REGULATIONS. THE SHEET(S) ARE PROVIDED IN COMPLIANCE WITH OSHA HAZARD COMMUNICATION STANDARD 29 CFR 1910.1200. ALL HAZARDOUS INGREDIENTS GREATER THAN 1% AND ALL CARCINOGENS GREATER THAN 0.1% BY WEIGHT ARE LISTED SHOWING CHEMICAL NAME AND TLV AS SPECIFIED IN THE CURRENT OSHA REGULATIONS, 1910.1000 THROUGH 1046.

GLENN T. CARNINE
TSCA COORDINATOR
216-441-4900 EXT. 5616

PRODUCT NUMBER	DESCRIPTION	REVISION DATE	STATUS
14500	SUPER DRAW BC-201-V	01/01/90	NEW PURCHASE

REF. #1207300-01 5205810

Maint 250

Health	3
Flammability	4
Reactivity	1
Personal Protection	B

HMIS Ratings

BOWMAN DISTRIBUTION MATERIAL SAFETY DATA SHEET

SECTION I

Health	2
Flammability	3
Reactivity	1
Specific Hazard	

NFPA Ratings

PRODUCT NAME **SUPER GLUE REMOVER**	BOWMAN PART NO. **21992** **(page 1 of 2)**
SUPPLIER **Bowman Distribution, Barnes Group Inc.**	EMERGENCY TELEPHONE NO. **[redacted]-7200**
ADDRESS **850 East 72nd Street, Cleveland, OH 44103**	DATE **10/3/88**
HAZARDOUS MATERIAL DESCRIPTION, PROPER SHIPPING NAME, HAZARD CLASS, HAZARD ID NO. (49 CFR 172.101) **Flammable liquid (red label required)**	
ADDITIONAL HAZARD CLASSES (as applicable) **None**	
CHEMICAL FAMILY **Nitrile**	FORMULA **Proprietary**

SECTION II - HAZARDOUS INGREDIENTS

CAS REGISTRY NUMBER	%W	%V	CHEMICAL NAME(S)	OSHA PEL	ACGIH TLV	Other Limits	Listed as Carcinogen NTP, IARC or OSHA 1910(z) (specify)
75-05-8	70		Acetonitrile	40 ppm	40 ppm	N.E.	None
			All other remaining ingredients less than				
			1% or non-hazardous.				

SECTION III - PHYSICAL DATA

BOILING POINT 182 °F ____ °C		SPECIFIC GRAVITY (H_2O = 1)	0.840		
VAPOR PRESSURE @ ____ °F 20 °C ☒ mm Hg ☐ psi <70		PERCENT VOLATILE BY VOLUME (%)	75%	PERCENT SOLID BY WEIGHT (%)	0
VAPOR DENSITY (AIR = 1)	1.41	EVAPORATION RATE (H_2O = 1)	>100		
SOLUBILITY IN WATER	miscible	pH =	N.E.		
APPEARANCE AND ODOR White transparent, aromatic odor				MATERIAL IS: LIQUID	

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT 50 °F ____ °C method used TCC	FLAMMABLE LIMITS Vapors	LEL 4.4% (w)	UEL 16% (w)

EXTINGUISHING MEDIA
Carbon dioxide on small fires, with foam on larger fires.

SPECIAL FIRE FIGHTING PROCEDURES
Mechanical foam of the alcohol type is best. Water should be kept on fire exposed containers to keep cool.

TRW-02515

UNUSUAL FIRE AND EXPLOSION HAZARDS
Wear self-contained breathing apparatus, goggles if eye protection not provided. Emits toxic fumes of cyanides when heated.

0908-3896

Emergency Telephone No. (216) 391-7200

SECTION V - HEALTH HAZARD DATA

HEALTH HAZARDS (ACUTE AND CHRONIC — INCLUDE TARGET ORGAN EFFECTS)
Acute - high concentration can cause symptoms of weakness, flushing of face, some temporary bronchial tightness, eye irritation.

Chronic - liver/kidney. Non-carcinogenic.

CONDITIONS TO AVOID
Contact with strong acids, e.g. sulfuric, perchlorates, chlorosulfonic acid.

SIGNS AND SYMPTOMS OF OVEREXPOSURE
High concentrations can cause symptoms of weakness, flushing of the face.

PRIMARY ROUTES OF ENTRY Inhalation [X] Skin Contact [X] Other (specify)

EMERGENCY AND FIRST AID PROCEDURES
Call physician. Remove to uncontaminated atmosphere. If breathing has stopped, give artificial respiration. Flush eyes 15 minutes with water.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Pre-existing diseases of liver, kidney, central nervous system, lungs and glands.

SECTION VI - REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	**Contact with strong acids.**

INCOMPATIBILITY (materials to avoid)
Strong acids, e.g. chlorosulfonic, sulfuric and perchlorates.

HAZARDOUS DECOMPOSITION PRODUCTS:
Fire produces toxic cyanide fumes and vapors.

HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID
	WILL NOT OCCUR	X	

SECTION VII - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Use adequate ventilation equipment. Containment, if possible by building temporary dikes with dirt and remove for pollution control.

WASTE DISPOSAL METHOD
Comply with local, state and federal regulations where destroyed by burning.

CERCLA (Superfund) REPORTABLE QUANTITY (in lbs)
N.E.

RCRA HAZARDOUS WASTE NO. (40 CFR 261.33)
(MCA) CC-64, cic-5, TEG, references.

VOLATILE ORGANIC COMPOUND (VOC) (as packaged, minus water) **Acetonitrile**	[X] Theoretical 4.8 lb/gal
	[ ] Analytical N.E. lb/gal

SECTION VIII - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)
In non-ventilated areas use air pak or similar breathing air equipment.

VENTILATION	LOCAL EXHAUST (specify rate) ***To control conc. below TLV.***	SPECIAL ***Normally not required.***
	MECHANICAL (general) (specify rate) **Normally not required.**	OTHER **Normally not required.**

PROTECTIVE GLOVES (specify type) **Neoprene**	EYE PROTECTION (specify type) **Safety glasses**

OTHER PROTECTIVE EQUIPMENT
Rubber-soled safety shoes and rubber overshoes.

TRW-02516

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
Avoid high concentration of vapors, store at ambient temp. and avoid gross contamination of skin by washing with soap and water. Wash after using.

OTHER PRECAUTIONS
Keep containers closed with adequate ventilation away from heat, sparks, open flames, no smoking when using. Store in a dark-cool area having automatic sprinklers.

0908-3897

C-8/88
BOWMAN DISTRIBUTION, BARNES GROUP INC.
850 East 72nd Street, Cleveland, OH 44103
Emergency Telephone No. (216) 391-7200
10-3-88

HUSSEY COPPER LTD.

BY: HUSSEY COPPER CORP., GENERAL PARTNER
LEETSDALE, PA 15056

M.S.D.S. HC-85-155

DATE: 3/26/85
REV. DATE: 4/21/86
REVISION NO.: 1

MATERIAL SAFETY DATA SHEET

SECTION 1

MANUFACTURER'S NAME:	HUSSEY COPPER LTD.
ADDRESS:	Washington Street LEETSDALE, PA. 15056
EMERGENCY PHONE NO.:	412-857-4200
CHEMICAL NAME AND SYNONYMS:	COPPER
TRADE NAME AND SYNONYMS:	SUPER SILVER COPPER CDA ALLOY 155
CHEMICAL FAMILY:	COPPER

SECTION 11 - HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	CAS NO.	OSHA-PEL/ACGIH-TLV
Base Metal Copper	99.75* MIN	7440-50-8	Exposure Levels See Section V

HAZARDOUS MIXTURES OF OTHERS LIQUIDS, SOLIDS, OR GASES:
If exposure to copper dust/fume is kept below Permissible Exposure Limits (PEL)/ Threshold Limit Value (TLV) all trace elements should not pose any health risk.

* Copper plus silver - 155 copper is expected to contain less than .1% silver.

SECTION 111 - PHYSICAL DATA

MELTING	1972° F
Vapor Pressure (mm Hg.)	Not applicable
Solubility in Water	negligible
Specific Gravity (H^2O = 1)	8.9

SECTION 1V - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Not applicable*
Extinguishing Media	Not Applicable
Special Fire Fighting Procedures	Not applicable
Unusual Fire and Explosion Hazards	Not applicable

0908-3898

TRW-02517

* Under normal conditions. Heavy concentrations of fine copper dust may cause flash fire if exposed to ignition source.

SECTION V – HEALTH HAZARD DATA

EXPOSURE LEVELS: Copper dusts and mists - OSHA (PEL): TWA = 1MG/M^3. ACGIH (TLV): TWA = 1 MG/M^3.
Copper fume - OSHA (PEL): TWA = 0.1 MG/M^3.ACGIH (TLV): TWA = 0.2 MG/M^3.

CARCINOGENICITY: Not listed as a carcinogenic in NTP or IARC monographs.

EFFECT OF OVERDOSE: Fume and dust - sneezing, congestion, nausea, metallic taste, chills, fever.

EMERGENCY AND FIRST AID PROCEDURES:

Skin: Flush thoroughly with water. Eyes - flush with water, call Physician. Ingestion - drink water induce vomiting, call Physician. Inhalation - remove victim to fresh air, call Physician.
Copper fume, dusts and mists are listed by OSHA as air contaminants.

PRIMARY ROUTE(S) OF ENTRY: Inhalation

SECTION VI – REACTIVITY DATA

STABILITY - Stable

INCOMPATABILITY (material to avoid): (Dust & Fume) acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS : Copper Fume/dust

HAZARDOUS POLYMERIZATION - Will Not Occur

SECTION VII – SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Dust or Fume – wear respirator follow OSHA use instructions, shovel up, or vacuum and place in approved DOT container and seal. Wash contaminated clothing.

WASTE DISPOSAL METHOD:
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Follow federal, state and local regulations for disposal.

SECTION VIII – SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify Type) : dust or fume - NIOSH/MSHA approved dust/fume respirator

VENTILATION - Local Exhaust: dust/fume - if exposure levels exceeded.

EYE PROTECTION: (dust) goggles

SECTION IX – SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Avoid breathing dust or fumes. Do not take internally.

HUSSEY COPPER LTD.

BY: HUSSEY COPPER CORP., GENERAL PARTNER
LEETSDALE, PA 15056

M.S.D.S. HC-85-155

DATE: 3/26/85
REV. DATE: 4/21/86
REVISION NO.: 1

MATERIAL SAFETY DATA SHEET

SECTION I

MANUFACTURER'S NAME:	HUSSEY COPPER LTD.
ADDRESS:	Washington Street LEETSDALE, PA. 15056
EMERGENCY PHONE NO.:	412-857-4200
CHEMICAL NAME AND SYNONYMS:	COPPER
TRADE NAME AND SYNONYMS:	SUPER SILVER COPPER CDA ALLOY 155
CHEMICAL FAMILY:	COPPER

SECTION II – HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	CAS NO.	OSHA-PEL/ACGIH-TLV
Base Metal Copper	99.75* MIN	7440-50-8	Exposure Levels See Section V

HAZARDOUS MIXTURES OF OTHERS LIQUIDS, SOLIDS, OR GASES:
If exposure to copper dust/fume is kept below Permissible Exposure Limits (PEL)/ Threshold Limit Value (TLV) all trace elements should not pose any health risk.

* Copper plus silver - 155 copper is expected to contain less than .1% silver.

SECTION III – PHYSICAL DATA

MELTING	1972° F
Vapor Pressure (mm Hg.)	Not applicable
Solubility in Water	negligible
Specific Gravity (H^2O = 1)	8.9

SECTION IV – FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Not applicable*
Extinguishing Media	Not Applicable
Special Fire Fighting Procedures	Not applicable
Unusual Fire and Explosion Hazards	Not applicable

0908-3900

TRW-02519

*Under normal conditions. Heavy concentrations of fine copper dust may cause flash fire if exposed to ignition source.

SECTION V – HEALTH HAZARD DATA

EXPOSURE LEVELS: Copper dusts and mists - OSHA (PEL): TWA = 1MG/M^3. ACGIH (TLV): TWA = 1 MG/M^3.
Copper fume - OSHA (PEL): TWA = 0.1 MG/M^3. ACGIH (TLV): TWA = 0.2 MG/M^3.

CARCINOGENICITY: Not listed as a carcinogenic in NTP or IARC monographs.

EFFECT OF OVERDOSE: Fume and dust - sneezing, congestion, nausea, metallic taste, chills, fever.

EMERGENCY AND FIRST AID PROCEDURES:

Skin: Flush thoroughly with water. Eyes - flush with water, call Physician. Ingestion - drink water induce vomiting, call Physician. Inhalation - remove victim to fresh air, call Physician.
Copper fume, dusts and mists are listed by OSHA as air contaminants.

PRIMARY ROUTE(S) OF ENTRY: Inhalation

SECTION VI – REACTIVITY DATA

STABILITY - Stable

INCOMPATABILITY (material to avoid): (Dust & Fume) acetylene, chlorine

HAZARDOUS DECOMPOSITION PRODUCTS : Copper Fume/dust

HAZARDOUS POLYMERIZATION - Will Not Occur

SECTION VII – SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:

Dust or Fume – wear respirator follow OSHA use instructions, shovel up, or vacuum and place in approved DOT container and seal. Wash contaminated clothing.

WASTE DISPOSAL METHOD:
Dispose of contaminated product and materials used in cleaning up spills or leaks in a manner approved for this material. Follow federal, state and local regulations for disposal.

SECTION VIII – SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify Type) : dust or fume - NIOSH/MSHA approved dust/fume respirator

VENTILATION - Local Exhaust: dust/fume - if exposure levels exceeded.

EYE PROTECTION: (dust) goggles

SECTION IX – SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Avoid breathing dust or fumes. Do not take internally.

0908-3901

Cyprus Minerals Company

MATERIAL SAFETY DATA SHEET

231 ASSMB

TALCUM POWDER

Health	1
Flammability	0
Reactivity	0
Personal Protection	E

I. IDENTIFICATION

Product Name: [redacted]

Chemical Name: [redacted] HYDROUS MAGNESIUM SILICATE | Chemical Family: SILICATES

Formula: $3MgO \cdot 4SiO_2 \cdot H_2O$

II. INGREDIENTS

Mineral or Chemical Name(s)	Weight %	CAS #
TALC - A NATURAL HYDROUS MAGNESIUM SILICATE MINERAL	90-99%	14807-96-6
DOLOMITE - A NATURAL MAGNESIUM CALCIUM CARBONATE MINERAL	less than 5%	None
CALCITE - A NATURAL CALCIUM CARBONATE MINERAL	less than 5%	1317-65-3
CHLORITE - A NATURAL HYDROUS MAGNESIUM ALUMINUM SILICATE MINERAL	less than 5%	None
QUARTZ - A NATURAL CRYSTALLINE SILICA MINERAL	less than 1%	14808-60-7

III. PHYSICAL DATA

Boiling Point: NOT APPLICABLE	Freezing Point: NOT APPLICABLE	
Vapor Pressure: NOT APPLICABLE	Vapor Density: NOT APPLICABLE	
Evaporation Rate: NOT APPLICABLE	% Volatile: NOT APPLICABLE	
Specific Gravity (water = 1): 2.7 - 2.8	Solubility in Water: NEGLIGIBLE	pH: 7.5 - 9.5

Appearance and Odor: A WHITE POWDER WITH AN EARTHY ODOR

IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: NOT APPLICABLE | Flammable Limits: NOT APPLICABLE

Extinguishing Media: NOT APPLICABLE

Special Fire Fighting Procedures: NOT APPLICABLE

Unusual Fire and Explosion Hazards: NOT APPLICABLE

V. HEALTH HAZARD DATA

Threshold Limit Value: 2 mg/M^3 RESPIRABLE DUST OVER AN 8 HOUR EXPOSURE PERIOD

Possible Effects of a Single Overexposure	
Inhalation	ACUTE ACCIDENTAL EXPOSURE WOULD BE NON-SPECIFIC AND SIMILAR TO THE INHALATION OF ANY DUST. SYMPTOMS MIGHT INCLUDE COUGHING, WHEEZING, DIFFICULT BREATHING AND UPPER RESPIRATORY TRACT IRRITATION.
Skin Contact	NO ADVERSE EFFECTS ARE KNOWN AS A CONSEQUENCE OF APPLICATION TO UNBROKEN SKIN.
Eye Contact	AS WITH ANY PARTICULATE MATERIAL, TALC CAN CAUSE TEMPORARY DISCOMFORT AND IRRITATION IF ACCIDENTALLY INTRODUCED INTO THE EYE.
Ingestion	NO KNOWN HAZARD.

TRW-02521

Cyprus Industrial Minerals Company/Talc Division
Box 3419, Englewood, CO 80155/(303) 740-5440

Possible Effects of Repeated Overexposure

THERE ARE REPORTS THAT A RELATIVELY MILD PNEUMONOCONIOSIS CAN DEVELOP OVER 10-40 YEARS OF OCCUPATIONAL EXPOSURE TO MIXED DUSTS CONTAINING TALC. THE PULMONARY DISEASE WHICH DEVELOPS AFTER SUCH PROLONGED EXPOSURE MAY EXIST WITH OR WITHOUT IMPAIRMENT IN LUNG FUNCTION. PROLONGED INHALATION MAY PROVOKE A FIBROTIC RESPONSE SIMPLY BECAUSE OF THE INSOLUBLE NATURE OF THE MINERAL TALC.

Emergency and First Aid Procedures

Inhalation	REMOVE TO FRESH AIR. IF BREATHING IS DIFFICULT, GIVE OXYGEN AND CALL A PHYSICIAN.
Skin Contact	OF NO GENERAL CONCERN. BROKEN SKIN CAN BE CLEANSED WITH SOAP AND WATER.
Eye Contact	FOR ACUTE EXPOSURE, FLUSH WITH WATER. IF IRRITATION OR DISCOMFORT PERSISTS, CALL A PHYSICIAN.
Ingestion	NO TREATMENT NECESSARY.

Notes to Physician

THERE ARE NO SPECIFIC ANTIDOTES TO ACUTE OVEREXPOSURE. TREATMENT SHOULD BE DIRECTED AT THE CONTROL OF THE SYMPTOMS AND THE CLINICAL CONDITION. INDIVIDUALS WITH ACTIVE PULMONARY DISEASE SHOULD NOT BE ASSIGNED TO A HEAVY TALC DUST ENVIRONMENT.

VI. REACTIVITY DATA

Stability: TALC IS STABILE AND INERT

Incompatibility: NONE

Hazardous Decomposition Products: NONE

Hazardous Polymerization: NONE

Conditions to Avoid: NONE

VII. SPILL OR LEAK PROCEDURES

Steps to be Taken if Material is Released or Spilled	VACUUM CLEAN OR WET SWEEP SPILLAGE
Waste Disposal Method	WASTE SHOULD BE DISPOSED OF IN CLOSED CONTAINERS TO PREVENT DUST

VIII. SPECIAL PROTECTION INFORMATION

Respiratory Protection	NIOSH APPROVED DUST RESPIRATORS FOR EXPOSURE TO POTENTIALLY HIGH TALC DUST ENVIRONMENT		
Ventilation	LOCAL EXHAUST VENTILATION RECOMMENDED		
Protective Gloves	NOT REQUIRED	Eye Protection	SAFETY GLASSES
Other Protective Equipment	NOT REQUIRED		

IX. SPECIAL PRECAUTIONS

Precautions to be Taken in Handling and Storage

- AS WITH ALL POWDERS, LIMIT THE CREATION AND INHALATION OF DUST
- WET FLOORS MAY BECOME EXTREMELY SLIPPERY WHEN TALC IS PRESENT

X. ADDITIONAL INFORMATION

EMERGENCY TELEPHONE NUMBERS

Medical: (303) 740-5440

Technical: (303) 740-5700

FEDERAL HAZARD CLASSIFICATION NUMBERS

- DOT Hazard Classification - Talc not listed
- RCRA Hazardous Waste No. - Talc not listed
- CERCLA (Superfund) Reportable Quantity - Talc not listed

MATERIAL SAFETY DATA SHEET

PRODUCT NAME: TRU-PLATE SURF PREP CHEM 0170 MSDS No.: 10618
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/88 REVISION DATE: 07/07/92

SECTION A. MATERIAL IDENTIFICATION.

MANUFACTURER: McGEAN-ROHCO, INC.

2910 HARVARD AVE.
CLEVELAND OH 44105
TELEPHONE: 216-441-4900

CHEMTREC:
TELEPHONE #:800-424-9300

SECTION B. INGREDIENTS AND HAZARDS.

INGREDIENT: SULFURIC ACID---SARA 313 CHEMICAL

CAS NUMBER:7664-93-9 40.0 - 50.0%
EXPOSURE LIMIT: TWA:1mg/CU METER
SUSPECT CARCINOGEN: NO

SECTION C. PHYSICAL DATA.

APPEARANCE: LIGHT TAN LIQUID.
ODOR: BLAND

BOILING POINT: >100C
FREEZING POINT: UK

SPECIFIC GRAVITY: 1.4
pH: <1

VAPOR PRESSURE: UK
VAPOR DENSITY: UK
% VOLATILE BY VOLUME: NA
SOLUBILITY IN WATER: COMPLETE

EVAPORATION RATE: <BUTYL ACETATE

SECTION D. FIRE AND EXPLOSION HAZARD DATA.

FLASH POINT: NONE
TEST METHOD: NA

LIMITS: LEL: NA
UEL: NA

HAZARD SYMBOL CODES

	NFPA	HMIS
HEALTH:	3	3
FLAMMABILITY:	0	0
REACTIVITY:	1	1
SPECIAL:		

EXTINGUISHING MEDIA: NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES: SELFCONTAINED BREATHING APPARATUS AND FULL PROTECTIVE GEAR SHOULD BE WORN.

UNUSUAL FIRE OR EXPLOSION HAZARDS: CONTACT WITH METALS MAY GENERATE FLAMMABLE AND EXPLOSIVE HYDROGEN GAS.

PRODUCT NAME: TRU-PLATE SURF PREP CHEM 0170 MSDS No.: 10618
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/88 REVISION DATE: 07/07/92

SECTION E. REACTIVITY DATA.

MATERIAL IS STABLE.
HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

CONDITIONS TO AVOID: NA

CHEMICAL INCOMPATIBILITIES: ALKALIES.

HAZARDOUS DECOMPOSITION PRODUCTS: IF INVOLVED IN FIRE, OXIDES OF SULFUR COULD BE GIVEN OFF.

SECTION F. HEALTH HAZARD DATA.

SUMMARY OF RISKS: SARA--ACUTE AND CHRONIC

MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY CONTACT: DERMATITIS.

TARGET ORGANS: SKIN,EYES,LUNGS.

PRIMARY ENTRY ROUTES: THROUGH CONTACT OR INHALATION OF MIST.

ACUTE EFFECTS: IRRITATION OR BURNING.

CHRONIC EFFECTS: AFFECT TARGET ORGANS. MAMMALIAN REPRODUCTIVE TOXIN.

SIGNS & SYMPTOMS OF OVEREXPOSURE:

EYE CONTACT: CORROSION WITH POSSIBLE CORNEAL ULCERATION.

SKIN CONTACT: SKIN BURNS OR ULCERATION.

INHALATION: IRRITATION OF UPPER RESPIRATORY PASSAGES.

INGESTION: SEVERE BURNS TO MUCOUS MEMBRANES OF THE MOUTH AND ESOPHAGUS.

PRODUCT NAME: TRU-PLATE SURF PREP CHEM 0170 MSDS No.: 10618
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/88 REVISION DATE: 07/07/92

EMERGENCY & FIRST AID PROCEDURES:

EYE CONTACT: FLUSH WITH WATER FOR 15 MINUTES. GET MEDICAL ATTENTION.

SKIN CONTACT: FLUSH WITH WATER FOR 15 MINUTES. IF ANY IRRITATION PERSISTS, GET MEDICAL ATTENTION.

INHALATION: REMOVE TO FRESH AIR.

INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS,GIVE 2 GLASSES OF WATER AND GET MEDICAL ATTENTION. NOTE TO PHYSCIAN: ACTIVATED CHARCOAL SLURRY MAY BE ADMINISTERED.

SECTION G. SPILL, LEAK AND DISPOSAL PROCEDURES.

SPILL/LEAK PROCEDURES: SOAK UP WITH SAWDUST,SAND,OIL DRY, OR OTHER ABSORBANT MATERIAL. NEUTRALIZE RESIDUE WITH SODA ASH OR LIME AND FLUSH TO SEWER.

WASTE MANAGEMENT & DISPOSAL PROCEDURES: NEUTRALIZE WITH LIME OR SODA ASH TO WITHIN POTW pH DISCHARGE LIMITS AND SEWER WITH WATER. FOLLOW ALL LOCAL,STATE,AND FEDERAL REGULATIONS.

RCRA # (IF DISPOSED AS RECEIVED): D002

SECTION H. SPECIAL PROTECTION INFORMATION

PERSONAL PROTECTIVE EQUIPMENT:

GOGGLES: CHEMICAL GOGGLES.
GLOVES: RUBBER.
RESPIRATOR: IF TWA IS EXCEEDED,MUST BE NIOSH OR MSHA APPROVED.

OTHER: SUFFICIENT TO PREVENT SKIN CONTACT.

PRODUCT NAME: TRU-PLATE SURF PREP CHEM 0170 MSDS No.: 10618
REVISION: 2
PREPARED BY: TSCA COORDINATOR ISSUE DATE:04/01/88 REVISION DATE: 07/07/92

WORKPLACE CONSIDERATIONS:
VENTILATION: SUFFICIENT TO KEEP BELOW TWA LIMIT.
SAFETY STATIONS: EYE WASH.
OTHER: SAFETY SHOWER.

SECTION I. SPECIAL PRECAUTIONS.

SPECIAL HANDLING & STORAGE PROCEDURES: DO NOT STORE WITH STRONG BASES.

D.O.T. CLASS: 8.0 UN REGISTER: UN-1760
IMCO CLASS: 8.0 UN REGISTER: UN-1760

EXPLANATION OF SYMBOLS
NA = NOT APPLICABLE UK = UNKNOWN

THIS MATERIAL SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION, AND INVESTIGATION. WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, McGEAN-ROHCO, INC. MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED TO COMPLY WITH TITLE 29 CODE OF FEDERAL REGULATIONS, PART 1910.1200, OSHA HAZARD COMMUNICATION STANDARD, AND TO FULFILL THE ANNUAL CHEMICAL NOTIFICATION REQUIREMENTS OF SARA TITLE III, SECTION 313.

230

SWAN MICHIGAN OIL CO. 180 WEST 5th STREET BAYONNE, N.J. 07002

201-437-0410

DATE ISSUED: JAN.29th,1990

MATERIAL SAFETY DATA SHEET

#15 DRAWING CMPD.

A. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
[redacted]

PRODUCT CODE #15

CHEMICAL NAME Water Soluble Potassium Oleate Soap.

CAS NUMBER
Complex Mixture
CAS Number not applicable

PRODUCT APPEARANCE AND ODOR: Light tan color, soft soap consistency Essentially odorless

EMERGENCY TELEPHONE NUMBER [redacted] 201-568-6067

B. COMPONENTS AND HAZARD INFORMATION

COMPONENTS	CAS NO. OF COMPONENTS	APPROXIMATE CONCENTRATION	
Potassium Soap	143-18-0 and 61790-32-7	40%	(Non-Hazardous Under OSHA FED. REG. : 29 CFR 1910.1200)
Water	7732-18-5	60%	

C. PRIMARY ROUTES OF ENTRY AND EMERGENCY AND FIRST AID PROCEDURES

EYE CONTACT
If lubricant gets into the eyes, flush with clear water for 15 minutes or until irritation subsides. If irritation persists, call a physician.

SKIN
In case of skin contact, wash thoroughly with water.
If injected under the skin, regardless of the appearance of the wound or its size, contact a physician IMMEDIATELY.

0908-3908

TRW-02527

INHALATION
Vapor pressure is very low. Vapor inhalation under ambient conditions is normally not a problem. If overcome by vapor from hot product, remove from exposure and call a physician immediately. If breathing is irregular or has stopped, start resuscitation, administer oxygen, if available.

INGESTION
If ingested, DO NOT induce vomiting; call a physician immediately.

D. FIRE AND EXPLOSION HAZARD INFORMATION

FLASH POINT (MINIMUM)
None; self-extinguishing

AUTOIGNITION TEMPERATURE
Not determined

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) - HAZARD IDENTIFICATION
Health Flammability Reactivity BASIS
Not applicable

HANDLING PRECAUTIONS
Use product with caution around heat, sparks, pilot lights, static electricity, and open flame.

FLAMMABLE OR EXPLOSIVE LIMITS (APPROXIMATE PERCENT BY VOLUME IN AIR)
Estimated values: Not applicable

EXTINGUISHING MEDIA AND FIRE FIGHTING PROCEDURES
No fire hazard. Cool fire-exposed containers with water spray.

DECOMPOSITION PRODUCTS UNDER FIRE CONDITIONS
Fumes, smoke, carbon monoxide, aldehydes and other decomposition products, in the case of incomplete combustion.

"EMPTY" CONTAINER WARNING
"Empty" containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to clean since residue is difficult to remove. "Empty" drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All other containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations. For work on tanks refer to Occupational Safety and Health Administration regulations, ANSI Z49.1, and other governmental and industrial references pertaining to cleaning, repairing, welding, or other contemplated operations.

E. HEALTH AND HAZARD INFORMATION

VARIABILITY AMONG INDIVIDUALS
Health studies have shown that many petroleum hydrocarbons and synthetic lubricants pose potential human health risks which may vary from person to person. As a precaution, exposure to liquids, vapors, mists or fumes should be minimized.

EFFECTS OF OVEREXPOSURE (Signs and symptoms of exposure)
Prolonged or repeated skin contact may cause skin irritation.

NATURE OF HAZARD AND TOXICITY INFORMATION
Prolonged or repeated skin contact with this product tends to remove skin oils possibly leading to irritation and dermatitis; however, based on human experience and available toxicological data, this product is judged to be neither a "corrosive" nor an "irritant" by OSHA criteria.

Product contacting the eyes may cause eye irritation.

Product has a low order of acute oral and dermal toxicity, but minute amounts aspirated into the lungs during ingestion or vomiting may cause mild to severe pulmonary injury and possibly death.

This product is judged to have an acute oral LD50 (rat) greater than 5 g/kg of body weight, and an acute dermal LD50 (rabbit) greater than 3.16 g/kg of body weight.

PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE
None Recognized

F. PHYSICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
IBP Approximately 100°C (210°F)

SPECIFIC GRAVITY (15.6 C/15.6 C)
0.96

MOLECULAR WEIGHT
Not determined

pH
Approximately 10

POUR, CONGEALING OR MELTING POINT
89°C (192°F)
Melting Point by ASTM D 127

VISCOSITY
235 Worked penetration, mm/10, @ 25°C, ASTM D 217

VAPOR PRESSURE
17.5 mm Hg @ 20°C

VAPOR DENSITY (AIR = 1)
Greater than 5

PERCENT VOLATILE BY VOLUME
Approximately 34% water

EVAPORATION RATE @ 1 ATM. AND 25 C (77 F)
(n-BUTYL ACETATE = 1)
35% water

SOLUBILITY IN WATER @ 1 ATM. AND 25 C (77 F)
Emulsifiable

G. REACTIVITY

This product is stable and will not react violently with water. Hazardous polymerization will not occur. Avoid contact with strong oxidants such as liquid chlorine, concentrated oxygen, sodium hypochlorite or calcium hypochlorite.

H. ENVIRONMENTAL INFORMATION

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
Recover free product. Add sand, earth or other suitable absorbent to spill area. Minimize breathing vapors. Minimize skin contact. Open all windows and doors. Keep product out of sewers and watercourses by diking or impounding. Advise authorities if product has entered or may enter sewers, watercourses, or extensive land areas.
Assure conformity with applicable governmental regulations.

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302
Not applicable

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355
Not applicable

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372
Not applicable

EPA HAZARD CLASSIFICATION CODE:	Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard	Not Applicable
						XXX

I. PROTECTION AND PRECAUTIONS

VENTILATION
Use local exhaust to capture vapor, mists or fumes, if necessary. Provide ventilation to minimize inhalation exposure and prevent buildup of explosive concentrations of vapor in air. use explosion-proof equipment. No smoking or open lights.

RESPIRATORY PROTECTION
Use supplied-air respiratory protection in confined or enclosed spaces, if needed.

PROTECTIVE GLOVES
Use chemical-resistant gloves, if needed, to avoid prolonged or repeated skin contact.

EYE PROTECTION
Use splash goggles or face shield when eye contact may occur.

OTHER PROTECTIVE EQUIPMENT
Use chemical-resistant apron or other impervious clothing, if needed, to avoid contaminating regular clothing which could result in prolonged or repeated skin contact.

WORK PRACTICES / ENGINEERING CONTROLS
Keep containers and storage containers closed when not in use. Do not store near heat, sparks, flame or strong oxidants.

PERSONAL HYGIENE
Minimize breathing vapor, mist or fumes. Avoid prolonged or repeated contact with skin. Remove contaminated clothing; launder or dry-clean before reuse. Remove contaminated shoes and thoroughly clean before reuse; discard if oil-soaked. Cleanse skin thoroughly after contact, before breaks and meals, and at end of work period. Product is readily removed from skin by waterless hand cleaners followed by washing thoroughly with soap and water.

J. TRANSPORTATION INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
Not applicable

The information and recommendations contained herein are, to the best of Swan's knowledge and belief, accurate and reliable as of the date issued. Swan does not warrant or guarantee their accuracy or reliability, and Swan shall not be liable for any loss or damage arising out of the use thereof.

The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use.

ALVIN A. BIRNE, LUBRICATION ENGINEER

JANUARY 29th, 1990

USED AS THINNER FOR PAINT 2-5

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-00S-4)

NOT USED

Synasol Solvent PM 3224

CHEMICAL NAME: **SYNASOL® SOLVENT (PM 3224)**

SYNONYMS: None

CHEMICAL FAMILY: Alcohols

FORMULA: Not applicable

MOLECULAR WEIGHT: Not applicable

TRADE NAME AND SYNONYMS: SYNASOL SOLVENT, SYNASOL

I. PHYSICAL DATA

BOILING POINT, 760 mm. Hg	80°C. (176°F.)	FREEZING POINT	<-100°C.
SPECIFIC GRAVITY ($H_2O = 1$)	0.8115 at 20/20°C.	VAPOR PRESSURE at 20°C.	0.9 psia.
VAPOR DENSITY (air = 1)	1.6	SOLUBILITY IN WATER, % by wt. at 20°C.	Complete
PER CENT VOLATILES BY VOLUME	90	EVAPORATION RATE (Butyl Acetate = 1)	3.3
APPEARANCE AND ODOR	Water-white liquid; mild and nonresidual odor.		

II. HAZARDOUS INGREDIENTS

MATERIAL	%	TLV (Units)
Methanol	4 (volume)	200 ppm.

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (test method)	55°F., Tag open cup	AUTOIGNITION TEMPERATURE		795°F. (estimated)	
FLAMMABLE LIMITS IN AIR, % by volume		LOWER	4.3 (calculated)	UPPER	18.8 (calculated)

EXTINGUISHING MEDIA	Carbon dioxide or dry chemical for small fires. Alcohol or polymer foam for large fires.
SPECIAL FIRE FIGHTING PROCEDURES	Dilution of the burning liquid with water may reduce the intensity of the flame.
UNUSUAL FIRE AND EXPLOSION HAZARDS	None

EMERGENCY PHONE NUMBERS

Dr. C. U. Dernehl, 212/551-4785; 914/946-0646 (night)
Dr. K. S. Lane, 212/551-4787; 914/666-3656 (night)
C. P. Carpenter, Ph.D., 412/327-1020; 412/241-7896 (night)

TRW-02531

Legal responsibility is assumed only for the fact that all studies reported here and all opinions are those of qualified experts

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	1,000 ppm.
EFFECTS OF OVEREXPOSURE	Swallowing liquid causes inebriation, headache, nausea and vomiting, and perhaps blindness. Liquid causes eye irritation. Breathing of vapors may cause drowsiness, nausea, and vomiting.
EMERGENCY AND FIRST AID PROCEDURES	Flush skin and eye contact with plenty of water. Get medical care for eyes. If inhaled, remove to fresh air and give artificial respiration if breathing has stopped. Call a physician. If swallowed, induce vomiting at once; then, give 2 teaspoons of baking soda in a glass of water. Call a physician at once.

V. REACTIVITY DATA

STABILITY			
UNSTABLE	STABLE	CONDITIONS TO AVOID	Heat, fire, and sparks.
– –	√		

INCOMPATIBILITY (materials to avoid)	None
HAZARDOUS DECOMPOSITION PRODUCTS	None

HAZARDOUS POLYMERIZATION			
May Occur	Will not Occur	CONDITIONS TO AVOID	None
– –	√		

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Flush away spilled material with large volumes of water.
WASTE DISPOSAL METHOD	Incinerate in a furnace. Small quantities may be diluted with water and flushed to a sewer.

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)		Fresh-air mask		
VENTILATION	LOCAL EXHAUST	Preferable	SPECIAL	– –
	MECHANICAL (general)	Acceptable	OTHER	– –
PROTECTIVE GLOVES		Plastic gloves	EYE PROTECTION	Goggles
OTHER PROTECTIVE EQUIPMENT		Safety shower and eye bath		

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	SYNASOL® SOLVENT (PM 3224) WARNING! FLAMMABLE. Keep away from heat, sparks, and fire. Do not leave container open. Use with adequate ventilation. Do not take internally. Contains methanol (wood alcohol), a poison. KEEP OUT OF REACH OF CHILDREN FOR INDUSTRY USE ONLY POISON If taken internally, will cause serio consequences to health or possibly death.
OTHER HANDLING AND STORAGE CONDITIONS	– –

TRW-02532

Form Approved
Budget Bureau No. 44-R1387

U.S. DEPARTMENT OF LABOR

WORKPLACE STANDARDS ADMINISTRATION

Bureau of Labor Standards

MATERIAL SAFETY DATA SHEET

APPROVED

NOV 04 1985

ENVIRONMENTAL ENGINEERING

SECTION I

MANUFACTURER'S NAME: FRANKLIN OIL CORP.(OHIO)	EMERGENCY TELEPHONE NO.: 216/ 232-3000
ADDRESS (Number, Street, City, State, and ZIP Code): BOX 46030 - FRANKLIN PARK, CLEVELAND, OHIO 44146	
CHEMICAL NAME AND SYNONYMS:	TRADE NAME AND SYNONYMS: SYNDRAW 18
CHEMICAL FAMILY: SYNTHETIC AMINE SOAP	FORMULA: PROPRIETARY

SECTION II HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS	0.0		BASE METAL	0.0	
CATALYST	0.0		ALLOYS	0.0	
VEHICLE	0.0		METALLIC COATINGS	0.0	
SOLVENTS	0.0		FILLER METAL PLUS COATING OR CORE FLUX	0.0	
ADDITIVES	0.0		OTHERS	0.0	
OTHERS	0.0				

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
ALL MATERIALS USED IN THE MANUFACTURING OF THIS PRODUCT MEET		
CURRENT OSHA CRITERIA.		

SECTION III PHYSICAL DATA

BOILING POINT (°F.)	212°F.	SPECIFIC GRAVITY (H_2O=1)	1.06
VAPOR PRESSURE (mm Hg.)	17.5	PERCENT VOLATILE BY VOLUME (%)	51.5
VAPOR DENSITY (AIR=1)	N/A	EVAPORATION RATE (WATER =1)	> 1
SOLUBILITY IN WATER	100%		
APPEARANCE AND ODOR	CLEAR AMBER LIQUID, MILD ODOR		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used): NONE	FLAMMABLE LIMITS	Lel: N/A	Uel: N/A
EXTINGUISHING MEDIA: DRY CHEMICAL, FOAM, CARBON DIOXIDE			
SPECIAL FIRE FIGHTING PROCEDURES: NONE			
UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE			

TRW-02533

0908-3914

SECTION V HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE	UNKNOWN
EFFECTS OF OVEREXPOSURE	EYES: CAUSES TRANSIENT IRRITATION. SKIN: PROLONGED OR REPEATED EXPOSURE MAY CAUSE DE-FATTING OF SKIN.
EMERGENCY AND FIRST AID PROCEDURES	INGESTION: CALL A PHYSICIAN. EYES: FLUSH FOR AT LEAST 15 MINS. WITH CLEAR WATER. CONTACT A PHYSICIAN. SKIN: WASH WITH SOAP AND WATER - USE A MOISTURIZING CREAM ON HANDS.

SECTION VI REACTIVITY DATA

STABILITY	UNSTABLE		CONDITIONS TO AVOID
	STABLE	X	
INCOMPATABILITY (Materials to avoid)	STRONG OXIDANTS, STRONG ACIDS.		
HAZARDOUS DECOMPOSITION PRODUCTS	CO, CO_2, HYDROGEN CHLORIDE, OXIDES OR NITROGEN AND PHOSPHOROUS UPON COMBUSTION.		
HAZARDOUS POLYMERIZATION	MAY OCCUR		CONDITIONS TO AVOID NONE
	WILL NOT OCCUR	X	

SECTION VII SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED

RECOVER FREE MATERIAL - FLUSH REMAINDER TO DRAIN WITH LARGE AMOUNTS OF WATER.

WASTE DISPOSAL METHOD

GENERALLY COMPATIBLE WITH MOST MUNICIPAL WASTE TREATMENT SYSTEMS. DOES NOT CONTAIN PHENOL, NITRITE, PETROLEUM OIL OR HEAVY METALS.

SECTION VIII SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type)	NOT REQUIRED			
VENTILATION	LOCAL EXHAUST	NOT REQUIRED	SPECIAL	NOT REQUIRED
	MECHANICAL (General)	NOT REQUIRED	OTHER	NOT REQUIRED
PROTECTIVE GLOVES	NEOPRENE	EYE PROTECTION	CHEMICAL SAFETY GOGGLES	
OTHER PROTECTIVE EQUIPMENT	IMPERVIOUS APRON FOR CLEANLINESS.			

SECTION IX SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING

STORE INDOORS AWAYS FROM STRONG OXIDANTS AND ACIDS. DO NOT FREEZE.

OTHER PRECAUTIONS

NONE

Karen Rich

1411 Karen Rich
Tech Service
Coordinator
M.S. Environmental Chemistry

TRW-02534

0908-3915

Franklin Oil

Franklin Oil Corporation (Ohio)
Box 46030, Franklin Park
Cleveland, Ohio 44146-0030

PHONE: 216-232-3000
TELEX: 810 427-2270

WATS Ohio: 1-800-362-1388
WATS Out of State: 1-800-321-2152

TECHNICAL INFORMATION

SYNDRAW 18

DESCRIPTION: Syndraw 18 is a 100% synthetic drawing and stamping compound designed for use on severe drawing operations. It may be diluted with water for economical use on less difficult jobs.

Its superior performance, versatility, ease of cleaning and disposal provide favorable economics over straight or soluble oils.

APPLICATION: Syndraw 18 may be sprayed through Pax units in the concentrate or diluted form. It may also be applied manually with brushes or with roller coaters.

Syndraw 18 foaming is controlled to allow recirculation.

TECHNICAL DATA:

APPEARANCE.	Clear to hazy, amber liquid
VISCOSITY @ 100°F..	43 cSt (200 SUS)
BULK DENSITY.	8.8 lbs./gallon
SPECIFIC GRAVITY.	1.062
pH (NEAT)	8.8
FLASH POINT (COC)	None - water based
CARBIDE WEIGHT LOSS (14% DILUTION ON K-94 CARBIDE) .	3.75 mg./dm^2/day

continued. . .

All information, recommendations and suggestions appearing in this literature concerning the use of our products are based upon tests and data believed to be reliable, however, it is the user's responsibility to determine the suitability for his own use of the products described herein. Since the actual use by others is beyond our control, no guarantee, expressed or implied, is made by Franklin Oil Corp. (Ohio) as to the effects of such use or the results to be obtained nor does Franklin Oil Corp. (Ohio) assume any liability arising out of use, by others, of the products referred to herein. Nor is the information herein to be construed as absolutely complete since additional information may be necessary or desirable when particular or exceptional conditions or circumstances exist or because of applicable laws or government regulations. Nothing herein contained is to be construed as permission or as a recommendation to infringe any patent.
FRANKLIN OIL CORP. (OHIO)

TECHNICAL DATA CONTINUED:

CADILLAC CAST IRON CHIP RUST TEST (2%).	Pass - no rust - 1 hour
FOAM CONTROL	Compatible with recirculating systems/ tramp oil may be skimmed from surface.
FREEZE/THAW STABILITY.	O.K. - 5 cycles
HARD WATER STABILITY (10% IN 30 GRAINS/ GALLON WATER).	No scum or precipitate

METAL COMPATIBILITY: Recommended for steel, stainless steel, aluminum, copper and brass.

CLEANING: Easily removed with mild alkaline cleaners.

DISPOSAL: Syndraw 18 contains no petroleum oil, chromates, nitrites, chlorinated paraffin, borates, or PCB's.

TITRATION MATERIALS / METHOD

TITRATION INSTRUCTIONS FOR SYNDRAW 18

CUTBACK

1. FILL TEST TUBE TO 7 ml. MARK WITH WATER
2. ADD SAMPLE TO 10 ml. MARK.
3. ADD 2 - 3 DROPS OF BROM PHENOL BLUE INDICATOR SOLUTION.
4. TITRATE DROPWISE WITH 0.5 N SULFURIC ACID (H_2SO_4) - INVERT TEST TUBE BETWEEN DROPS TO MIX. (MAKE SURE ACID IS ADDED WITH DROPPER UPRIGHT).
5. WHEN SOLUTION CHANGES FROM BLUE TO YELLOW AND REMAINS YELLOW THE END POINT HAS BEEN REACHED.
6. DETERMINE CONCENTRATION CHART BELOW:

PERCENT	DILUTION RATIO	DROP OF ACID
50.0	1:1	69
25.0	1:3	31
16.7	1:5	21
11.1	1:8	14
9.1	1:10	12

MT/10-84

TITRATION MATERIALS / METHOD

TITRATION INSTRUCTIONS FOR SYNDRAW 18

1. FILL TEST TUBE TO 10 ml. MARK WITH SAMPLE
2. ADD 2 - 3 DROPS OF BROM PHENOL BLUE INDICATOR SOLUTION.
3. TITRATE DROPWISE WITH 0.5 N SULFURIC ACID (H_2SO_4) INVERT TEST TUBE BETWEEN DROPS TO MIX. (MAKE SURE ACID IS ADDED WITH DROPPER UPRIGHT).
4. WHEN SOLUTION CHANGES FROM BLUE TO YELLOW AND REMAINS YELLOW THE END POINT HAS BEEN REACHED.
5. DETERMINE CONCENTRATION CHART BELOW:

PERCENT	DILTUION RATIO	DROP OF ACID
6.25	1:15	27
4.76	1:20	21
3.23	1:30	14
2.44	1:40	11
1.96	1:50	9

MT/10-84

SYNDRAW 18

REFRACTOMETER INDEX SCALE

% BY VOLUME	DILUTION RATIO	R. I. SCALE
50.0	1:1	22.00
25.0	1:3	11.25
16.7	1:5	8.20
11.1	1:8	5.35
9.1	1:10	4.50
6.25	1:15	3.10
4.76	1:20	2.30
3.23	1:30	1.50
2.44	1:40	1.25
1.96	1:50	1.00

MT/10-84

Franklin Oil

LEADERSHIP IN SYNTHETIC TECHNOLOGY

Franklin Oil has established credentials as an industry leader in the development of synthetic metalworking lubricants and coolants.

In addition to products of superior quality and performance, Franklin Oil provides technical expertise to help plant operators realize the maximum benefits provided by synthetic lubricants. Franklin Oil lubrication engineers and chemists can provide the assistance needed to improve the efficiency and economy of your operations. The drawing and stamping compounds described in this brochure are all 100% synthetic formulations, the most technologically advanced lubricants available today. They offer metalworking plants the unique advantages available only from synthetic lubricants, for a full range of drawing and stamping operations.

For quality products and superior technical expertise, you'll find that Franklin Oil maintains the highest standards of performance. Franklin Oil—a leader in lubricant research and development for more than eight decades.

SynDraw 6-T

A 100% water-soluble, synthetic compound designed for all types of drawing and stamping operations. High-film-strength polymers and extreme-pressure characteristics give this lubricant outstanding versatility. SynDraw 6-T can be used in central systems. Contains no petroleum oil, paraffin wax, borates, phenols or heavy metals.

Specifications

Specific Gravity	1.026
Density	8.54 lbs/gal.
pH @ 100%	8.6
pH @ 5%	8.2
Flash Point	None
Falex Test	4500 lbs. with no break point @ 1:20 dilution
Solubility	100% water soluble

Metal Compatability—Not recommended on copper or copper alloys.

Outstanding features

- More economical than straight oils, soluble oils or semi-synthetics
- Superior performance
- Will not foam
- Biodegradable

SynDraw 6T-AS

This advanced-technology synthetic compound is designed for use in severe drawing and stamping operations, especially with difficult-to-form stainless and alloy steels. SynDraw 6T-AS is an extremely potent formulation which has successfully replaced chlorinated oil lubricants in a wide range of applications. The physical properties, versatility of use and performance levels of SynDraw 6T-AS are allied closely to those demonstrated by SynDraw 6-T.

Specifications

Specific Gravity	1.030
Density	8.60 lbs/gal.
pH @ 100%	8.6
pH @ 5%	8.2
Flash Point	None
Falex Test	4500 lbs. with no break point @ 1:20 dilution
Solubility	100% water soluble

Metal Compatability—Not recommended on copper or copper alloys.

Outstanding features

- More economical than straight oils, soluble oils or semi-synthetics
- Superior performance
- Will not foam
- Easy cleaning
- Biodegradable

SynDraw 6600

A 100% non-petroleum lubricant designed for deep draw with medium to heavy gauge metals. SynDraw 6600 can be used straight under severe conditions; it can be applied by roller coat or spray methods. (Not recommended for aluminum.)

Specifications

Specific Gravity	1.0616
Density	8.46 lbs/gal.
pH (Conc.)	9.43
Flash Point	None
Falex Test	4,000 lbs. @ 2%
Foam (at 10%)	Less than 30 seconds break
Solubility	100% water soluble

Outstanding features

- Economical to use
- Non-foaming
- Easy removal
- Biodegradable

SynDraw 18

A 100% non-petroleum, synthetic compound designed especially for use in severe drawing operations. Recommended for steel, stainless steel, aluminum, copper and brass. Metal compatability and high-film-strength polymers make SynDraw 18 the most versatile synthetic lubricant available today.

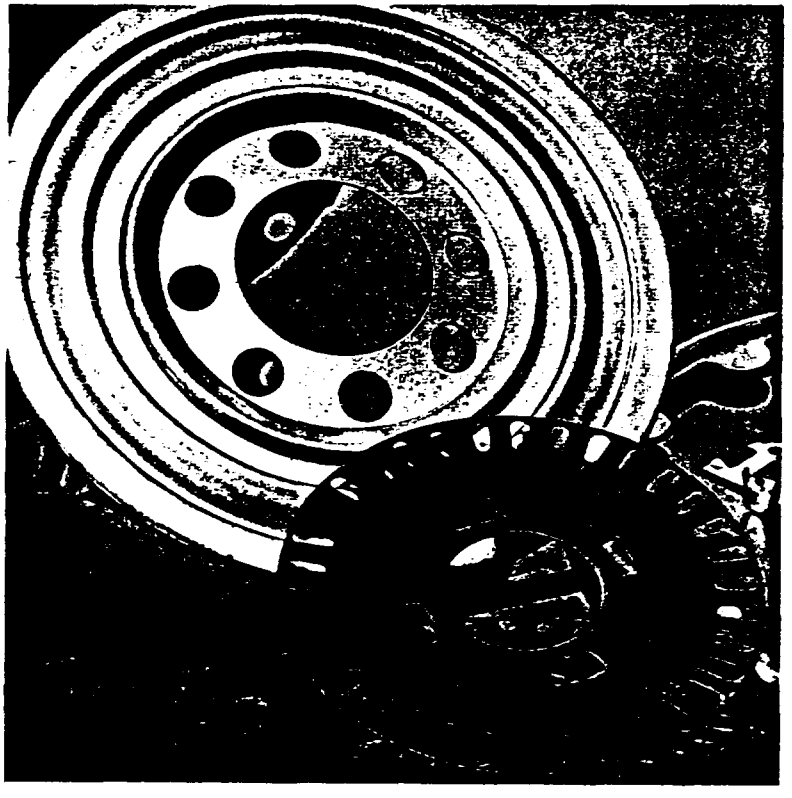
SynDraw 18 may be sprayed through PAX Lube units in both concentrated and diluted forms. It may also be applied manually with brushes or roller coaters. For less difficult operations, SynDraw 18 may be diluted with water for better economy.

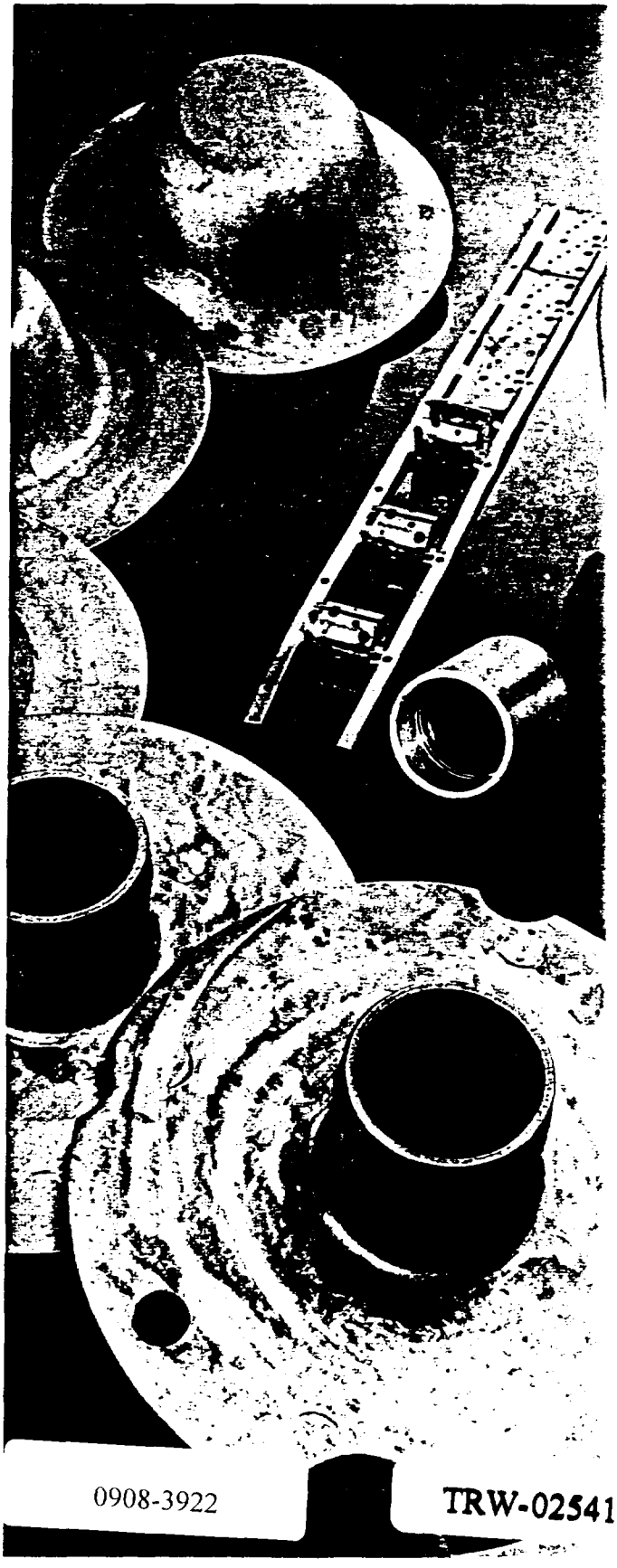
Specifications

Specific Gravity	1.062
Density	8.8 lbs/gal.
pH (neat)	8.8
Flash Point	None
Falex Test	4500 lbs. with no break point @ 1:20 dilution
Solubility	100% water soluble

Outstanding features

- Economical to use
- Excellent rust protection
- Foaming controlled to allow recirculation
- Easy removal
- Biodegradable





THIS PRODUCT CARRIES THE U.S.D.A. SAFETY CERTIFICATION FOR USE IN CLEANING IN ALL DEPTS OF OFFICIAL ESTABLISHMENTS OPERATING UNDER THE FEDERAL MEAT, POULTRY, SHELL EGG PRODUCTS INSPECTION PROGRAMS.

U.S. DEPARTMENT OF LABOR
Occupational Safety and Health Administration

Form Approved
OMB No. 44-R1387

MATERIAL SAFETY DATA SHEET

Required under USDL Safety and Health Regulations for Ship Repairing, Shipbuilding, and Shipbreaking (29 CFR 1915, 1916, 1917)

SECTION I

MANUFACTURER'S NAME GP66 CHEMICAL CORPORATION	EMERGENCY TELEPHONE NO. 301-633-6600 301-485-066 301-643-6652 301-285-045
ADDRESS (Number, Street, City, State, and ZIP Code) 1901 PORTAL ST., BALTO., MD 21224 P.O. BOX 8832	
CHEMICAL NAME AND SYNONYMS SYNTHETIC DETERGENT	TRADE NAME AND SYNONYMS GP66 MIRACLE CLEANER
CHEMICAL FAMILY NONIONIC SURFACTANT	FORMULA surfactants; wetting agents; emulsifiers etc builders

SECTION II - HAZARDOUS INGREDIENTS

PAINTS, PRESERVATIVES, & SOLVENTS	%	TLV (Units)	ALLOYS AND METALLIC COATINGS	%	TLV (Units)
PIGMENTS			BASE METAL		
CATALYST			ALLOYS		
VEHICLE			METALLIC COATINGS		
SOLVENTS DOES NOT PERTAIN TO THIS			FILLER METAL PLUS COATING OR CORE FLUX		
ADDITIVES CLEANER			OTHERS		
OTHERS					

HAZARDOUS MIXTURES OF OTHER LIQUIDS, SOLIDS, OR GASES	%	TLV (Units)
GP66 IS NON-HAZARDOUS. GP66 IS CERTIFIED SAFE BY THE UNITED STATES DEPT		
OF AGRICULTURE AND CARRIES THE TOP A-1 RATING. GP66 DOES NOT CONTAIN ANY		
OF EPA'S 132 TOP PRIORITY POLLUTANTS. GP66 IS COPYRIGHTED WITH THE U.S.		
PATENT OFFICE. GP66 IS A PROPRIETARY FORMULATION AND WE ARE SOLE SOURCE.		

SECTION III - PHYSICAL DATA

BOILING POINT (°F.)	220°	SPECIFIC GRAVITY (H_2O=1)	1,002 at 2
VAPOR PRESSURE (mm Hg.)	NONE	PERCENT, VOLATILE BY VOLUME (%)	NONE
VAPOR DENSITY (AIR=1)	NONE	EVAPORATION RATE (_____ =1)	Same as H2
SOLUBILITY IN WATER	COMPLETE		

APPEARANCE AND ODOR PINK... NO OBJECTIONABLE ODOR

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (Method used) NON-FLAMMABLE	FLAMMABLE LIMITS	Lel	Uel

EXTINGUISHING MEDIA

SPECIAL FIRE FIGHTING PROCEDURES
WATER BASE DOES NOT PERTAIN

UNUSUAL FIRE AND EXPLOSION HAZARDS

0908-3923 TRW-02542

(Continued on reverse side)

Form OSHA-20
Rev. May 72

NFPA Code	
Health	2
Flammability	3
Reactivity	0

MATERIAL SAFETY DATA SHEET

PRODUCT CODE: 2866

DATE OF PREP. January 12, 1989

Section I

MANUFACTURER: RAFFI & SWANSON, INC.
100 EAMES STREET
WILMINGTON, MA 01887

EMERGENCY TELEPHONE NO.: 617-933-4200

TRADE NAME: None

MANUFACTURERS' CODE IDENTIFICATION:
Synthetic Enamel Thinner 2866

PRODUCT CLASS: Thinner

THIS PRODUCT IS A MIXTURE CONTAINING ONE OR MORE HAZARDOUS INGREDIENTS.

INFORMATION ON THE COMPOSITION OF RAFFI & SWANSON, INC. PRODUCTS IS CONFIDENTIAL PROPRIETARY INFORMATION AND IS PROVIDED SOLELY TO AID IN SAFE HANDLING OF THESE MATERIALS. USE OR DISCLOSURE FOR ANY OTHER PURPOSE IS EXPRESSLY FORBIDDEN.

Section II — HAZARDOUS INGREDIENTS

INGREDIENTS	CAS NUMBER	APPROX. PERCENT BY WEIGHT	TLV PPM	TLV mg/M³	LEL % BY VOL	VAPOR PRESSURE mm of Hg
Xylol †	1330-20-7	100	100		1.0	5.9

† Subject to the reporting requirements of EPA Reg. 40 CFR 372 (SARA Title III, Sec. 313).
Mixture does not contain any known or suspect carcinogen according to ACGIH, OSHA, NTP or IARC.

Section III — PHYSICAL DATA

EVAPORATION RATE: ☐ FASTER ☒ SLOWER, THAN ETHER

VAPOR DENSITY: ☒ HEAVIER ☐ LIGHTER, THAN AIR

BOILING RANGE: 281°-291°F

PERCENT VOLATILE BY VOL: 100%

WEIGHT PER GAL: 7.2#

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY CLASSIFICATION:
DOT: Flammable Liquid
OSHA: Flammable Liquid - Class IC

FLASH POINT (closed cup): 81°F

LEL: 1.0%

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical or foam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Keep containers tightly closed. Isolate from heat, sparks and open flame. Do not apply to hot surfaces. Closed containers may explode when exposed to extreme heat.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective. Water may be used to cool closed containers. Irritating or toxic gases may be present. Use self-contained breathing apparatus.

INFORMATION PRESENTED IS ACCURATE TO THE BEST KNOWLEDGE OF RAFFI & SWANSON, INC., RAFFI AND SWANSON, INC. ASSUMES NO LE[illegible] RESPONSIBILITY FOR LOSS OR INJURY RESULTING FROM THE USE OF [illegible]

Section V — HEALTH HAZARD DATA (Based on data for individual ingredients)

THRESHOLD LIMIT VALUE - See Section II

EFFECTS OF OVEREXPOSURE

CHRONIC TOXICITY: Not known to produce chronic or cumulative effects with exposures within recommended guidelines.

INHALATION: Vapor irritating to eyes, nose, and throat. Can cause headache, dizziness, nausea, weakness, loss of consciousness. Prolonged overexposure may cause permanent injury.

SKIN: Brief contact not expected to be harmful. Prolonged and repeated contact may cause drying of the skin, and absorption of harmful amounts.

EYE CONTACT: Burning and irritation.

INGESTION: Do not take internally. May cause nausea, vomiting, diarrhea and other toxic effects.

EMERGENCY AND FIRST AID PROCEDURES

INHALATION: Provide fresh air. Give artificial respiration or oxygen if necessary. CALL A PHYSICIAN.

SKIN: Wash thoroughly with soap and water. Remove contaminated clothing and shoes. Wash clothes thoroughly before re-use.

EYE CONTACT: Flush with water for at least 15 minutes. SEE PHYSICIAN.

INGESTION: DO NOT INDUCE VOMITING. If vomiting occurs spontaneously, keep head below hips to prevent aspiration of liquid into lungs. CALL A PHYSICIAN.

Section VI — REACTIVITY DATA

STABILITY: ☐ UNSTABLE ☒ STABLE HAZARDOUS POLYMERIZATION: ☐ MAY OCCUR ☒ WILL NOT OCCUR

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion produces carbon monoxide and carbon dioxide. Unidentified organic compounds may be formed.

MATERIALS AND CONDITIONS TO AVOID: Strong acids, strong alkalis, strong oxidizers.

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all sources of ignition. Avoid breathing vapors. Ventilate area. Remove with inert absorbent and non-sparking tools.

WASTE DISPOSAL METHOD: Incinerate in approved facility. Do not incinerate closed containers. Dispose in accordance with local, state and federal regulations.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Avoid breathing concentrated vapors or overspray particles if sprayed. In confined or poorly ventilated areas, use NIOSH approved mask with chemical canister or supplied air.

VENTILATION: Provide general mechanical ventilation or local exhaust ventilation sufficient to keep concentration of solvent vapors below 100 PPM

PROTECTIVE GLOVES: Use chemical resistant, impervious gloves for prolonged or repeated contact.

EYE PROTECTION: Safety goggles or face shield where splashes can occur.

OTHER PROTECTIVE EQUIPMENT:

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: ☒ FLAMMABLE ☐ COMBUSTIBLE

Keep in closed containers. Avoid sparks or flame when handling. Can be stored under ambient conditions. Keep closures tight and containers upright to prevent leakage.

OTHER PRECAUTIONS: Avoid prolonged and repeated contact with the skin. Use good personal hygiene practices. Wash hands thoroughly before eating/drinking/smoking/using toilet facilities.

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