PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

ATLAS RESIN PROPPANTS
N7500 COUNTY ROAD P

TAYLOR ,WI 54659

UNIVAR USA INC. (425)889-3400
17425 NE UNION HILL RD , REDMOND , WA 98052

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

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

PRODUCT NAME:	CAUSTIC SODA LIQUID (ALL GRADES)
MSDS NUMBER:	DZ32415
DATE ISSUED:	01/07/2009
SUPERSEDES:	11/12/2008
ISSUED BY:	008730

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Distributed by:
Univar USA Inc.
17425 NE Union Hill Rd.
Redmond, WA 98052
425-889-3400

Trade Name:
Caustic Soda Diaphragm Grade 10%, 15%, 18%, 20%, 25%, 30%, 35%, 40%, 50%,
Caustic Soda Rayon Grade 18%, 20%, 25%, 30%, 50%, 50% Caustic Soda Rayon

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Medical Conditions Aggravated by Exposure: Asthma, Respiratory disorders

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Component	Concentration (by weight %)	CAS - No.
Water	48.5 - 94.5	7732-18-5
Sodium hydroxide	5.5 - 51.5	1310-73-2
Sodium chloride (NaCl)	1 - 5	7647-14-5

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

Skin Contact: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing before reuse. Discard contaminated leather goods. GET MEDICAL ATTENTION IMMEDIATELY.

Eye Contact: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

Ingestion: Never give anything by mouth to an unconscious or convulsive person. If swallowed, do not induce vomiting. Give large amounts of water. If vomiting occurs spontaneously, keep airway clear. Give more water when vomiting stops. GET MEDICAL ATTENTION IMMEDIATELY.

Notes to Physician: The absence of visible signs or symptoms of burns does NOT reliably exclude the presence of actual tissue damage. Probable mucosal damage may contraindicate the use of gastric lavage.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Hazardous Component	CAS-No.	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Sodium hydroxide	1310-73-2			2 mg/m3			2 mg/m3

ENGINEERING CONTROLS: Provide local exhaust ventilation where dust or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear chemical safety goggles with a faceshield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Contaminated clothing should be removed, then discarded or laundered.

Hand Protection: Wear appropriate chemical resistant gloves Protective Material Types: Natural rubber, Neoprene, Nitrile

Hazardous Component	Immediately Dangerous to Life/ Health (IDLH)
Sodium hydroxide	10 mg/m3 IDLH

Respiratory Protection: A NIOSH approved respirator with N95 (dust, fume, mist) cartridges may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure. If eye irritation occurs, a full face style mask should be used. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Clear to opaque
Color:	Colorless to slightly colored
Odor:	Odorless
Boiling Point/Range:	230 291 F (110 144 C)
Freezing Point/Range:	-26 to 59 F (-32 to 15 C)
Vapor Pressure:	13 - 135 mmHg @ 60 C
Vapor Density (air=1):	No data available
Specific Gravity (water=1):	1.11 1.53 @ 15.6 C
Water Solubility:	100%

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

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12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY: This material has exhibited moderate toxicity to aquatic organisms. Data provided are for sodium hydroxide.

Freshwater Fish Data:
LC50 brook trout: 25 ppm/24 hr
LC50 king salmon: 48 ppm

Invertebrate Toxicity Data:
EC50 daphnia magna: 100 ppm
EC50 shrimp: 33 100 ppm/48 hr
EC50 cockle: 330 1000 ppm/48 hr

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is alkaline and may raise the pH of surface waters with low buffering capacity. This material is believed to exist in the disassociated state in the environment.

BIOCONCENTRATION: This material is not expected to bioconcentrate in organisms.

ADDITIONAL ECOLOGICAL INFORMATION: This material has exhibited slight toxicity to terrestrial organisms.

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261. Hazardous Waste Number(s): D002

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME:	Sodium Hydroxide Solution
DOT UN NUMBER:	UN1824
HAZARD CLASS/ DIVISION:	8
PACKING GROUP:	II
LABELING REQUIREMENTS:	8
DOT RQ (lbs):	RQ 1000 lbs. (Sodium Hydroxide)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME:	Sodium hydroxide solution
UN NUMBER:	UN1824
CLASS:	8
PACKING/RISK GROUP:	II

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

CANADIAN REGULATIONS:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: E

16. OTHER INFORMATION

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)
Health: 3 Flammability: 0 Reactivity: 1
NFPA 704 - Hazard Identification Ratings (SCALE 0-4)
Health: 3 Flammability: 0 Reactivity: 1

Lubrizol

Material Safety Data Sheet
CHEMBETAINE(TM) CAS SURFACTANT

Prepared according to 29CFR 1910.1200.

1 Chemical Product and Company Identification

THE LUBRIZOL CORPORATION
9921 BRECKSVILLE RD
BRECKSVILLE, OH 44141

Product Trade Name	CHEMBETAINE(TM) CAS SURFACTANT
CAS Number	68139-30-0
Synonyms	None.
Generic Chemical Name	Cocoamidopropyl hydroxysultaine
Product Type	Specialty Surfactants
Preparation/Revision Date	04 December 2008
Transportation Emergency Phone No.	FOR TRANSPORT EMERGENCY call CHEMTREC: (+1) 703-527-3887 (outside the U.S.), 1-800-424-9300 (in the U.S.)
MSDS No.	36505331-2802012-911870-102103

2 Hazards Identification

Appearance Pale yellow liquid.

Odor Mild

Principal Hazards Warning.

- Causes eye irritation.
- May cause skin irritation.

See Section 11 for complete health hazard information.

3 Composition/Information on Ingredients

Hazardous Ingredients

Comp	CAS No.	Percentage (by wt.)	Carcinogen
Cocoamidopropyl hydroxysultaine	68139-30-0	From 30 to 39.9 percent	N/E
Sodium chloride	7647-14-5	From 5 to 9.9 percent	N/E
Glycerin	56-81-5	From 1 to 4.9 percent	N/E

(N/E) - None established

4 First Aid Measures

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Eyes	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical attention.
Skin	Wash with soap and water. If skin irritation occurs, get medical attention. Launder contaminated clothing before reuse.
Inhalation	Remove exposed person to fresh air if adverse effects are observed.
Oral	DO NOT INDUCE VOMITING. Get immediate medical attention.
Additional Information	Note to physician: Treat symptomatically.

5 Fire Fighting Measures

Flash Point	> 100 °C, 212 °F PMCC (Minimum)
Extinguishing Media	CO2, dry chemical, or foam. Water can be used to cool and protect exposed material.
Firefighting Procedures	Recommend wearing self-contained breathing apparatus. Water may be ineffective fighting fires.
Unusual Fire & Explosion Hazards	None known.

6 Accidental Release Measures

Spill Procedures	Personal Protective Equipment must be worn, see Personal Protection Section for PPE recommendations. Ventilate area if spilled in confined space or other poorly ventilated areas. Prevent entry into sewers and waterways, dispose of in accordance with all federal, state and local environmental regulation. Pick up free liquid for recycle and/or disposal. Residual liquid can be absorbed on inert material.

7 Handling and Storage

Pumping Temperature	Not determined.
Maximum Handling Temperature	Not determined.
Handling Procedures	Keep containers closed when not in use. Do not discharge into drains or the environment, dispose to an authorized waste collection point. Use appropriate containment to avoid environmental contamination. Avoid drinking, tasting, swallowing or ingesting this product. Avoid inhalation of dust, aerosol, mist, spray, fume, or vapor. Use with appropriate and adequate ventilation. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Empty container contains product residue which may exhibit hazards of product.
Maximum Storage Temperature	Not determined.
Storage Procedures	Store in a cool, dry, well-ventilated area. Keep container closed when not in use. Do not store at temperatures greater than 120 deg F (49 deg C).
Loading Temperature	Not determined.

8 Exposure Controls/Personal Protection

Exposure Limits

	Exposure Guidelines					
	OSHA		ACGIH		Other	
Comp	TWA	STEL	TWA	STEL	TWA	STEL
Glycerin	15 mg/cu. M	N/E	10 mg/cu. M	N/E	N/E	N/E

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(s) - Skin exposure
(p) - Proposed limit
(c) - Ceiling exposure
(l) - Recommended exposure limit
(u) - Supplier recommended exposure limit
(N/E) - None established

Other Exposure Limits	None known.
Engineering Controls	Use with adequate ventilation.
Gloves Procedures	Use nitrile or neoprene gloves.
Eye Protection	Safety Glasses.
Respiratory Protection	Use NIOSH/MSHA approved full face respirator with a combination organic vapor and dust/mist cartridge if the recommended exposure limit is exceeded. Use self-contained breathing apparatus for entry into confined space, for other poorly ventilated areas and for large spill clean-up sites.
Clothing Recommendation	Long sleeve shirt is recommended. Do not wear rings, watches or similar apparel that could entrap the material and cause a skin reaction. Launder contaminated clothing before reuse.

9 Physical and Chemical Properties

Flash Point	> 100 °C, 212 °F PMCC (Minimum)
Upper Flammable Limit	Not determined.
Lower Flammable Limit	Not determined.
Autoignition Point	Not determined.
Explosion Data	Material does not have explosive properties.
Vapor Pressure	Not determined.
pH	6.5 - 8 at 5% in water
Specific Gravity	1.11 (20 °C)
Bulk Density	9.22 Lb/gal, 1.1 Kg/L
Water Solubility	Soluble.
Percent Solid	Not determined.
Percent Volatile	50% By Weight
Volatile Organic Compound	Not determined.
Vapor Density	Not determined.
Evaporation Rate	Not determined.
Odor	Mild
Appearance	Pale yellow liquid.
Viscosity	Not determined.
Odor Threshold	Not determined.
Boiling Point	Not determined.
Pour Point Temperature	Not determined.
Melting / Freezing Point	Not determined.

The above data are typical values and do not constitute a specification. Vapor pressure data are calculated unless otherwise noted.

10 Stability and Reactivity

Stability Material is normally stable at moderately elevated temperatures and pressures.

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Decomposition Temperature	Not determined.
Incompatibility	Strong acids and oxidizing agents. Strong bases.
Polymerization	Will not occur.
Thermal Decomposition	Smoke, carbon monoxide, carbon dioxide, aldehydes and other products of incomplete combustion. Under combustion conditions, oxides of the following elements will be formed: nitrogen, sulfur.
Conditions to Avoid	Not determined.

11 Toxicological Information

-- ACUTE EXPOSURE --

Eye Irritation	Moderate to strong eye irritation. Based on data from components or similar material.
Skin Irritation	May cause skin irritation. Based on data from components or similar materials.
Respiratory Irritation	If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract. Based on data from components and similar materials.
Dermal Toxicity	The LD50 in rabbits is > 2000 mg/Kg. Based on data from components or similar materials.
Inhalation Toxicity	No data available to indicate product or components may be a toxic inhalation hazard.
Oral Toxicity	The LD50 in rats is > 5000 mg/kg. Based on data from components or similar materials. Ingestion of this material may cause gastrointestinal irritation.
Dermal Sensitization	No data available to indicate product or components may be a skin sensitizer.
Inhalation Sensitization	No data available to indicate product or components may be respiratory sensitizers.

-- CHRONIC EXPOSURE --

Chronic Toxicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Carcinogenicity	No data available to indicate any components present at greater than 0.1% may present a carcinogenic hazard.
Mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Reproductive Toxicity	No data available to indicate either product or components present at greater than 0.1% that may cause reproductive toxicity.
Teratogenicity	No data available to indicate product or any components contained at greater than 0.1% may cause birth defects.

-- ADDITIONAL INFORMATION --

Other	No other health hazards known.

12 Ecological Information

-- ENVIRONMENTAL TOXICITY --

Freshwater Fish Toxicity	Not determined.
Freshwater Invertebrates Toxicity	The acute EC50 is 10 - 100 mg/L based on component data.
Algal Inhibition	Not determined.
Saltwater Fish Toxicity	Not determined.
Saltwater Invertebrates	Not determined.

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Toxicity	
Bacteria Toxicity	Not determined.
Miscellaneous Toxicity	Not determined.

-- ENVIRONMENTAL FATE --

Biodegradation	Adequate data is not available to estimate the biodegradation potential of this material.
Bioaccumulation	25% or greater of the components display no potential to bioconcentrate.
Soil Mobility	Not determined.

13 Disposal Considerations

Waste Disposal	This material, if discarded, is not a hazardous waste under RCRA Regulation 40 CFR 261. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

14 Transport Information

ICAO/IATA I	Not regulated.
ICAO/IATA II	Not regulated.
IMDG	Not regulated.
IMDG EMS Fire	Not applicable.
IMDG EMS Spill	Not applicable.
IMDG MFAG	Not applicable.
MARPOL Annex II	Not determined.
USCG Compatibility	Not determined.
U.S. DOT Bulk	Not regulated.
U.S. DOT Non-Bulk	Not regulated.
DOT NAERG	Not applicable.
TDG Bulk	Not regulated.
TDG Non-Bulk	Not regulated.
Mexico	Not regulated.
Mexico Non-Bulk	Not regulated.
Bulk Quantity	85000 liters, 22457 gal.
Non-Bulk Quantity	207.8 liters, 55 gal.

Review classification requirements before shipping materials at elevated temperatures.

15 Regulatory Information

-- Global Chemical Inventories --

USA	All components of this material are on the US TSCA Inventory or are exempt.
Other TSCA Reg.	None known.
EU	All components are in compliance with the EC Seventh amendment Directive 92 /32/EEC.
Japan	May require notification in Japan.
Australia	All components are in compliance with chemical notification requirements in Australia.

New Zealand	All components are in compliance with chemical notification requirements in New Zealand.
Canada	All components are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Substances List.
Switzerland	All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.
Korea	All components are in compliance in Korea.
Philippines	All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).
China	All components of this product are listed on the Inventory of Existing Chemical Substances in China.

-- Other U.S. Federal Regulations --

SARA Ext. Haz. Subst.	This product does not contain greater than 1.0% of any chemical substance on the SARA Extremely Hazardous Substances list.
SARA Section 313	This product does not contain greater than 1.0% (greater than 0.1% for carcinogenic substance) of any chemical substances listed under SARA Section 313.
SARA 311 Classifications	

Acute Hazard	Yes
Chronic Hazard	No
Fire Hazard	No
Reactivity Hazard	No

CERCLA Hazardous Substances	None known.
FDA Approval	Not applicable.

-- State Regulations --

Cal. Prop. 65	This product does not intentionally contain any chemicals known by the State of California to cause cancer and/or birth defects. Moreover, we do not routinely analyze its products for impurities which may be such chemicals.

-- Product Registrations --

U.S. Fuel Registration	Not applicable.
U.S. Dept of Agriculture	This product has not been filed with the USDA to support H2 approvals.
NSF Nonfood Compounds Registration	This product has not been filed with the NSF to support H1 or H2 approvals.
Finnish Registration Number	Not Registered
Swedish Registration Number	Not Registered
Norwegian Registration Number	Not Registered
Danish Registration Number	Not Registered
Swiss Registration Number	Not Registered
Italian Registration Number	Not Registered
Korean Registration Number	Not Registered

-- Other / International --

TDG Regulated Limit.	None known.

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16 Other Information

US NFPA Codes

Health	Fire	Reactivity	Special
2	1	1	N/E

(N/E) - None established

HMIS Codes

Health	Fire	Reactivity
2	1	1

Precautionary Labels

Warning.

- Causes eye irritation.
- May cause skin irritation.

Revision Indicators

Section: 1 Product type.	Changed: 4 August 2008
Section: 2 Principal hazards.	Changed: 4 December 2008
Section: 3 Hazardous ingredients.	Changed: 3 December 2008
Section: 4 Inhalation first aid.	Changed: 3 December 2008
Section: 7 Handling procedures.	Changed: 4 December 2008
Section: 8 Hazardous ingredients.	Changed: 3 December 2008
Section: 8 Ventilation procedures.	Changed: 3 December 2008
Section: 9 Explosion data.	Changed: 4 December 2008
Section: 9 Odor threshold.	Changed: 3 December 2008
Section: 9 Viscosity.	Changed: 3 December 2008
Section: 11 Dermal toxicity.	Changed: 3 December 2008
Section: 11 Oral toxicity.	Changed: 3 December 2008
Section: 11 Respiratory irritation.	Changed: 3 December 2008
Section: 16 Principal hazards.	Changed: 4 December 2008

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 this product. Information contained herein is believed to be true and accurate but all statements or suggestions are made without warranty, expressed 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. Compliance with all applicable federal, state, and local regulations remains the responsibility of the user.

Stepan

MATERIAL SAFETY DATA SHEET

Chembetaine

1. Chemical Product & Company Identification

Material name	AMPHOSOL CS-50
Version #	07
Revision date	08-25-2009
Product code	0577
Chemical class	Betaine
Manufacturer	Stepan Company 22 West Frontage Road Northfield, IL 60093 USA
Emergency	Medical 800-228-5635 Chemtrec 800-424-9300 Chemtrec Int'l 703-527-3887
General information	General (847) 446-7500

2. Hazards Identification

Emergency overview

Moderately irritating to the eyes.Contact with skin may cause irritation.May cause irritation of respiratory tract.

Potential health effects

Eyes	Moderately irritating to the eyes.
Skin	This product may cause irritation to the skin.
Inhalation	Inhalation of vapors or mists of the product may be irritating to the respiratory system.
Ingestion	Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

3. Composition / Information on Ingredients

Components	CAS #	Percent
_Water	7732-18-5	50
_Cocoamidopropyl hydroxysultaine	68139-30-0	43.5
_Sodium chloride	7647-14-5	6.5

4. First Aid Measures

First aid procedures

Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes.If irritation persists get medical attention.
Skin contact	For skin contact flush with large amounts of water.Immediately take off all contaminated clothing.If irritation persists get medical attention.Wash clothing separately before reuse.
Inhalation	If symptoms are experienced, remove source of contamination or move victim to fresh air.If symptoms persist, get medical attention.If the affected person is not breathing, apply artificial respiration.If breathing is difficult, give oxygen.Get medical attention immediately.
Ingestion	If ingestion of a large amount does occur, seek medical attention.Do NOT induce vomiting.

5. Fire Fighting Measures

Extinguishing media

Suitable extinguishing media	Water fog.Foam.Dry chemical powder.Carbon dioxide (CO_2).

Protection of firefighters

Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions	Isolate area. Keep unnecessary personnel away.Stay upwind.Keep out of low areas.Ventilate closed spaces before entering.

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Environmental precautions	Prevent further leakage or spillage if safe to do so.
Methods for containment	Prevent entry into waterways, sewers, basements or confined areas.
Methods for cleaning up	Wear appropriate protective equipment and clothing during clean-up. Small Spills:Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spills:Dike far ahead of liquid spill for later disposal.

7. Handling and Storage

Handling	Avoid contact with skin and eyes.Wash hands thoroughly after handling.
Storage	Store in cool place.Keep in a well-ventilated place.Keep at temperatures between 10C and 50C.

8. Exposure Controls / Personal Protection

Engineering controls	Use general ventilation.Local exhaust is suggested for use, where possible, in enclosed or confined spaces.
Personal protective equipment	
General	Eye wash fountain and emergency showers are recommended.
Eye / face protection	Wear chemical goggles.Face-shield.
Skin protection	Wear suitable protective clothing.Use impervious gloves.
Respiratory protection	If ventilation is not sufficient to effectively prevent buildup of aerosols or vapors, appropriate NIOSH/MSHA respiratory protection must be provided.

9. Physical & Chemical Properties

Physical state	Liquid.
Form	Liquid.
pH	7 - 9 (10% in H2O)
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C)
Flash point	> 201 °F (> 93.9 °C) PMCC
Vapor pressure	20 mm Hg
Specific gravity	9.25 lb/gal @ 25 C
Solubility (water)	Complete
VOC	0 %
RVOC	0 %
Pour point	40 °F (4.4 °C)
Viscosity	150 cps @ 25 C

10. Stability & Reactivity

Chemical stability	Stable at normal conditions.
Incompatible materials	Strong oxidizing agentsThis product may react with strong alkalies.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Product	Test Results
AMPHOSOL CS-50	Acute Oral LD50 Rat: 5000 - 15000 mg/kg

* Estimates for product may be based on additional component data not shown.

Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not mutagenic in AMES Test.

ARP-Taylor46506

12. Ecological Information

Not available.

13. Disposal Considerations

Disposal instructions Dispose in accordance with all applicable regulations.All wastes must be handled in accordance with local, state and federal regulations.Regulations vary.

14. Transport Information

Notes Refer to bill of lading or container label for DOT or other transportation hazard classification, if any.

15. Regulatory Information

Reportable Quantity There is no calculable reportable quantity (RQ) for this product.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: X

NFPA ratings
Health: 1
Flammability: 1
Instability: 0

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ARP-Taylor46508

Issue date	08-25-2009
MSDS Section Changes	Ecological Information: Ecotoxicity

ARP-Taylor46510

Stepan

MATERIAL SAFETY DATA SHEET

Chembetaine

1. Chemical Product & Company Identification

Material name	AMPHOSOL CS-50
Version #	07
Revision date	08-25-2009
Product code	0577
Chemical class	Betaine
Manufacturer	Stepan Company 22 West Frontage Road Northfield, IL 60093 USA
Emergency	Medical 800-228-5635 Chemtrec 800-424-9300 Chemtrec Int'l 703-527-3887
General information	General (847) 446-7500

2. Hazards Identification

Emergency overview Moderately irritating to the eyes.Contact with skin may cause irritation.May cause irritation of respiratory tract.

Potential health effects

Eyes	Moderately irritating to the eyes.
Skin	This product may cause irritation to the skin.
Inhalation	Inhalation of vapors or mists of the product may be irritating to the respiratory system.
Ingestion	Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

3. Composition / Information on Ingredients

Components	CAS #	Percent
_Water	7732-18-5	50
_Cocoamidopropyl hydroxysultaine	68139-30-0	43.5
_Sodium chloride	7647-14-5	6.5

4. First Aid Measures

First aid procedures

Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes.If irritation persists get medical attention.
Skin contact	For skin contact flush with large amounts of water.Immediately take off all contaminated clothing.If irritation persists get medical attention.Wash clothing separately before reuse.
Inhalation	If symptoms are experienced, remove source of contamination or move victim to fresh air.If symptoms persist, get medical attention.If the affected person is not breathing, apply artificial respiration.If breathing is difficult, give oxygen.Get medical attention immediately.
Ingestion	If ingestion of a large amount does occur, seek medical attention.Do NOT induce vomiting.

5. Fire Fighting Measures

Extinguishing media

Suitable extinguishing media	Water fog.Foam.Dry chemical powder.Carbon dioxide (CO_2).

Protection of firefighters

Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions Isolate area. Keep unnecessary personnel away.Stay upwind.Keep out of low areas.Ventilate closed spaces before entering.

Environmental precautions	Prevent further leakage or spillage if safe to do so.
Methods for containment	Prevent entry into waterways, sewers, basements or confined areas.
Methods for cleaning up	Wear appropriate protective equipment and clothing during clean-up. Small Spills:Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spills:Dike far ahead of liquid spill for later disposal.

7. Handling and Storage

Handling	Avoid contact with skin and eyes.Wash hands thoroughly after handling.
Storage	Store in cool place.Keep in a well-ventilated place.Keep at temperatures between 10C and 50C.

8. Exposure Controls / Personal Protection

Engineering controls	Use general ventilation.Local exhaust is suggested for use, where possible, in enclosed or confined spaces.
Personal protective equipment	
General	Eye wash fountain and emergency showers are recommended.
Eye / face protection	Wear chemical goggles.Face-shield.
Skin protection	Wear suitable protective clothing.Use impervious gloves.
Respiratory protection	If ventilation is not sufficient to effectively prevent buildup of aerosols or vapors, appropriate NIOSH/MSHA respiratory protection must be provided.

9. Physical & Chemical Properties

Physical state	Liquid.
Form	Liquid.
pH	7 - 9 (10% in H2O)
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C)
Flash point	> 201 °F (> 93.9 °C) PMCC
Vapor pressure	20 mm Hg
Specific gravity	9.25 lb/gal @ 25 C
Solubility (water)	Complete
VOC	0 %
RVOC	0 %
Pour point	40 °F (4.4 °C)
Viscosity	150 cps @ 25 C

10. Stability & Reactivity

Chemical stability	Stable at normal conditions.
Incompatible materials	Strong oxidizing agentsThis product may react with strong alkalies.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Product	Test Results
AMPHOSOL CS-50	Acute Oral LD50 Rat: 5000 - 15000 mg/kg

* Estimates for product may be based on additional component data not shown.

Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not mutagenic in AMES Test.

12. Ecological Information

Not available.

13. Disposal Considerations

Disposal instructions Dispose in accordance with all applicable regulations.All wastes must be handled in accordance with local, state and federal regulations.Regulations vary.

14. Transport Information

Notes Refer to bill of lading or container label for DOT or other transportation hazard classification, if any.

15. Regulatory Information

Reportable Quantity There is no calculable reportable quantity (RQ) for this product.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 302 extremely hazardous substance No

Section 311 hazardous chemical No

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: X

NFPA ratings
Health: 1
Flammability: 1
Instability: 0

Disclaimer Terms and Conditions. This MSDS is designed only as guidance for the products to which it applies. To the greatest extent permitted by applicable law, nothing contained herein creates any legal obligation including contractual obligations, expressed or implied warranties, including any warranties of merchantibility or fitness for particular purpose; or confers any intellectual property rights, including rights to use trademarks or a license to use patents, issued or pending. The information contained herein is based on the manufacturer's own study and the work of others, and is subject to change at any time without further notice. There is no warranty, expressed or implied, as to the accuracy, completeness or adequacy of the information contained herein, and neither the provider nor the manufacturer (nor the agents, directors, officers, contractors or employees of either) are liable to any party for any damages of any nature, including direct, special or consequential damages arising out of or in connection with the accuracy, completeness, adequacy or furnishing of any information in this MSDS, or in any other way related (directly or indirectly) to this MSDS. The receipt and use of this information constitutes consent to these terms and conditions.

Issue date	08-25-2009
MSDS Section Changes	Ecological Information: Ecotoxicity

—plenco—

EXPERIMENTAL/LAB SAMPLE PRODUCT
MATERIAL SAFETY DATA SHEET
PLASTICS ENGINEERING COMPANY

DATE: February 2007

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 14288 Resol (CRC)	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 37337-65-8	CHEMICAL NAME AND SYNONYMS Single Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer is not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). The primary health risk from exposure to the product "as sold" is irritation. Ingestion and contact with skin and eyes should be avoided. "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol, formaldehyde and ammonia may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - Irritant to eyes, lungs and skin. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the State of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans

AMMONIA - Irritant to eyes, mucous membranes and respiratory tract.

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Material presents a nuisance dust hazard. See Section V for possible phenol hazard.

INGESTION:
If conscious, give water immediately and induce vomiting by placing finger down throat. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372		%	TLV (Units)
henol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	less than	0.3	
*Formaldehyde 50-00-0 ACGIH - 0.3 ppm; OSHA - 0.75 ppm; STEL 2 ppm	less than	3.0	

SECTION VI – PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3 74.9 – 81.1 lbs/cu ft
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	No Data	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Coarse ground or pastille with slight odor of phenol.

SECTION VII – REACTIVITY DATA

STABILITY	UNSTABLE ☐	CONDITIONS TO AVOID Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain – phenol, formaldehyde or ammonia

HAZARDOUS POLYMERIZATION	MAY OCCUR ☐	CONDITIONS TO AVOID Heating, oxidizers
	WILL NOT OCCUR ☒	

SECTION VIII – CONTROL MEASURES

VENTILATION	LOCAL EXHAUST Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	SPECIAL
	MECHANICALS (General) Use explosion proof motors.	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES Gloves recommended	EYE PROTECTION Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX – SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life, Gas Blanket)
Store in a cool, dry place. Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices. Note: empty containers contain product residue. All safety warning labels must be observed. Do not refill empty containers.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification Plastic Materials Viz:	D.O.T. Hazard Class Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Theodore N. Morrison EXT. 3822 TITLE Supervisor Resin Application & Development PLENCO 14288

Chemical Name: **Dow Corning ® 2-8692 Fluid (Organofunctional Siloxane)**

CAS#: 556-67-2

Emergency Phone Number: Chemtec (800)424-9300 **24 hour emergency (989)496-5900**

NFPA Code: Health= 1 Fire= 2 Reactivity= 0

REF :(0 = Not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme)

Hazards:

Static electricity will accumulate and may ignite vapors. Prevent possible fire hazard by bonding and grounding or inert gas purge. Keep container closed and away from heat, sparks, and flame.

Exposure and Required PPE:

Safety glasses (minimum), proper gloves, respirator in enclosed areas without proper ventilation. Use good hygiene.

First Aid:

Flush eyes with water for 15 minutes. Wash skin with soap and water. Move to fresh air. Low ingestion hazard in normal use.

Emergency Response Information:

Large fires use dry chemical, foam, or water spray. Full protective clothing and breathing apparatus. Small fires use carbon dioxide (CO2), dry chemical or water spray. Water can be used to cool fire exposed containers.

Handling and Storage:

Avoid skin/eye contact. Use proper ventilation. Avoid breathing vapor, mist, dust, or fumes. Keep container closed. Static electricity will accumulate and may ignite vapors. Prevent possible fire hazard by bonding and grounding or inert gas purge. Keep container closed and away from heat, sparks, and flame.

Accidental Release and Clean-up

Spills require full face respirator, proper gloves and clothing.

Physical Characteristics

Straw colored liquid. Odor= Not available.

Chemical Properties

Melting Point: Not Det Boiling Point: >35C Vapor Density: Not Det Flash Point: 189F

Solubility: Not determined Specific Gravity: 1.030 Specific gravity of Water= 1.0

Other Information:

Hazardous decomposition may evolve Silicon Dioxide, carbon oxides and traces of incompletely burned carbon compounds, and formaldehyde (which causes cancer). **See attached MSDS.**

DOW CORNING

DOW CORNING CORPORATION
Material Safety Data Sheet

DOW CORNING(R) 2-8692 FLUID

1. PRODUCT AND COMPANY IDENTIFICATION

Dow Corning Corporation
South Saginaw Road
Midland, Michigan 48686

24 Hour Emergency Telephone: (989) 496-5900
Customer Service: (989) 496-6000
Product Disposal Information: (989) 496-6315
CHEMTREC: (800) 424-9300

MSDS No.: 03325822

Revision Date: 2009/06/23

Generic Description: Organofunctional Siloxane
Physical Form: Liquid
Color: Straw
Odor: Not available

NFPA Profile: Health 1 Flammability 2 Instability/Reactivity 0

Note: NFPA = National Fire Protection Association

2. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Acute Effects

Eye: Direct contact may cause mild irritation.

Skin: No significant irritation expected from a single short-term exposure.

Inhalation: No significant effects expected from a single short-term exposure.

Oral: Low ingestion hazard in normal use.

Prolonged/Repeated Exposure Effects

Skin: Repeated or prolonged exposure may cause irritation.

Inhalation: Overexposure by inhalation may injure the following organ(s): Reproductive System.

Oral: No known applicable information.

Signs and Symptoms of Overexposure

No known applicable information.

Medical Conditions Aggravated by Exposure

No known applicable information.

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions,

component data and/or expert review of the product. Please refer to Section 11 for the detailed toxicology information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS Number	Wt %	Component Name
556-67-2	3.0 - 7.0	Octamethylcyclotetrasiloxane
541-02-6	1.0 - 5.0	Decamethylcyclopentasiloxane

The above components are hazardous as defined in 29 CFR 1910.1200.

4. FIRST AID MEASURES

Eye:	Immediately flush with water for 15 minutes.
Skin:	Remove from skin and wash thoroughly with soap and water or waterless cleanser. Get medical attention if irritation or other ill effects develop or persist.
Inhalation:	Remove to fresh air. Get medical attention if ill effects persist.
Oral:	No first aid should be needed.
Notes to Physician:	Treat according to person's condition and specifics of exposure.

5. FIRE FIGHTING MEASURES

Flash Point:	189.9 °F / 87.7 °C (Closed Cup)
Autoignition Temperature:	Not determined.
Flammability Limits in Air:	Not determined.
Extinguishing Media:	On large fires use dry chemical, foam or water spray. On small fires use carbon dioxide (CO_2), dry chemical or water spray. Water can be used to cool fire exposed containers.
Fire Fighting Measures:	Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.
Unusual Fire Hazards:	None.

6. ACCIDENTAL RELEASE MEASURES

Containment/Clean up: Determine whether to evacuate or isolate the area according to your local emergency plan. Observe all personal protection equipment recommendations described in Sections 5 and 8. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbant. Clean area as appropriate since spilled materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbant or cleaning materials appropriately, since spontaneous heating may occur. Local, state and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 13 and 15 of this MSDS provide information regarding certain federal and state requirements.

Note: See section 8 for Personal Protective Equipment for Spills. Call (989) 496-5900, if additional information is required.

7. HANDLING AND STORAGE

Use with adequate ventilation. Avoid eye contact. Avoid skin contact. Avoid breathing vapor, mist, dust, or fumes. Keep container closed.

Static electricity will accumulate and may ignite vapors. Prevent a possible fire hazard by bonding and grounding or inert gas purge. Keep container closed and away from heat, sparks, and flame.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

CAS Number	Component Name	Exposure Limits
556-67-2	Octamethylcyclotetrasiloxane	Dow Corning guide: TWA 10 ppm.
541-02-6	Decamethylcyclopentasiloxane	Dow Corning guide: TWA 10 ppm.

Engineering Controls

Local Ventilation: Recommended.
General Ventilation: Recommended.

Personal Protective Equipment for Routine Handling

Eyes: Use proper protection - safety glasses as a minimum.

Skin: Washing at mealtime and end of shift is adequate.

Suitable Gloves:	Avoid skin contact by implementing good industrial hygiene practices and procedures. Select and use gloves and/or protective clothing to further minimize the potential for skin contact. Consult with your glove and/or personnel protective equipment manufacturer for selection of appropriate compatible materials.
Inhalation:	Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. IH personnel can assist in judging the adequacy of existing engineering controls.
Suitable Respirator:	General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators.

Personal Protective Equipment for Spills

Eyes:	Use full face respirator.
Skin:	Washing at mealtime and end of shift is adequate.
Inhalation/Suitable Respirator:	Respiratory protection recommended. Follow OSHA Respirator Regulations (29 CFR 1910.134) and use NIOSH/MHSA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.
Precautionary Measures:	Avoid eye contact. Avoid skin contact. Avoid breathing vapor, mist, dust, or fumes. Keep container closed. Use reasonable care.
Comments:	When heated to temperatures above 150 C (300 F) in the presence of air, product can form formaldehyde vapors. Formaldehyde is a potential cancer hazard and a known skin and respiratory sensitizer. Vapors irritate eyes, nose, and throat. Safe handling conditions may be maintained by keeping vapor conditions within the OSHA permissible exposure limit for formaldehyde.

Note: These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions. For further information regarding aerosol inhalation toxicity, please refer to the guidance document regarding the use of silicone-based materials in aerosol applications that has been developed by the silicone industry (www.SEHSC.com) or contact the Dow Corning customer service group.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form:	Liquid
Color:	Straw
Odor:	Not available
Specific Gravity @ 25°C:	1.030

Viscosity:	140 cSt
Freezing/Melting Point:	Not determined.
Boiling Point:	> 35 °C
Vapor Pressure @ 25°C:	Not determined.
Vapor Density:	Not determined.
Solubility in Water:	Not determined.
pH:	Not determined.
Volatile Content:	Not determined.
Flash Point:	189.9 °F / 87.7 °C (Closed Cup)
Autoignition Temperature:	Not determined.
Flammability Limits in Air:	Not determined.

Note: The above information is not intended for use in preparing product specifications. Contact Dow Corning before writing specifications.

10. STABILITY AND REACTIVITY

Chemical Stability:	Stable.
Hazardous Polymerization:	Hazardous polymerization will not occur.
Conditions to Avoid:	None.
Materials to Avoid:	Oxidizing material can cause a reaction.

Hazardous Decomposition Products

Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Silicon dioxide. Carbon oxides and traces of incompletely burned carbon compounds. Formaldehyde.

11. TOXICOLOGICAL INFORMATION

Component Toxicology Information

Recent results from a 2 year repeated vapour inhalation exposure study to rats of octamethylcyclotetrasiloxane (D4) indicate effects (benign uterine adenomas) in the uterus of female animals. These effects, which have been shown to be rat-specific, occur at the highest exposure dose (700 ppm) only, a level that greatly exceeds typical workplace or consumer exposures. Industrial, commercial, or consumer uses of products containing D4 do not represent a risk to humans.

Octamethylcyclotetrasiloxane administered to rats by inhalation at concentrations of 500 and 700 ppm resulted in statistically significant decreases in the number of pups born and the live litter size in both the first and second generations. Prolonged estrous cycles, and decreased mating and fertility indices were observed following 700 ppm exposure in the second generation only. There were also increases in the incidence of deliveries of offspring extending over an unusually long time period (dystocia). Subsequent mode of action work demonstrated the effect on reproduction

in female rats is due to delayed ovulation caused by a treatment-related delay in or blockage of the luteinizing hormone (LH) surge on the day of proestrus. This mode of action is not considered relevant to humans.

Recent results from a 2 year repeated vapour inhalation exposure study to rats of decamethylcyclopentasiloxane (D5) indicate effects (uterine endometrial tumors) in female animals. These effects, which have been shown to be rat-specific, occur at the highest exposure dose (160 ppm) only, a level that greatly exceeds typical workplace or consumer exposures. Industrial, commercial, or consumer uses of products containing D5 do not represent a risk to humans.

Special Hazard Information on Components

Reproductive Toxicity

CAS Number	Wt %	Component Name	
556-67-2	3.0 - 7.0	Octamethylcyclotetrasiloxane	Evidence of reproductive effects in laboratory animals.

12. ECOLOGICAL INFORMATION

Environmental Fate and Distribution

Complete information is not yet available.

Environmental Effects

Complete information is not yet available.

Fate and Effects in Waste Water Treatment Plants

Complete information is not yet available.

Ecotoxicity Classification Criteria

Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100
Acute Terrestrial Toxicity	<=100	>100 and <= 2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

13. DISPOSAL CONSIDERATIONS

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? No

State or local laws may impose additional regulatory requirements regarding disposal.Call (989) 496-6315, if additional

information is required.

14. TRANSPORT INFORMATION

DOT Road Shipment Information (49 CFR 172.101)

Proper Shipping Name:	Combustible liquid, n.o.s.
Hazard Technical Name:	Octamethylcyclotetrasiloxane / Decamethylcyclopentasiloxane
Hazard Class:	C
UN/NA Number:	NA 1993
Packing Group:	III
Hazard Label(s):	None
Remarks:	Above applies only to containers over 119 gallons or 450 liters.

Ocean Shipment (IMDG)

Not subject to IMDG code.

Air Shipment (IATA)

Not subject to IATA regulations.

Remarks: VENTED PACKAGES ARE FORBIDDEN FOR AIR TRANSPORT.

Call Dow Corning Transportation, (989) 496-8577, if additional information is required.

15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings

Section 302 Extremely Hazardous Substances (40 CFR 355):
None.

Section 304 CERCLA Hazardous Substances (40 CFR 302):
None.

Section 311/312 Hazard Class (40 CFR 370):

Acute: No
Chronic: Yes
Fire: Yes
Pressure: No
Reactive: No

Section 313 Toxic Chemicals (40 CFR 372):

None present or none present in regulated quantities.

Note: Chemicals are listed under the 313 Toxic Chemicals section only if they meet or exceed a reporting threshold.

Supplemental State Compliance Information

California

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer, birth defects or other reproductive harm.

None known.

Massachusetts

No ingredient regulated by MA Right-to-Know Law present.

New Jersey

CAS Number	Wt %	Component Name
102783-01-7	> 60.0	Dimethyl siloxane, ethoxylated 3-hydroxypropyl-terminated
27274-31-3	7.0 - 13.0	Polyethylene oxide monoallyl ether
556-67-2	3.0 - 7.0	Octamethylcyclotetrasiloxane
541-02-6	1.0 - 5.0	Decamethylcyclopentasiloxane
None	1.0 - 5.0	Dimethylcyclosiloxanes

Pennsylvania

CAS Number	Wt %	Component Name
102783-01-7	> 60.0	Dimethyl siloxane, ethoxylated 3-hydroxypropyl-terminated

27274-31-3	7.0 - 13.0	Polyethylene oxide monoallyl ether
556-67-2	3.0 - 7.0	Octamethylcyclotetrasiloxane

16. OTHER INFORMATION

Prepared by: Dow Corning Corporation

These data are offered in good faith as typical values and not as product specifications. 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.

(R) indicates Registered Trademark

DOW CORNING

DOW CORNING CORPORATION
Material Safety Data Sheet

Version: 1.3
Revision Date: 2011/10/17

DOW CORNING(R) Z-6137 SILANE

1. PRODUCT AND COMPANY IDENTIFICATION

Dow Corning Corporation
South Saginaw Road
Midland, Michigan 48686

24 Hour Emergency Telephone: (989) 496-5900
Customer Service: (989) 496-6000
Product Disposal Information: (989) 496-6315
CHEMTREC: (800) 424-9300

MSDS No.: 02459965

Revision Date: 2011/10/17

Generic Description: Organic silane
Physical Form: Liquid
Color: Not available
Odor: Not available

NFPA Profile: Health 1 Flammability 1 Instability/Reactivity 0

Note: NFPA = National Fire Protection Association

2. HAZARDS IDENTIFICATION

POTENTIAL HEALTH EFFECTS

Acute Effects

Eye: Direct contact may cause mild irritation.

Skin: May cause moderate irritation.

Inhalation: No significant effects expected from a single short-term exposure.

Oral: Low ingestion hazard in normal use.

Prolonged/Repeated Exposure Effects

Skin: No known applicable information.

Inhalation: No known applicable information.

Oral: No known applicable information.

Signs and Symptoms of Overexposure

No known applicable information.

Medical Conditions Aggravated by Exposure

No known applicable information.

The above listed potential effects of overexposure are based on actual data, results of studies performed upon similar compositions, component data and/or expert review of the product. Please refer to Section 11 for the detailed toxicology information.

3. COMPOSITION/INFORMATION ON INGREDIENTS

CAS Number	Wt %	Component Name
68400-09-9	15.0 - 35.0	(3-((2-Aminoethyl)amino)propyl) silanetriol homopolymer

The above components are hazardous as defined in 29 CFR 1910.1200.

4. FIRST AID MEASURES

Eye:	Immediately flush the contaminated eye(s) with lukewarm, gently flowing water for 5 minutes while holding the eyelid(s) open. Obtain medical attention.
Skin:	Remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Quickly and gently blot or brush away excess chemical. Flush with lukewarm gently flowing water for 15 minutes. If irritation persists, repeat flushing. If irritation persists, obtain medical advice.
Inhalation:	If symptoms are experienced remove source of contamination or move victim to fresh air. If irritation persists, obtain medical advice.
Oral:	If irritation or discomfort occur, obtain medical advice.
Notes to Physician:	Treat according to person's condition and specifics of exposure.

5. FIRE FIGHTING MEASURES

Flash Point:	> 212 °F / > 100 °C (Closed Cup)
Autoignition Temperature:	Not determined.
Flammability Limits in Air:	Not determined.
Extinguishing Media:	On large fires use dry chemical, foam or water spray. On small fires use carbon dioxide (CO_2), dry chemical or water spray. Water can be used to cool fire exposed containers.
Fire Fighting Measures:	Self-contained breathing apparatus and protective clothing should be worn in fighting large fires involving chemicals. Determine the need to evacuate or isolate the area according to your local emergency plan. Use water spray to keep fire exposed containers cool.
Unusual Fire Hazards:	None.

6. ACCIDENTAL RELEASE MEASURES

Containment/Clean up: Determine whether to evacuate or isolate the area according to your local emergency plan. Observe all personal protection equipment recommendations described in Sections 5 and 8. For large spills, provide diking or other appropriate containment to keep material from spreading. If diked material can be pumped, store recovered material in appropriate container. Clean up remaining materials from spill with suitable absorbant. Clean area as appropriate since spilled materials, even in small quantities, may present a slip hazard. Final cleaning may require use of steam, solvents or detergents. Dispose of saturated absorbant or cleaning materials appropriately, since spontaneous heating may occur. Local, state and federal laws and regulations may apply to releases and disposal of this material, as well as those materials and items employed in the cleanup of releases. You will need to determine which federal, state and local laws and regulations are applicable. Sections 13 and 15 of this MSDS provide information regarding certain federal and state requirements.

Note: See Section 8 for Personal Protective Equipment for Spills. Call (989) 496-5900, if additional information is required.

7. HANDLING AND STORAGE

Use with adequate ventilation. Avoid eye contact. Avoid skin contact.

Use reasonable care and store away from oxidizing materials.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Component Exposure Limits

There are no components with workplace exposure limits.

Engineering Controls

Local Ventilation: None should be needed.
General Ventilation: Recommended.

Personal Protective Equipment for Routine Handling

Eyes: Use proper protection - safety glasses as a minimum.

Skin: Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.

Suitable Gloves:	Avoid skin contact by implementing good industrial hygiene practices and procedures. Select and use gloves and/or protective clothing to further minimize the potential for skin contact. Consult with your glove and/or personnel protective equipment manufacturer for selection of appropriate compatible materials.
Inhalation:	No respiratory protection should be needed.
Suitable Respirator:	None should be needed.

Personal Protective Equipment for Spills

Eyes:	Use proper protection - safety glasses as a minimum.
Skin:	Wash at mealtime and end of shift. Contaminated clothing and shoes should be removed as soon as practical and thoroughly cleaned before reuse. Chemical protective gloves are recommended.
Inhalation/Suitable Respirator:	No respiratory protection should be needed.
Precautionary Measures:	Avoid eye contact. Avoid skin contact. Use reasonable care.
Comments:	When heated to temperatures above 150 degrees C in the presence of air, product can form formaldehyde vapors. Formaldehyde is a potential cancer hazard, a known skin and respiratory sensitizer, and an irritant to the eyes, nose, throat, skin, and digestive system. Safe handling conditions may be maintained by keeping vapor concentrations within the OSHA Permissible Exposure Limit for formaldehyde.

Note: These precautions are for room temperature handling. Use at elevated temperature or aerosol/spray applications may require added precautions. For further information regarding aerosol inhalation toxicity, please refer to the guidance document regarding the use of silicone-based materials in aerosol applications that has been developed by the silicone industry (www.SEHSC.com) or contact the Dow Corning customer service group.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical Form:	Liquid
Color:	Not available
Odor:	Not available
Specific Gravity @ 25°C:	1
Viscosity:	1 mm2/s
Freezing/Melting Point:	
Boiling Point:	100 °C
Vapor Pressure @ 25°C:	1.7 kPa
Vapor Density:	Not determined.
Solubility in Water:	Not determined.
pH:	10
Volatile Content:	Not determined.

Flash Point: > 212 °F / > 100 °C (Closed Cup)
Autoignition Temperature: Not determined.
Flammability Limits in Air: Not determined.

Note: The above information is not intended for use in preparing product specifications. Contact Dow Corning before writing specifications.

10. STABILITY AND REACTIVITY

Chemical Stability: Stable.

Hazardous Polymerization: Hazardous polymerization will not occur.

Conditions to Avoid: None.

Materials to Avoid: Oxidizing material can cause a reaction.

Hazardous Decomposition Products

Thermal breakdown of this product during fire or very high heat conditions may evolve the following decomposition products: Carbon oxides and traces of incompletely burned carbon compounds. Nitrogen oxides. Silicon dioxide. Formaldehyde.

11. TOXICOLOGICAL INFORMATION

Special Hazard Information on Components

No known applicable information.

12. ECOLOGICAL INFORMATION

Environmental Fate and Distribution

Complete information is not yet available.

Environmental Effects

Complete information is not yet available.

Fate and Effects in Waste Water Treatment Plants

Complete information is not yet available.

Ecotoxicity Classification Criteria

Hazard Parameters (LC50 or EC50)	High	Medium	Low
Acute Aquatic Toxicity (mg/L)	<=1	>1 and <=100	>100

Acute Terrestrial Toxicity	<=100	>100 and <= 2000	>2000

This table is adapted from "Environmental Toxicology and Risk Assessment", ASTM STP 1179, p.34, 1993.

This table can be used to classify the ecotoxicity of this product when ecotoxicity data is listed above. Please read the other information presented in the section concerning the overall ecological safety of this material.

13. DISPOSAL CONSIDERATIONS

RCRA Hazard Class (40 CFR 261)

When a decision is made to discard this material, as received, is it classified as a hazardous waste? No

State or local laws may impose additional regulatory requirements regarding disposal. Call (989) 496-6315, if additional information is required.

14. TRANSPORT INFORMATION

DOT Road Shipment Information (49 CFR 172.101)

Not subject to DOT.

Ocean Shipment (IMDG)

Not subject to IMDG code.

Air Shipment (IATA)

Not subject to IATA regulations.

Call Dow Corning Transportation, (989) 496-8577, if additional information is required.

15. REGULATORY INFORMATION

Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200.

TSCA Status: All chemical substances in this material are included on or exempted from listing on the TSCA Inventory of Chemical Substances.

EPA SARA Title III Chemical Listings

Section 302 Extremely Hazardous Substances (40 CFR 355):
None.

Section 304 CERCLA Hazardous Substances (40 CFR 302):

CAS Number	Wt %	Component Name
67-56-1	0.9	Methyl alcohol

Section 311/312 Hazard Class (40 CFR 370):

Acute: Yes
Chronic: No
Fire: No
Pressure: No
Reactive: No

Section 313 Toxic Chemicals (40 CFR 372):

None present or none present in regulated quantities.

Note: Chemicals are listed under the 313 Toxic Chemicals section only if they meet or exceed a reporting threshold.

Supplemental State Compliance Information

California

Warning: This product contains the following chemical(s) listed by the State of California under the Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) as being known to cause cancer, birth defects or other reproductive harm.

None known.

Massachusetts

No ingredient regulated by MA Right-to-Know Law present.

New Jersey

CAS Number	Wt %	Component Name
7732-18-5	70.0 - 90.0	Water
68400-09-9	15.0 - 35.0	(3-((2-Aminoethyl)amino)propyl) silanetriol homopolymer

Pennsylvania

CAS Number	Wt %	Component Name
7732-18-5	70.0 - 90.0	Water
68400-09-9	15.0 - 35.0	(3-((2-Aminoethyl)amino)propyl) silanetriol homopolymer

16. OTHER INFORMATION

Prepared by: Dow Corning Corporation

These data are offered in good faith as typical values and not as product specifications. 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.

(R) indicates Registered Trademark

Chemical Name: **Hexamethylenetetramine HEXA**

CAS#: 100-97-0

Emergency Phone Number: (800) 424-9300 Chemtrec **Interatlas Chemical**

NFPA Code: Health= 2 Fire= 3 Reactivity= 1

REF:(0 = Not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme)

Hazards:

Danger! Flammable Solid, Sensitizer, may cause severe allergic respiratory and skin reaction. Harmful if swallowed. Target Organs: skin, eyes (lens or cornea), mucous membranes

Exposure and Required PPE:

Eye splash goggles, respirator, Tyvek suit, latex gloves

First Aid:

Rinse eyes for 15 minutes, remove contaminated clothing and thoroughly wash area with soap and water, give several glasses of water or milk and vomiting may occur spontaneously, but **DO NOT induce vomiting, seek medical attention.**

Emergency Response Information:

Proper PPE w/ SCBA w/ full face-piece operated in positive pressure mode. Gives off irritating vapors, during a fire highly toxic gases may be generated by thermal decomposition.
Extinguishing media of fog, dry chemical carbon dioxide or regular foam.

Handling and Storage:

Wear proper PPE. Store in a cool dry well-ventilated area, in original containers. Keep away from heat sources. Do not mix with acids or oxidizing materials. Maintain clean hygiene and work environment.

Accidental Release and Clean-up

Remove all sources of ignition, ventilate area, Wear proper PPE, Clean up in a manner not to disperse dust. Contain and dispose of via licensed waste disposal contractor. Inform authorities if product has caused environmental pollution.

Physical Characteristics

Solid, Crystalline power, Mild odor

Chemical Properties

Melting Point: Boiling Point: 505F Vapor Density: 4.9 Flash Point: 482 F

Solubility: Water Specific Gravity: 1.33 Specific gravity of Water= 1.0

Other Information:

Hazardous decomposition products: Nitrogen, oxides of carbons, formaldehyde
See attached MSDS

Conforms to ANSI Z400.5-2004 Standard (United States, Canada, Mexico).

Material Safety Data Sheet

Hexamethylenetetramine

InterAtlas Chemical

1. Product and company identification

Product name	: Hexamethylenetetramine
Material uses	: Not available.
Supplier/Manufacturer	: InterAtlas Chemical Inc. 63 Church Street, Suite 403 St. Catharines, ON CANADA L2R 3C4 Tel. 905.684.9991 Fax. 905.684.4504
Validation date	: 06/20/2008
Responsible name	: Atrion Regulatory Services, Inc.
In case of emergency	: CHEMTREC, U.S. : +1-800-424-9300 International: +1-703-527-3887

2. Hazards identification

Physical state	: Solid.
Odor	: Mild.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	: DANGER! FLAMMABLE SOLID. MAY CAUSE SEVERE ALLERGIC RESPIRATORY AND SKIN REACTION. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. Flammable solid. May cause sensitization by inhalation and skin contact. Keep away from heat, sparks and flame. Do not get on skin or clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.
Potential acute health effects	
Inhalation	: May cause sensitization by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
Ingestion	: No known significant effects or critical hazards.
Skin	: May cause sensitization by skin contact.
Eyes	: No known significant effects or critical hazards.
Potential chronic health effects	: Carcinogenicity: Not classified or listed by IARC, NTP, OSHA and ACGIH. Mutagenicity: Not available. Teratogenicity: Not available.
Target organs	: May cause damage to the following organs: mucous membranes, skin, eye, lens or cornea.
Medical conditions aggravated by over-exposure	: Pre-existing respiratory and skin disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

3. Composition/information on ingredients

United States		
Name	CAS number	%
Hexamethylenetetramine	100-97-0	60 - 100

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3. Composition/information on ingredients

Canada

Name	CAS number	%
Hexamethylenetetramine	100-97-0	60 - 100

Mexico

Name	UN number	IDLH	Classification H	F	R	Special	CAS number	%
Hexamethylenetetramine	UN1328	-	2	3	0		100-97-0	60 - 100

4. First aid measures

Eye contact : Check for and remove any contact lenses. In case of contact with eyes, rinse immediately with plenty of water. Get medical attention.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 20 minutes. Get medical attention.

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention.

Ingestion : Do not induce vomiting. Never give anything by mouth to an unconscious person. Get medical attention.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

5. Fire-fighting measures

Flammability of the product : Flammable solid.

Extinguishing media

Suitable : Use an extinguishing agent suitable for the surrounding fire.

Not suitable : None known.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

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6. Accidental release measures

Small spill : Move containers from spill area. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor.

Large spill : Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Vacuum or sweep up material and place in a designated, labeled waste container. Dispose of via a licensed waste disposal contractor. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

	Canada
Product name	Exposure limits
Hexamethylenetetramine	**CA Ontario Provincial (Canada, 3/2007).** STEV: 0.35 ppm 15 minute(s). STEV: 2 mg/m³ 15 minute(s).

Consult local authorities for acceptable exposure limits.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.

Engineering measures : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Eyes : Safety glasses.

Skin : Lab coat.

Respiratory : A respirator is not needed under normal and intended conditions of use.

Hands : Natural rubber (latex).

Personal protective equipment (Pictograms) :

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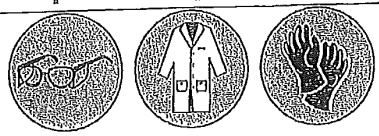
8. Exposure controls/personal protection



HMIS Code/Personal protective equipment	: B
Environmental exposure controls	: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

Physical state	: Solid.
Flash point	: Closed cup: 249.85°C (481.7°F)
Odor	: Mild.
Molecular weight	: 140.22 g/mole
Molecular formula	: $C_6H_{12}N_4$
pH	: 8.4 [Conc. (% w/w): 28%]
Boiling/condensation point	: 263°C (505.4°F)
Melting/freezing point	: Sublimation temperature: 263°C (505.4°F)
Specific gravity	: 1.331 g/cm^3 [20°C (68°F)]
Vapor density	: 4.83 [Air = 1]

10. Stability and reactivity

Stability	: The product is stable.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to avoid	: No specific data.
Incompatibility with various substances	: Reactive or incompatible with the following materials: oxidizing materials.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

11. Toxicological information

Acute toxicity

Inhalation	: May cause sensitization by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
Ingestion	: No known significant effects or critical hazards.
Skin	: May cause sensitization by skin contact.
Eyes	: No known significant effects or critical hazards.

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12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Species	Exposure	Result
Hexamethylenetetramine	Daphnia	48 hours	Acute EC50 36000000 to 43390000 ug/L Fresh water
	Fish	96 hours	Acute LC50 >10000000 ug/L Marine water

Other adverse effects : No known significant effects or critical hazards.

Environmental precautions : No known significant effects or critical hazards.

Products of degradation : Products of degradation: carbon oxides (CO, CO_2) and water, Ammonia (NH_3), hydrogen cyanide (HCN).

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

AERG : 133

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN1328	HEXAMETHYLENETETRAMINE	4.1	III		**Limited quantity** Yes. **Packaging instruction** Passenger aircraft Quantity limitation: 25 kg Cargo aircraft Quantity limitation: 100 kg **Special provisions** A1, IB8, IP3, T1
TDG Classification	UN1328	HEXAMETHYLENETETRAMINE	4.1	III		-
Mexico Classification	UN1328	HEXAMETHYLENAMINE	4.1	III		-

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14 . Transport information

IMDG Class	UN1328	HEXAMETHYLENETETRAMINE	4.1	III		-
IATA-DGR Class	UN1328	HEXAMETHYLENETETRAMINE	4.1	III		Passenger and Cargo AircraftQuantity limitation: 25 kg Cargo Aircraft Only Quantity limitation: 100 kg Limited Quantities - Passenger Aircraft Quantity limitation: 10 kg

PG* : Packing group

15 . Regulatory information

United States

HCS Classification : Flammable solid
Sensitizing material
Target organ effects

U.S. Federal regulations : **United States inventory (TSCA 8b):** This material is listed or exempted.
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification No products were found.
SARA 302/304/311/312 hazardous chemicals: Hexamethylenetetramine
SARA 311/312 MSDS distribution - chemical inventory - hazard identification Hexamethylenetetramine: Fire hazard, Immediate (acute) health hazard
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.
Clean Air Act (CAA) 112 accidental release prevention No products were found.
Clean Air Act (CAA) 112 regulated flammable substances No products were found.
Clean Air Act (CAA) 112 regulated toxic substances No products were found.

State regulations : **Connecticut Carcinogen Reporting:** This material is not listed.
Connecticut Hazardous Material Survey: This material is not listed.
Florida substances: This material is not listed.
Illinois Chemical Safety Act This material is not listed.
Illinois Toxic Substances Disclosure to Employee Act This material is not listed.
Louisiana Reporting: This material is not listed.
Louisiana Spill: This material is not listed.
Massachusetts Spill: This material is not listed.
Massachusetts Substances: This material is not listed.
Michigan Critical Material: This material is not listed.
Minnesota Hazardous Substances: This material is not listed.
New Jersey Hazardous Substances: This material is listed.
New Jersey Spill: This material is not listed.
New Jersey Toxic Catastrophe Prevention Act: This material is not listed.
New York Acutely Hazardous Substances: This material is not listed.
New York Toxic Chemical Release Reporting: This material is not listed.
Pennsylvania RTK Hazardous Substances: This material is not listed.
Rhode Island Hazardous Substances: This material is not listed.

California Prop. 65
No products were found.

Canada

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15 . Regulatory information

WHMIS (Canada) : Class B-4: Flammable solid.
Class D-2B: Material causing other toxic effects (Toxic).

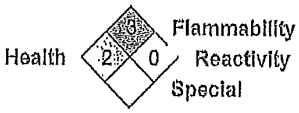
Canadian lists : CEPA Toxic substances: This material is not listed.
Canadian ARET: This material is not listed.
Canadian NPRI: This material is not listed.
Alberta Designated Substances: This material is not listed.
Ontario Designated Substances: This material is not listed.
Quebec Designated Substances: This material is not listed.

Canada Inventory : Canada Inventory: This material is listed or exempted.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

Mexico

Classification :



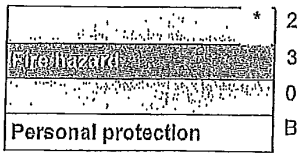
International regulations

International lists : This product, (and its ingredients) is (are) listed on national inventories, or is (are) exempted from being listed, in Australia (AICS), in Europe (EINECS/ELINCS), in Korea (TCCL), in Japan (METI), in the Philippines (RA6969).

16 . Other information

Label requirements : FLAMMABLE SOLID. MAY CAUSE SEVERE ALLERGIC RESPIRATORY AND SKIN REACTION. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Hazardous Material Information System (U.S.A.) :

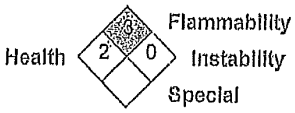


HAZARD RATINGS

4- Extreme
3- Serious
2- Moderate
1- Slight
0- Minimal
See section 8 for more detailed information on personal protection.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



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16 . Other information

References : ANSI Z400.5, MSDS Standard, 2004. - Manufacturer's Material Safety Data Sheet. - 29CFR Part1910.1200 OSHA MSDS Requirements. - 49CFR Table List of Hazardous Materials, UN#, Proper Shipping Names, PG. - Canada Gazette Part II, Vol. 122, No. 2. Registration SOR/88-64, 31 December 1987. Hazardous Products Act "Ingredient Disclosure List" - Canadian Transport of Dangerous Goods, Regulations and Schedules, Clear Language version 2005. - Official Mexican Standards NOM-018-STPS-2000 and NOM-004-SCT2-1994.

Date of Issue : 06/20/2008
Version : 1

Notice to reader
To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

ARP-Taylor46546

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

Hex A

EMERGENCY TELEPHONE NUMBER: CHEMTREC (800) 424-9300

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14289

CAS NO. : 100-97-0

CHEMICAL FAMILY: TERTIARY AMINE

CHEMICAL NAME : HEXAMETHYLENETETRAMINE

REVISION DATE : 11/17/10 REVISION NUMBER : 2

S E C T I O N 1 HEALTH HAZARD DATA

AS SOLD:

HEXAMETHYLENETETRAMINE (HEXA) MAY BE HAZARDOUS IF INGESTED AND IS KNOWN TO CAUSE SKIN RASHES ON SENSITIVE INDIVIDUALS. UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS SKIN IRRITATION AND SENSITIZATION. INGESTION AND CONTACT WITH THE SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

THE NORMAL USE OF THIS PRODUCT IS AS A CURING AGENT FOR PHENOLIC RESINS. UNDER NORMAL CONDITIONS OF USE, SMALL AMOUNTS OF GASEOUS AMMONIA, FORMALDEHYDE, AND WATER VAPOR ARE EVOLVED. IF THE PRODUCT IS OVERHEATED OR BURNED (HEXA IS A FLAMMABLE SOLID WHICH BURNS WITH A BLUE, ALMOST INVISIBLE, FLAME), CARBON MONOXIDE, CARBON DIOXIDE, OXIDES OF NITROGEN, FORMALDEHYDE AND AMMONIA ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF AMMONIA OR FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATIONS OF THOSE CHEMICALS SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THOSE CHEMICALS BEGIN TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF AMMONIA AND

... CONTINUED ON NEXT PAGE ...

FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

2. AMMONIA - IRRITANT TO EYES, MUCOUS MEMBRANE AND RESPIRATORY TRACT.

S E C T I O N 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : MAY CAUSE SKIN IRRITATION OR DERMATITIS. WASH THOROUGHLY WITH SOAP AND WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE.

INHALATION : HARMFUL IF INHALED. USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. IF HEADACHE, DIZZINESS OR VISUAL PROBLEMS DEVELOP - GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

S E C T I O N 3 FIRE AND EXPLOSION DATA

FLASH POINT: OPEN CUP 349 DEG F.
FLAMMABLE LIMITS - LEL: .015 OZ/FT.3 UEL: NO DATA

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: HEXAMETHYLENETETRAMINE WILL PRODUCE TOXIC FUMES WHEN BURNED. WEAR MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS AND FULL TURN OUT GEAR TO FIGHT FIRES. AVOID

... CONTINUED ON NEXT PAGE ...

INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: HEXAMETHYLENETETRAMINE IS A FLAMMABLE SOLID. THE DUST CAN BE HIGHLY FLAMMABLE OR EXPLOSIVE. IT BURNS WITH A COLORLESS FLAME AND GIVES OFF TOXIC FUMES.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: CHEMICAL RESISTANT GLOVES.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: AVOID GENERATING DUST. AVOID BREATHING DUST, PREVENT SKIN CONTACT. KEEP AWAY FROM OPEN FLAME OR OTHER SOURCES OF IGNITION. KEEP CONTAINERS CLOSED AND STORE IN COOL, DRY PLACE.

SECTION 5 PHYSICAL DATA

BOILING POINT: (760 MM HG) SUBLIMES @ 263 DEG C.	SPECIFIC GRAVITY: (H2O = 1) 1.27 @ 25 DEG C.
VAPOR PRESSURE: (MM HG 20 DEG C) N/A	PERCENT VOLATILE: (BY WEIGHT) N/A
VAPOR DENSITY: (AIR = 1) N/A	EVAPORATION RATE: (BUTYL ACETATE = 1) N/A
HEAT OF VAPORIZATION: (DELTA HV) N/A	SOLUBILITY IN WATER: (% BY WEIGHT) 45% @ 77 DEG F

APPEARANCE AND ODOR: WHITE CRYSTALS WITH AMINE ODOR.

... CONTINUED ON NEXT PAGE ...

SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL		
*FORMALDEHYDE	50-00-0	.60	ACGIH-C	0.3	PPM
			OSHA-TWA	0.75	PPM
			OSHA-STEL	2.0	PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		100	ACGIH-TWA/TOTAL	10	MG/M3
			OSHA-TWA/TOTAL	15	MG/M3
			OSHA-TWA/RESPIR	5	MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 80 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG ACIDS AND OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - AMMONIA, FORMALDEHYDE, AND NITROGEN OXIDES. AT TEMPERATURES GREATER THAN 800 DEG C (1472 DEG F) HYDROGEN CYANIDE CAN BE PRODUCED.

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

... CONTINUED ON NEXT PAGE ...

SECTION 9 TRANSPORTATION INFORMATION

* *

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
HEXAMETHYLENETETRAMINE UN1328 NMFC ITEM #43940	CLASS 4.1 (FLAMMABLE SOLID)

NOTE: I.A.T.A. FLAMMABLE SOLID YELLOW LABEL

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

The information set forth herein is furnished free of charge and is based on technical data which PLENCO believes to be reliable. It is intended for use by persons having technical skills and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, expressed or implied, and assume no liability in connection with your use of this information.

PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 11/17/10 TIME: 17:40

CHEMANOL

MATERIAL SAFETY DATA SHEET
HEXAMETHYLENETETRAMINE

SECTION I : PRODUCT & COMPANY IDENTIFICATION

Product	: HEXAMETHYLENE TETRAMINE	**Label**	: Flammable Solid
		HAZCHEM code	: 1Z
Synonyms	: Hexamine, Urotropine, Methenamine	**NFPA**	: 2-1-0
		Contact Information	: METHANOL CHEMICALS COMPANY P.O. Box 2101, Jubail Industrial City 31951, KSA www.chemanol.com
CAS Number	: 100-97-0	**Tel. No.**	: +966-3-358-9905/ 358-1111
U.N. Number	: 1328	**Emergency Tel. No.**	: +966-3-358-0384
EINECS number	: 202-905-8		

SECTION II : COMPOSITON/ INFORMATION ON INGREDIENTS

Formula	: $C_6H_{12}N_4$	**MOL. WT.**	: 140.22
Proportion	: 98.2 % min (stab) 99.5% min (unstab)	**Metal Content**	: N.T.

SECTION III : PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor	: White crystalline Powder & slight odor of amine	**Bulk Density**	: 700-800 gm/liter
		Melting Point	: 280° C(subl)
		Solubility in water	: Soluble
pH of 10% aq. solution	: 8 – 9		
Vapor Pressure	: 0.0035 mbar @20°C	**Specific gravity**	: 1.33 at 20° C

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SECTION IV : FIRE & EXPLOSION DATA

Flash Point	:	250°C	**Flammable limits**	: LEL : Not Available
Auto Ignition Temperature	:	390°C		UEL : Not Available
Fire and Explosion Hazard	:	Flammable /combustible material. May be ignited by friction, heat, sparks or flame. Burns rapidly with flare burning effect. Powders, dust shavings, borings, turnings, or cutting may explode or burn with explosive violence. May re-ignite after fire is extinguished. Concentrated dust may form a cloud & produce an explosion.		
Extinguishing Media	:	Water spray, foam, dry chemical powder and carbon dioxide. Sand in presence of electrical equipment		
Fire fighting procedure	:	Keep containers cool by spraying water. Fire fighters should wear self-contained breathing apparatus and protective clothing.		

SECTION V : STABILITY & REACTIVITY DATA

Instability	:	Stable
Hazardous de-composition products	:	Nitrogen Oxides(NOX) / Ammonia / CN- Formaldehyde
Incompatibility (Materials to avoid)	:	React with oxidizing materials, explosive reaction with Acetic Acid + Acetic Unhydride + Ammonium nitrate + Nitric Acid. Reaction with nitric Acid + Acetic Unhydride forms the military explosives RDX & HMX. Reacts violently with Na_2O_2, strong oxidizing agents.
Condition to Avoid	:	Avoid direct heat and naked flames. Ensure that equipment is earthed. Do not expose to air or moisture over prolonged period.
Recommended Material for Equipment	:	Stainless Steel

SECTION VI : HAZARD IDENTIFICATION

Primary routes of exposure	:	Eye, Skin and inhalation
Acute signs & symptoms of over exposure	:	Exposure to high concentrations causes irritation to eyes and rashes to the skin. Inhaling can irritate nose, throat & lungs causing coughing, wheezing & shortness of breath.
Chronic signs & symptoms	:	Hexamethylene Tetramine is a mild poison by sub-cutaneou route. It is moderately toxic.

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SECTION VII : EXPOSURES & FIRST AID MEASURES

General Advice	:	In case of accident or if you feel unwell, seek medical advice immediately. (show the level where possible)
Eye Contact	:	Contact with eyes may produce irritation. Wash gently with clean water.
Skin Contact	:	Contact with skin may cause rash. Wash affected skin with water.
Inhalation	:	In case of inhalation move patient to fresh air. Begin rescue breathing & CPR in case of a complicated scenario. Transfer to a medical facility.
Ingestion	:	If taken orally, make the victim drink large quantities of water or milk. Do not introduce vomiting without medical advice.

SECTION VIII : HANDLING AND STORAGE

Storage containers	:	Polypropylene woven bags with loose inner Polyethylene liner: 25 Kgs, 500 kgs & 1000 kgs net.
Storage recommendations & precautions	:	As it is sensitive to moisture it should be stored in dry cool and well-ventilated area (relative humidity below 60%). Keep away from any ignition sources, moisture, combustible & incompatible material. Smoking is strictly prohibited in storage area. Use only non sparking tools & equipment.

SECTION IX : EXPOSURE CONTROL / PERSONAL PROTECTION

Engineering Measures	:	Ensure adequate ventilation, especially in confined areas.
Personal Protection		
Eye Protection	:	Safety goggles or face shield.
Respiratory Protection	:	Wear dust mask or respirator .If > 30 mg/m3,use SCBA
Hand Protection	:	PVC disposable gloves
Skin & Body	:	Impervious long sleeved clothing
Exposure limits	:	PAC-1=30mg/m3 (mild health effect) PAC-2=50mg/m3 (serious health effect) PAC-3=500mg/m3(life threatening health effect)

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SECTION X : TOXICOLOGICAL INFORMATION

Acute Toxicity	:	RTECS Number : MN4725000 Oral, LD 50 , Mouse : 569 mg / kg
Chronic Toxicity	:	Chronic exposure may cause nausea & vomiting , higher exposure causes unconsciousness
Local effect	:	Symptoms of overexposure may be headache, dizziness, tiredness, nausea & vomiting.
Specific Effect	:	May include moderate to severe erythematic (redness) and moderate Edema (raised skin), nausea, vomiting & headache.
Carcinogenic effect	:	No data available
Mutagenic effect	:	No data available
Reproductive toxicity	:	No data available. May be harmful in case of pregnancy.

SECTION XI : ACCIDENTAL RELEASE MEASURES

Evacuate personnel. Eliminate all ignition sources. To clean up spill, the OSHA hazardous waste operations & emergency response standard (29 CFR 1910.120) may apply. Do not wash into sewer or surface water.

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SECTION XII: ECOLOGICAL INFORMATION

Mobility	:	No data available
Bio accumulation	:	No data available
Eco Toxicity Effect	:	No data available
Aquatic Toxicity	:	May cause long term adverse effects in the aquatic environment
US DOT-Appendix B-Marine Pollutant	:	Not listed
United Kingdom-the Red List	:	Not listed
WHO-Drinking water	:	Not listed
Ecotoxicity -Fish species data	:	Not listed
Ecotoxicity-Freshwater Algae data	:	Not listed
EPA-HPV Challenge program Chemical List	:	Indicator 2, not sponsored

SECTION XIII : DISPOSAL CONSIDERATION

Any waste or contaminated spills should be collected and disposed off in accordance with local and statutory regulations using a registered waste disposal contractor. Waste disposal is possible by total incineration. Do not reuse empty containers.

SECTION XIV : TRANSPORT INFORMATION

Proper Shipping Name	:	Hexamethylenetetramine
Packaging	:	Polypropylene sacks with liner.
Transport classification	:	Flammable solid.
DOT number	:	UN 1328
IMO class	:	4.1 flammable solids.
IMDG code (page no)	:	4150
Packing group	:	III
Emergency action code (Hazchem code)	:	1 Z

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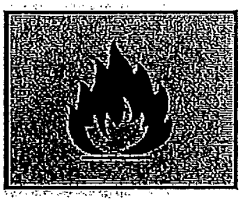
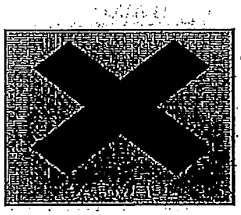
SECTION XV : REGULATORY INFORMATION

Supply classification	:	Flammable solids
Risk phrases	:	❖ R 11 Highly flammable ❖ R 42/43 May cause sensitization by inhalation & skin contact
Safety phrases	:	❖ S 16 Keep away from source of ignition- no smoking ❖ S 22 Do not breathe dust ❖ S 37 Wear suitable gloves ❖ S 24 Avoid contact with skin
Indication of Danger	:	❖ F, Xn Flammable, Harmful





AICS (Australia)	:	Present
Inventory (China)	:	Present
EU EINECS List	:	202-905-8
KECL (Korea)	:	KE-18615
PICCS (Philippines)	:	Present

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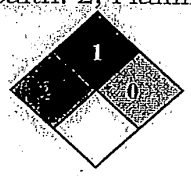
ENCS (Japan) : Unknown

NFPA rating Health: 2, Flammable: 1, Instability: 0



HMIS(USA) : Health-2,Fire-1,Reactivity-0,Personal Protection-E

Health Hazard	2
Fire Hazard	1
Physical Hazard	0
Personal Protection	E

OSHA : Hazardous by definition of hazard communication standard (29CFR1910.1200)

WHMIS (CANADA) : Class B-4 Flammable solid
Class D-2B material causing other toxic effect(TOXIC)

SECTION XVI : OTHER INFORMATION

References: Not available.

Other Special considerations: Not available.

Last Updated: October 2009.

Information Contact: Technical Services Department.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall CHEMANOL be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if CHEMANOL has been advised of the possibility of such damages.

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MATERIAL SAFETY DATA SHEET

(HEXAMETHYLENE TETRAMINE)

1.0 IDENTIFICATION

Product	:	**HEXAMETHYLENE TETRAMINE**
Formula	:	($C_6H_{12}N_4$) Molecular Wt. – 140.22
CAS NO.	:	100-97-0
HS Tariff No.	:	2933.90.000
Company	:	**METHANOL CHEMICALS COMPANY (CHEMANOL)**
		P.O. Box 2101, Jubail Industrial City 31951, K.S.A.
Tel. No.	:	00966 3 358 9905/ 358 1111
Emergency Contact Person	:	Shift Superintendent
Tel. No.	:	00966-3- 358 0384

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients

Chemical Name	CAS NO.	Proportion	Exposure Limit	Toxicity Data
Hexamethylene Tetramine	100-97-0	98.2-99.5%	N/A	Moderately toxic.

3.0 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	White powder
Odour	:	Slight odour of Amine
Melting Point	:	280°C
Flash Point	:	250°C
Ignition Temp	:	390°C
Vapour Density at 20°C	:	0.0035 mbar
Density at 20°C	:	1.33 gm/cm³
Bulk Density	:	700-800 Kg/M³
pH	:	8-9
Solubility	:	Soluble in water

4.0 STABILITY AND REACTIVITY

Stability	:	Hexamethylene Tetramine is stable for a long period.
Conditions to avoid	:	Avoid direct heat & naked flames. Ensure that equipment is earthed to prevent static charge build-up.
Materials to avoid	:	Hexamethylene Tetramine is sensitive to moisture. It should be stored in an atmosphere at relative humidity less than 60%
Recommended materials for equipment	:	Stainless steel

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Hazardous decomposition products	:	Hexamethylene Tetramine decomposes when heated above 200°C releasing ammonia and hydrocyanic acid vapours. The substance sublimates between 230°C and 270°C without melting and with partial decomposition.

5.0 HAZARDS INFORMATION

FLAMMABLE SOLID

6.0 FIRE FIGHTING MEASURES

Extinguishing Media	:	Water spray, foam, chemical dry powder and carbon dioxide. Sand in presence of electrical equipment
Fire and Explosion Hazards	:	Hexamethylene is an inflammable solid material. Readily ignites in contact with flame.
Protective Measures	:	Keep containers cool by spraying with water. Fire fighters should wear self contained breathing apparatus and protective clothing.

7.0 HEALTH HAZARD DATA

ACUTE EFFECTS

Eye	:	Contact with eyes causes irritation in the eyes.
Skin	:	Contact with skin causes skin rash.
Ingestion	:	Pure Hexamethylene Tetramine may be taken internally in small amounts and has been used in medicines as a urinary antiseptic. When swallowed inflammation of the urogenital tracts may happen.
Chronic Effects	:	Hexamethylene Tetramine is a mild poison by sub-cutaneous route. It is moderately toxic and a questionable carcinogen.

8.0 EXPOSURE & FIRST AID MEASURES

Skin Contact	:	Contact with skin may cause rash. Wash affected skin with water.
Eyes Contact	:	Contact with eyes may produce irritation. Wash gently with clean water.
Ingestion	:	If taken orally, make the victim drink large quantities of liquid 'Diamox'

9.0 ACCIDENTAL RELEASE MEASURES.

Personal Precautions	:	Wear dust mask, protective overalls, safety goggles, chemical resistant gloves.
Environmental Precaution	:	Prevent material from entering into drains, water course or sewers. If the substance enters a water course or sewer, inform the Police, Fire Brigade & Local Health Authority immediately.

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Recovery	:	Collect the spilled material for disposal into suitable containers.

10.0 HANDLING AND STORAGE

Storage	:	Keep containers sealed. Store in a cool fire-resistant area. NO SMOKING in storage area.
Ventilation	:	General ventilation should be used to control airborne levels. A dust mask should be worn.
Handling	:	Avoid contact with skin, eyes and clothing. Do not eat or drink during handling. Observe normal standards in industrial hygiene.

11.0 EXPOSURE CONTROL/PERSONAL PROTECTION

Respiratory Protection	:	Wear suitable respiratory protection, if dusts are generated.
Hand Protection	:	Wear chemical resistant gloves.
Eye Protection	:	Wear goggles or face shield.
Other	:	Wear chemical resistant footwear, protective overalls.

12.0 ECOLOGICAL INFORMATION

Mobility	:	Soluble in water
Resistance and Degradability	:	Not readily biodegradable in soil and water.
Aquatic toxicity	:	The substance causes disturbances of equilibrium in fish (disturbance threshold 5 gm/lit).

13.0 DISPOSAL CONSIDERATION

Any waste or contaminated spills should be collected and disposed off in accordance with local and statutory regulations using a registered waste disposal contractor.

14.0 TRANSPORT INFORMATION

Packaging	:	Polythene sacks.
Transport classification	:	Flammable solid
Substance identification No.	:	1328
IMCO Class	:	4.1 flammable solids

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IMDG Code (Page No.)	:	4150
Packing Group	:	III

15.0 REGULATORY INFORMATION

Supply classification	:	Flammable solids	
Hazard Pictogram	:		
Risk phrases		❖ R 11	Highly flammable
		❖ R 43	May cause skin sensitization on contact.
Safety Phrases		❖ S 16	Keep away from source of ignition.
		❖ S 24	Avoid contact with skin.
Risk symbols		❖ F, Xi	

16.0 OTHER INFORMATION

This information, which describes our product with regard to possible security requirements is based on the present state of our knowledge and experience. SFCCL do not accept any liability arising out of the use of this information.

ARP-Taylor46562

HEXA METHYLENE TETRAMINE
(HEXAMINE)

A) APPEARANCE : WHITE CRYSTALLINE FREE FLOWING MATERIAL

B) GRADE : **WITH ANTICAKING AGENT**
(STABILIZED WITH BENZOIC ACID)

C) SPECIFICATIONS :

APPEARANCE	White Crystalline Powder
HEAVY METALS AS PB (WT %)	0.001 max
SULFATE (WT %)	0.02 max
CHLORIDE (WT %)	0.015 max
AMMONIA SALTS (WT %)	0.001 max
ASH (WT %)	0.050 max
WATER CONTENT (WT %)	0.30 max
PURITY (WT %)	98.80 min

HEXAMETHYLINE
TETRAMINE

Untreated, 25kg bags
CAS No. 100-97-0

SPECIFICATION

Appearance ..... White crystalline
Purity (%)..... 99,0 min
Water content (%) ..... 0.5 max
Ph ..... 7.5 min
Water Solution (APHA) ..... 10 max (10% solution)

20 max (20% solution)
Ammonium salt (%)..... 0.001 max (NH3)
Sulphates SO4 (%)..... 0.02 max
Chlorides CL (%)..... 0.015 max
Heavy metals PB (%) ..... 0.001 max
Ash content (%)..... 0.02 max

—plenco—

EXPERIMENTAL/LAB SAMPLE PRODUCT

MATERIAL SAFETY DATA SHEET

PLASTICS ENGINEERING COMPANY

modified

DATE: February 2012

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 14889	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 9003-35-4	CHEMICAL NAME AND SYNONYMS Two Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer of not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol and formaldehyde may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - irritant to eyes, lungs, and skin. May cause respiratory sensitization. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the state of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans. It is the opinion of the U.S. Dept of Health and Human Services that formaldehyde is "known to be a human carcinogen."

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Use with adequate ventilation. If breathing is affected, remove to fresh air. If breathing stops, apply mouth to mouth resuscitation. Get medical attention.

INGESTION:
Do not induce vomiting. If conscious, rinse mouth and provide small glass of water to help dilute. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372	%	TLV (Units)
*Phenol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	<1.0	
Nuisance Particulates OSHA 15 Mg/M^3	100	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	N/A	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Yellow to amber colored pastilles with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY	UNSTABLE ☐	CONDITIONS TO AVOID Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain – phenol, formaldehyde

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

SECTION VIII - CONTROL MEASURES

VENTILATION	LOCAL EXHAUST Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	SPECIAL
	MECHANICALS (General) Use explosion proof motors.	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves recommended	Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life, Gas Blanket)
Store in a cool, dry place (below 75°F). Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Theodore N. Morrison EXT. 3822 TITLE Resin Application and Development Supervisor PLENCO 14889

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

ATLAS RESIN PROPPANTS
N7500 COUNTY ROAD P

TAYLOR ,WI 54659

UNIVAR USA INC. (425)889-3400
17425 NE UNION HILL RD , REDMOND , WA 98052

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

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

PRODUCT NAME:	CAUSTIC SODA LIQUID (ALL GRADES)
MSDS NUMBER:	DZ32415
DATE ISSUED:	01/07/2009
SUPERSEDES:	11/12/2008
ISSUED BY:	008730

****
****

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Distributed by:
Univar USA Inc.
17425 NE Union Hill Rd.
Redmond, WA 98052
425-889-3400

Trade Name:
Caustic Soda Diaphragm Grade 10%, 15%, 18%, 20%, 25%, 30%, 35%, 40%, 50%,
Caustic Soda Rayon Grade 18%, 20%, 25%, 30%, 50%, 50% Caustic Soda Rayon

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Medical Conditions Aggravated by Exposure: Asthma, Respiratory disorders

See Section 11: TOXICOLOGICAL INFORMATION

3. COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Component	Concentration (by weight %)	CAS - No.
Water	48.5 - 94.5	7732-18-5
Sodium hydroxide	5.5 - 51.5	1310-73-2
Sodium chloride (NaCl)	1 - 5	7647-14-5

4. FIRST AID MEASURES

Inhalation: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. If respiration or pulse has stopped, have a trained person administer basic life support (Cardio-Pulmonary Resuscitation/Automatic External Defibrillator) and CALL FOR EMERGENCY SERVICES IMMEDIATELY.

Skin Contact: Immediately flush contaminated areas with water. Remove contaminated clothing, jewelry, and shoes immediately. Wash contaminated areas with soap and water. Thoroughly clean and dry contaminated clothing before reuse. Discard contaminated leather goods. GET MEDICAL ATTENTION IMMEDIATELY.

Eye Contact: Immediately flush eyes with a directed stream of water for at least 15 minutes, forcibly holding eyelids apart to ensure complete irrigation of all eye and lid tissues. Washing eyes within several seconds is essential to achieve maximum effectiveness. GET MEDICAL ATTENTION IMMEDIATELY.

Ingestion: Never give anything by mouth to an unconscious or convulsive person. If swallowed, do not induce vomiting. Give large amounts of water. If vomiting occurs spontaneously, keep airway clear. Give more water when vomiting stops. GET MEDICAL ATTENTION IMMEDIATELY.

Notes to Physician: The absence of visible signs or symptoms of burns does NOT reliably exclude the presence of actual tissue damage. Probable mucosal damage may contraindicate the use of gastric lavage.

5. FIRE-FIGHTING MEASURES

Fire Hazard: Negligible fire hazard.

Extinguishing Media: Use media appropriate for surrounding fire

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Hazardous Component	CAS-No.	ACGIH TWA	ACGIH STEL	ACGIH Ceiling	OSHA TWA (Vacated)	OSHA STEL (Vacated)	OSHA Ceiling (Vacated)
Sodium hydroxide	1310-73-2			2 mg/m3			2 mg/m3

ENGINEERING CONTROLS: Provide local exhaust ventilation where dust or mist may be generated. Ensure compliance with applicable exposure limits.

PERSONAL PROTECTIVE EQUIPMENT:

Eye Protection: Wear chemical safety goggles with a faceshield to protect against eye and skin contact when appropriate. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

Skin and Body Protection: Wear chemical resistant clothing and rubber boots when potential for contact with the material exists. Contaminated clothing should be removed, then discarded or laundered.

Hand Protection: Wear appropriate chemical resistant gloves Protective Material Types: Natural rubber, Neoprene, Nitrile

Hazardous Component	Immediately Dangerous to Life/ Health (IDLH)
Sodium hydroxide	10 mg/m3 IDLH

Respiratory Protection: A NIOSH approved respirator with N95 (dust, fume, mist) cartridges may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits, or when symptoms have been observed that are indicative of overexposure. If eye irritation occurs, a full face style mask should be used. A respiratory protection program that meets 29 CFR 1910.134 must be followed whenever workplace conditions warrant use of a respirator.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical State:	Liquid
Appearance:	Clear to opaque
Color:	Colorless to slightly colored
Odor:	Odorless
Boiling Point/Range:	230 291 F (110 144 C)
Freezing Point/Range:	-26 to 59 F (-32 to 15 C)
Vapor Pressure:	13 - 135 mmHg @ 60 C
Vapor Density (air=1):	No data available
Specific Gravity (water=1):	1.11 1.53 @ 15.6 C
Water Solubility:	100%

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

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12. ECOLOGICAL INFORMATION

AQUATIC TOXICITY: This material has exhibited moderate toxicity to aquatic organisms. Data provided are for sodium hydroxide.

Freshwater Fish Data:
LC50 brook trout: 25 ppm/24 hr
LC50 king salmon: 48 ppm

Invertebrate Toxicity Data:
EC50 daphnia magna: 100 ppm
EC50 shrimp: 33 100 ppm/48 hr
EC50 cockle: 330 1000 ppm/48 hr

BIODEGRADATION: This material is inorganic and not subject to biodegradation.

PERSISTENCE: This material is alkaline and may raise the pH of surface waters with low buffering capacity. This material is believed to exist in the disassociated state in the environment.

BIOCONCENTRATION: This material is not expected to bioconcentrate in organisms.

ADDITIONAL ECOLOGICAL INFORMATION: This material has exhibited slight toxicity to terrestrial organisms.

13. DISPOSAL CONSIDERATIONS

Reuse or reprocess, if possible. Dispose in accordance with all applicable regulations. May be subject to disposal regulations: U.S. EPA 40 CFR 261. Hazardous Waste Number(s): D002

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME:	Sodium Hydroxide Solution
DOT UN NUMBER:	UN1824
HAZARD CLASS/ DIVISION:	8
PACKING GROUP:	II
LABELING REQUIREMENTS:	8
DOT RQ (lbs):	RQ 1000 lbs. (Sodium Hydroxide)

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME:	Sodium hydroxide solution
UN NUMBER:	UN1824
CLASS:	8
PACKING/RISK GROUP:	II

PRODUCT: CAUSTIC SODA LIQUID (ALL GRADES)

ORDER NO: 449956
PROD NO : 605579

Pennsylvania Right to Know Hazardous Substance List	Listed
Pennsylvania Right to Know Environmental Hazard List	Listed
Rhode Island Right to Know Hazardous Substance List	Listed

CANADIAN REGULATIONS:
This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS Classification: E

16. OTHER INFORMATION

HMIS: (SCALE 0-4) (Rated using National Paint & Coatings Association HMIS: Rating Instructions, 2nd Edition)
Health: 3 Flammability: 0 Reactivity: 1
NFPA 704 - Hazard Identification Ratings (SCALE 0-4)
Health: 3 Flammability: 0 Reactivity: 1

Lubrizol

Material Safety Data Sheet
CHEMBETAINE(TM) CAS SURFACTANT

Prepared according to 29CFR 1910.1200.

1 Chemical Product and Company Identification

THE LUBRIZOL CORPORATION
9921 BRECKSVILLE RD
BRECKSVILLE, OH 44141

Product Trade Name	CHEMBETAINE(TM) CAS SURFACTANT
CAS Number	68139-30-0
Synonyms	None.
Generic Chemical Name	Cocoamidopropyl hydroxysultaine
Product Type	Specialty Surfactants
Preparation/Revision Date	04 December 2008
Transportation Emergency Phone No.	FOR TRANSPORT EMERGENCY call CHEMTREC: (+1) 703-527-3887 (outside the U.S.), 1-800-424-9300 (in the U.S.)
MSDS No.	36505331-2802012-911870-102103

2 Hazards Identification

Appearance Pale yellow liquid.

Odor Mild

Principal Hazards Warning.

- Causes eye irritation.
- May cause skin irritation.

See Section 11 for complete health hazard information.

3 Composition/Information on Ingredients

Hazardous Ingredients

Comp	CAS No.	Percentage (by wt.)	Carcinogen
Cocoamidopropyl hydroxysultaine	68139-30-0	From 30 to 39.9 percent	N/E
Sodium chloride	7647-14-5	From 5 to 9.9 percent	N/E
Glycerin	56-81-5	From 1 to 4.9 percent	N/E

(N/E) - None established

4 First Aid Measures

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Eyes	Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists, get medical attention.
Skin	Wash with soap and water. If skin irritation occurs, get medical attention. Launder contaminated clothing before reuse.
Inhalation	Remove exposed person to fresh air if adverse effects are observed.
Oral	DO NOT INDUCE VOMITING. Get immediate medical attention.
Additional Information	Note to physician: Treat symptomatically.

5 Fire Fighting Measures

Flash Point	> 100 °C, 212 °F PMCC (Minimum)
Extinguishing Media	CO2, dry chemical, or foam. Water can be used to cool and protect exposed material.
Firefighting Procedures	Recommend wearing self-contained breathing apparatus. Water may be ineffective fighting fires.
Unusual Fire & Explosion Hazards	None known.

6 Accidental Release Measures

Spill Procedures	Personal Protective Equipment must be worn, see Personal Protection Section for PPE recommendations. Ventilate area if spilled in confined space or other poorly ventilated areas. Prevent entry into sewers and waterways, dispose of in accordance with all federal, state and local environmental regulation. Pick up free liquid for recycle and/or disposal. Residual liquid can be absorbed on inert material.

7 Handling and Storage

Pumping Temperature	Not determined.
Maximum Handling Temperature	Not determined.
Handling Procedures	Keep containers closed when not in use. Do not discharge into drains or the environment, dispose to an authorized waste collection point. Use appropriate containment to avoid environmental contamination. Avoid drinking, tasting, swallowing or ingesting this product. Avoid inhalation of dust, aerosol, mist, spray, fume, or vapor. Use with appropriate and adequate ventilation. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Empty container contains product residue which may exhibit hazards of product.
Maximum Storage Temperature	Not determined.
Storage Procedures	Store in a cool, dry, well-ventilated area. Keep container closed when not in use. Do not store at temperatures greater than 120 deg F (49 deg C).
Loading Temperature	Not determined.

8 Exposure Controls/Personal Protection

Exposure Limits

	Exposure Guidelines					
	OSHA		ACGIH		Other	
Comp	TWA	STEL	TWA	STEL	TWA	STEL
Glycerin	15 mg/cu. M	N/E	10 mg/cu. M	N/E	N/E	N/E

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(s) - Skin exposure
(p) - Proposed limit
(c) - Ceiling exposure
(l) - Recommended exposure limit
(u) - Supplier recommended exposure limit
(N/E) - None established

Other Exposure Limits	None known.
Engineering Controls	Use with adequate ventilation.
Gloves Procedures	Use nitrile or neoprene gloves.
Eye Protection	Safety Glasses.
Respiratory Protection	Use NIOSH/MSHA approved full face respirator with a combination organic vapor and dust/mist cartridge if the recommended exposure limit is exceeded. Use self-contained breathing apparatus for entry into confined space, for other poorly ventilated areas and for large spill clean-up sites.
Clothing Recommendation	Long sleeve shirt is recommended. Do not wear rings, watches or similar apparel that could entrap the material and cause a skin reaction. Launder contaminated clothing before reuse.

9 Physical and Chemical Properties

Flash Point	> 100 °C, 212 °F PMCC (Minimum)
Upper Flammable Limit	Not determined.
Lower Flammable Limit	Not determined.
Autoignition Point	Not determined.
Explosion Data	Material does not have explosive properties.
Vapor Pressure	Not determined.
pH	6.5 - 8 at 5% in water
Specific Gravity	1.11 (20 °C)
Bulk Density	9.22 Lb/gal, 1.1 Kg/L
Water Solubility	Soluble.
Percent Solid	Not determined.
Percent Volatile	50% By Weight
Volatile Organic Compound	Not determined.
Vapor Density	Not determined.
Evaporation Rate	Not determined.
Odor	Mild
Appearance	Pale yellow liquid.
Viscosity	Not determined.
Odor Threshold	Not determined.
Boiling Point	Not determined.
Pour Point Temperature	Not determined.
Melting / Freezing Point	Not determined.

The above data are typical values and do not constitute a specification. Vapor pressure data are calculated unless otherwise noted.

10 Stability and Reactivity

Stability Material is normally stable at moderately elevated temperatures and pressures.

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Decomposition Temperature	Not determined.
Incompatibility	Strong acids and oxidizing agents. Strong bases.
Polymerization	Will not occur.
Thermal Decomposition	Smoke, carbon monoxide, carbon dioxide, aldehydes and other products of incomplete combustion. Under combustion conditions, oxides of the following elements will be formed: nitrogen, sulfur.
Conditions to Avoid	Not determined.

11 Toxicological Information

-- ACUTE EXPOSURE --

Eye Irritation	Moderate to strong eye irritation. Based on data from components or similar material.
Skin Irritation	May cause skin irritation. Based on data from components or similar materials.
Respiratory Irritation	If material is misted or if vapors are generated from heating, exposure may cause irritation of mucous membranes and the upper respiratory tract. Based on data from components and similar materials.
Dermal Toxicity	The LD50 in rabbits is > 2000 mg/Kg. Based on data from components or similar materials.
Inhalation Toxicity	No data available to indicate product or components may be a toxic inhalation hazard.
Oral Toxicity	The LD50 in rats is > 5000 mg/kg. Based on data from components or similar materials. Ingestion of this material may cause gastrointestinal irritation.
Dermal Sensitization	No data available to indicate product or components may be a skin sensitizer.
Inhalation Sensitization	No data available to indicate product or components may be respiratory sensitizers.

-- CHRONIC EXPOSURE --

Chronic Toxicity	No data available to indicate product or components present at greater than 1% are chronic health hazards.
Carcinogenicity	No data available to indicate any components present at greater than 0.1% may present a carcinogenic hazard.
Mutagenicity	No data available to indicate product or any components present at greater than 0.1% are mutagenic or genotoxic.
Reproductive Toxicity	No data available to indicate either product or components present at greater than 0.1% that may cause reproductive toxicity.
Teratogenicity	No data available to indicate product or any components contained at greater than 0.1% may cause birth defects.

-- ADDITIONAL INFORMATION --

Other	No other health hazards known.

12 Ecological Information

-- ENVIRONMENTAL TOXICITY --

Freshwater Fish Toxicity	Not determined.
Freshwater Invertebrates Toxicity	The acute EC50 is 10 - 100 mg/L based on component data.
Algal Inhibition	Not determined.
Saltwater Fish Toxicity	Not determined.
Saltwater Invertebrates	Not determined.

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Toxicity	
Bacteria Toxicity	Not determined.
Miscellaneous Toxicity	Not determined.

-- ENVIRONMENTAL FATE --

Biodegradation	Adequate data is not available to estimate the biodegradation potential of this material.
Bioaccumulation	25% or greater of the components display no potential to bioconcentrate.
Soil Mobility	Not determined.

13 Disposal Considerations

Waste Disposal	This material, if discarded, is not a hazardous waste under RCRA Regulation 40 CFR 261. Treatment, storage, transportation, and disposal must be in accordance with applicable Federal, State/Provincial, and Local regulations.

14 Transport Information

ICAO/IATA I	Not regulated.
ICAO/IATA II	Not regulated.
IMDG	Not regulated.
IMDG EMS Fire	Not applicable.
IMDG EMS Spill	Not applicable.
IMDG MFAG	Not applicable.
MARPOL Annex II	Not determined.
USCG Compatibility	Not determined.
U.S. DOT Bulk	Not regulated.
U.S. DOT Non-Bulk	Not regulated.
DOT NAERG	Not applicable.
TDG Bulk	Not regulated.
TDG Non-Bulk	Not regulated.
Mexico	Not regulated.
Mexico Non-Bulk	Not regulated.
Bulk Quantity	85000 liters, 22457 gal.
Non-Bulk Quantity	207.8 liters, 55 gal.

Review classification requirements before shipping materials at elevated temperatures.

15 Regulatory Information

-- Global Chemical Inventories --

USA	All components of this material are on the US TSCA Inventory or are exempt.
Other TSCA Reg.	None known.
EU	All components are in compliance with the EC Seventh amendment Directive 92 /32/EEC.
Japan	May require notification in Japan.
Australia	All components are in compliance with chemical notification requirements in Australia.

New Zealand	All components are in compliance with chemical notification requirements in New Zealand.
Canada	All components are in compliance with the Canadian Environmental Protection Act and are present on the Domestic Substances List.
Switzerland	All components are in compliance with the Environmentally Hazardous Substances Ordinance in Switzerland.
Korea	All components are in compliance in Korea.
Philippines	All components are in compliance with the Philippines Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (R.A. 6969).
China	All components of this product are listed on the Inventory of Existing Chemical Substances in China.

-- Other U.S. Federal Regulations --

SARA Ext. Haz. Subst.	This product does not contain greater than 1.0% of any chemical substance on the SARA Extremely Hazardous Substances list.
SARA Section 313	This product does not contain greater than 1.0% (greater than 0.1% for carcinogenic substance) of any chemical substances listed under SARA Section 313.
SARA 311 Classifications	

Acute Hazard	Yes
Chronic Hazard	No
Fire Hazard	No
Reactivity Hazard	No

CERCLA Hazardous Substances	None known.
FDA Approval	Not applicable.

-- State Regulations --

Cal. Prop. 65	This product does not intentionally contain any chemicals known by the State of California to cause cancer and/or birth defects. Moreover, we do not routinely analyze its products for impurities which may be such chemicals.

-- Product Registrations --

U.S. Fuel Registration	Not applicable.
U.S. Dept of Agriculture	This product has not been filed with the USDA to support H2 approvals.
NSF Nonfood Compounds Registration	This product has not been filed with the NSF to support H1 or H2 approvals.
Finnish Registration Number	Not Registered
Swedish Registration Number	Not Registered
Norwegian Registration Number	Not Registered
Danish Registration Number	Not Registered
Swiss Registration Number	Not Registered
Italian Registration Number	Not Registered
Korean Registration Number	Not Registered

-- Other / International --

TDG Regulated Limit.	None known.

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16 Other Information

US NFPA Codes

Health	Fire	Reactivity	Special
2	1	1	N/E

(N/E) - None established

HMIS Codes

Health	Fire	Reactivity
2	1	1

Precautionary Labels

Warning.

- Causes eye irritation.
- May cause skin irritation.

Revision Indicators

Section: 1 Product type.	Changed: 4 August 2008
Section: 2 Principal hazards.	Changed: 4 December 2008
Section: 3 Hazardous ingredients.	Changed: 3 December 2008
Section: 4 Inhalation first aid.	Changed: 3 December 2008
Section: 7 Handling procedures.	Changed: 4 December 2008
Section: 8 Hazardous ingredients.	Changed: 3 December 2008
Section: 8 Ventilation procedures.	Changed: 3 December 2008
Section: 9 Explosion data.	Changed: 4 December 2008
Section: 9 Odor threshold.	Changed: 3 December 2008
Section: 9 Viscosity.	Changed: 3 December 2008
Section: 11 Dermal toxicity.	Changed: 3 December 2008
Section: 11 Oral toxicity.	Changed: 3 December 2008
Section: 11 Respiratory irritation.	Changed: 3 December 2008
Section: 16 Principal hazards.	Changed: 4 December 2008

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 this product. Information contained herein is believed to be true and accurate but all statements or suggestions are made without warranty, expressed 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. Compliance with all applicable federal, state, and local regulations remains the responsibility of the user.

Stepan

MATERIAL SAFETY DATA SHEET

Chembetaine

1. Chemical Product & Company Identification

Material name	AMPHOSOL CS-50
Version #	07
Revision date	08-25-2009
Product code	0577
Chemical class	Betaine
Manufacturer	Stepan Company 22 West Frontage Road Northfield, IL 60093 USA
Emergency	Medical 800-228-5635 Chemtrec 800-424-9300 Chemtrec Int'l 703-527-3887
General information	General (847) 446-7500

2. Hazards Identification

Emergency overview	Moderately irritating to the eyes.Contact with skin may cause irritation.May cause irritation of respiratory tract.
Potential health effects	
Eyes	Moderately irritating to the eyes.
Skin	This product may cause irritation to the skin.
Inhalation	Inhalation of vapors or mists of the product may be irritating to the respiratory system.
Ingestion	Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

3. Composition / Information on Ingredients

Components	CAS #	Percent
_Water	7732-18-5	50
_Cocoamidopropyl hydroxysultaine	68139-30-0	43.5
_Sodium chloride	7647-14-5	6.5

4. First Aid Measures

First aid procedures	
Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes.If irritation persists get medical attention.
Skin contact	For skin contact flush with large amounts of water.Immediately take off all contaminated clothing.If irritation persists get medical attention.Wash clothing separately before reuse.
Inhalation	If symptoms are experienced, remove source of contamination or move victim to fresh air.If symptoms persist, get medical attention.If the affected person is not breathing, apply artificial respiration.If breathing is difficult, give oxygen.Get medical attention immediately.
Ingestion	If ingestion of a large amount does occur, seek medical attention.Do NOT induce vomiting.

5. Fire Fighting Measures

Extinguishing media	
Suitable extinguishing media	Water fog.Foam.Dry chemical powder.Carbon dioxide (CO_2).
Protection of firefighters	
Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions	Isolate area. Keep unnecessary personnel away.Stay upwind.Keep out of low areas.Ventilate closed spaces before entering.

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Environmental precautions	Prevent further leakage or spillage if safe to do so.
Methods for containment	Prevent entry into waterways, sewers, basements or confined areas.
Methods for cleaning up	Wear appropriate protective equipment and clothing during clean-up. Small Spills:Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spills:Dike far ahead of liquid spill for later disposal.

7. Handling and Storage

Handling	Avoid contact with skin and eyes.Wash hands thoroughly after handling.
Storage	Store in cool place.Keep in a well-ventilated place.Keep at temperatures between 10C and 50C.

8. Exposure Controls / Personal Protection

Engineering controls	Use general ventilation.Local exhaust is suggested for use, where possible, in enclosed or confined spaces.
Personal protective equipment	
General	Eye wash fountain and emergency showers are recommended.
Eye / face protection	Wear chemical goggles.Face-shield.
Skin protection	Wear suitable protective clothing.Use impervious gloves.
Respiratory protection	If ventilation is not sufficient to effectively prevent buildup of aerosols or vapors, appropriate NIOSH/MSHA respiratory protection must be provided.

9. Physical & Chemical Properties

Physical state	Liquid.
Form	Liquid.
pH	7 - 9 (10% in H2O)
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C)
Flash point	> 201 °F (> 93.9 °C) PMCC
Vapor pressure	20 mm Hg
Specific gravity	9.25 lb/gal @ 25 C
Solubility (water)	Complete
VOC	0 %
RVOC	0 %
Pour point	40 °F (4.4 °C)
Viscosity	150 cps @ 25 C

10. Stability & Reactivity

Chemical stability	Stable at normal conditions.
Incompatible materials	Strong oxidizing agentsThis product may react with strong alkalies.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Product	Test Results
AMPHOSOL CS-50	Acute Oral LD50 Rat: 5000 - 15000 mg/kg

* Estimates for product may be based on additional component data not shown.

Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not mutagenic in AMES Test.

ARP-Taylor46583

12. Ecological Information

Not available.

13. Disposal Considerations

Disposal instructions Dispose in accordance with all applicable regulations.All wastes must be handled in accordance with local, state and federal regulations.Regulations vary.

14. Transport Information

Notes Refer to bill of lading or container label for DOT or other transportation hazard classification, if any.

15. Regulatory Information

Reportable Quantity There is no calculable reportable quantity (RQ) for this product.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 302 extremely hazardous substance	No
Section 311 hazardous chemical	No

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
Australia	Australian Inventory of Chemical Substances (AICS)	Yes
Canada	Domestic Substances List (DSL)	Yes
Canada	Non-Domestic Substances List (NDSL)	No
China	Inventory of Existing Chemical Substances in China (IECSC)	Yes
Europe	European Inventory of New and Existing Chemicals (EINECS)	Yes
Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
New Zealand	New Zealand Inventory	No
Philippines	Philippine Inventory of Chemicals and Chemical Substances (PICCS)	Yes
United States & Puerto Rico	Toxic Substances Control Act (TSCA) Inventory	Yes

A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: X

NFPA ratings
Health: 1
Flammability: 1
Instability: 0

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ARP-Taylor46585

Issue date	08-25-2009
MSDS Section Changes	Ecological Information: Ecotoxicity

ARP-Taylor46587

Stepan

MATERIAL SAFETY DATA SHEET

Chembetaine

1. Chemical Product & Company Identification

Material name	AMPHOSOL CS-50
Version #	07
Revision date	08-25-2009
Product code	0577
Chemical class	Betaine
Manufacturer	Stepan Company 22 West Frontage Road Northfield, IL 60093 USA
Emergency	Medical 800-228-5635 Chemtrec 800-424-9300 Chemtrec Int'l 703-527-3887
General information	General (847) 446-7500

2. Hazards Identification

Emergency overview Moderately irritating to the eyes.Contact with skin may cause irritation.May cause irritation of respiratory tract.

Potential health effects

Eyes	Moderately irritating to the eyes.
Skin	This product may cause irritation to the skin.
Inhalation	Inhalation of vapors or mists of the product may be irritating to the respiratory system.
Ingestion	Ingestion of large amounts may produce gastrointestinal disturbances including irritation, nausea, and diarrhea.

3. Composition / Information on Ingredients

Components	CAS #	Percent
_Water	7732-18-5	50
_Cocoamidopropyl hydroxysultaine	68139-30-0	43.5
_Sodium chloride	7647-14-5	6.5

4. First Aid Measures

First aid procedures

Eye contact	Immediately flush eyes with plenty of water for at least 15 minutes.If irritation persists get medical attention.
Skin contact	For skin contact flush with large amounts of water.Immediately take off all contaminated clothing.If irritation persists get medical attention.Wash clothing separately before reuse.
Inhalation	If symptoms are experienced, remove source of contamination or move victim to fresh air.If symptoms persist, get medical attention.If the affected person is not breathing, apply artificial respiration.If breathing is difficult, give oxygen.Get medical attention immediately.
Ingestion	If ingestion of a large amount does occur, seek medical attention.Do NOT induce vomiting.

5. Fire Fighting Measures

Extinguishing media

Suitable extinguishing media	Water fog.Foam.Dry chemical powder.Carbon dioxide (CO_2).

Protection of firefighters

Protective equipment and precautions for firefighters	As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. Accidental Release Measures

Personal precautions Isolate area. Keep unnecessary personnel away.Stay upwind.Keep out of low areas.Ventilate closed spaces before entering.

Environmental precautions	Prevent further leakage or spillage if safe to do so.
Methods for containment	Prevent entry into waterways, sewers, basements or confined areas.
Methods for cleaning up	Wear appropriate protective equipment and clothing during clean-up. Small Spills:Use a non-combustible material like vermiculite, sand or earth to soak up the product and place into a container for later disposal. Large Spills:Dike far ahead of liquid spill for later disposal.

7. Handling and Storage

Handling	Avoid contact with skin and eyes.Wash hands thoroughly after handling.
Storage	Store in cool place.Keep in a well-ventilated place.Keep at temperatures between 10C and 50C.

8. Exposure Controls / Personal Protection

Engineering controls	Use general ventilation.Local exhaust is suggested for use, where possible, in enclosed or confined spaces.
Personal protective equipment	
General	Eye wash fountain and emergency showers are recommended.
Eye / face protection	Wear chemical goggles.Face-shield.
Skin protection	Wear suitable protective clothing.Use impervious gloves.
Respiratory protection	If ventilation is not sufficient to effectively prevent buildup of aerosols or vapors, appropriate NIOSH/MSHA respiratory protection must be provided.

9. Physical & Chemical Properties

Physical state	Liquid.
Form	Liquid.
pH	7 - 9 (10% in H2O)
Freezing point	< 32 °F (< 0 °C)
Boiling point	212 °F (100 °C)
Flash point	> 201 °F (> 93.9 °C) PMCC
Vapor pressure	20 mm Hg
Specific gravity	9.25 lb/gal @ 25 C
Solubility (water)	Complete
VOC	0 %
RVOC	0 %
Pour point	40 °F (4.4 °C)
Viscosity	150 cps @ 25 C

10. Stability & Reactivity

Chemical stability	Stable at normal conditions.
Incompatible materials	Strong oxidizing agentsThis product may react with strong alkalies.
Hazardous decomposition products	Upon decomposition, this product may yield oxides of nitrogen and ammonia, carbon dioxide, carbon monoxide and other low molecular weight hydrocarbons.
Possibility of hazardous reactions	Will not occur.

11. Toxicological Information

Toxicological data

Product	Test Results
AMPHOSOL CS-50	Acute Oral LD50 Rat: 5000 - 15000 mg/kg

* Estimates for product may be based on additional component data not shown.

Carcinogenicity	This product is not considered to be a carcinogen by IARC, ACGIH, NTP, or OSHA.
Mutagenicity	Not mutagenic in AMES Test.

12. Ecological Information

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13. Disposal Considerations

Disposal instructions Dispose in accordance with all applicable regulations.All wastes must be handled in accordance with local, state and federal regulations.Regulations vary.

14. Transport Information

Notes Refer to bill of lading or container label for DOT or other transportation hazard classification, if any.

15. Regulatory Information

Reportable Quantity There is no calculable reportable quantity (RQ) for this product.

CERCLA (Superfund) reportable quantity

None

Superfund Amendments and Reauthorization Act of 1986 (SARA)

Section 302 extremely hazardous substance No

Section 311 hazardous chemical No

Inventory status

Country(s) or region	Inventory name	On inventory (yes/no)*
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Europe	European List of Notified Chemical Substances (ELINCS)	No
Japan	Inventory of Existing and New Chemical Substances (ENCS)	No
Korea	Existing Chemicals List (ECL)	No
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A "Yes" indicates that all components of this product comply with the inventory requirements administered by the governing country(s)

16. Other Information

Further information HMIS® is a registered trade and service mark of the NPCA.

HMIS® ratings
Health: 1
Flammability: 1
Physical hazard: 0
Personal protection: X

NFPA ratings
Health: 1
Flammability: 1
Instability: 0

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Issue date	08-25-2009
MSDS Section Changes	Ecological Information: Ecotoxicity

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

Hex A

EMERGENCY TELEPHONE NUMBER: CHEMTREC (800) 424-9300

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14289

CAS NO. : 100-97-0

CHEMICAL FAMILY: TERTIARY AMINE

CHEMICAL NAME : HEXAMETHYLENETETRAMINE

REVISION DATE : 11/17/10 REVISION NUMBER : 2

S E C T I O N 1 HEALTH HAZARD DATA

AS SOLD:

HEXAMETHYLENETETRAMINE (HEXA) MAY BE HAZARDOUS IF INGESTED AND IS KNOWN TO CAUSE SKIN RASHES ON SENSITIVE INDIVIDUALS. UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS SKIN IRRITATION AND SENSITIZATION. INGESTION AND CONTACT WITH THE SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

THE NORMAL USE OF THIS PRODUCT IS AS A CURING AGENT FOR PHENOLIC RESINS. UNDER NORMAL CONDITIONS OF USE, SMALL AMOUNTS OF GASEOUS AMMONIA, FORMALDEHYDE, AND WATER VAPOR ARE EVOLVED. IF THE PRODUCT IS OVERHEATED OR BURNED (HEXA IS A FLAMMABLE SOLID WHICH BURNS WITH A BLUE, ALMOST INVISIBLE, FLAME), CARBON MONOXIDE, CARBON DIOXIDE, OXIDES OF NITROGEN, FORMALDEHYDE AND AMMONIA ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF AMMONIA OR FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATIONS OF THOSE CHEMICALS SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THOSE CHEMICALS BEGIN TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF AMMONIA AND

... CONTINUED ON NEXT PAGE ...

FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

2. AMMONIA - IRRITANT TO EYES, MUCOUS MEMBRANE AND RESPIRATORY TRACT.

S E C T I O N 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : MAY CAUSE SKIN IRRITATION OR DERMATITIS. WASH THOROUGHLY WITH SOAP AND WATER. WASH CONTAMINATED CLOTHING BEFORE REUSE.

INHALATION : HARMFUL IF INHALED. USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. IF HEADACHE, DIZZINESS OR VISUAL PROBLEMS DEVELOP - GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

S E C T I O N 3 FIRE AND EXPLOSION DATA

FLASH POINT: OPEN CUP 349 DEG F.
FLAMMABLE LIMITS - LEL: .015 OZ/FT.3 UEL: NO DATA

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: HEXAMETHYLENETETRAMINE WILL PRODUCE TOXIC FUMES WHEN BURNED. WEAR MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS AND FULL TURN OUT GEAR TO FIGHT FIRES. AVOID

... CONTINUED ON NEXT PAGE ...

INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: HEXAMETHYLENETETRAMINE IS A FLAMMABLE SOLID. THE DUST CAN BE HIGHLY FLAMMABLE OR EXPLOSIVE. IT BURNS WITH A COLORLESS FLAME AND GIVES OFF TOXIC FUMES.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: CHEMICAL RESISTANT GLOVES.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: AVOID GENERATING DUST. AVOID BREATHING DUST, PREVENT SKIN CONTACT. KEEP AWAY FROM OPEN FLAME OR OTHER SOURCES OF IGNITION. KEEP CONTAINERS CLOSED AND STORE IN COOL, DRY PLACE.

SECTION 5 PHYSICAL DATA

BOILING POINT: (760 MM HG) SUBLIMES @ 263 DEG C.

SPECIFIC GRAVITY: (H_2O = 1) 1.27 @ 25 DEG C.

VAPOR PRESSURE: (MM HG 20 DEG C) N/A

PERCENT VOLATILE: (BY WEIGHT) N/A

VAPOR DENSITY: (AIR = 1) N/A

EVAPORATION RATE: (BUTYL ACETATE = 1) N/A

HEAT OF VAPORIZATION: (DELTA HV) N/A

SOLUBILITY IN WATER: (% BY WEIGHT) 45% @ 77 DEG F

APPEARANCE AND ODOR: WHITE CRYSTALS WITH AMINE ODOR.

... CONTINUED ON NEXT PAGE ...

SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL		
*FORMALDEHYDE	50-00-0	.60	ACGIH-C	0.3	PPM
			OSHA-TWA	0.75	PPM
			OSHA-STEL	2.0	PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		100	ACGIH-TWA/TOTAL	10	MG/M3
			OSHA-TWA/TOTAL	15	MG/M3
			OSHA-TWA/RESPIR	5	MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 80 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG ACIDS AND OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - AMMONIA, FORMALDEHYDE, AND NITROGEN OXIDES. AT TEMPERATURES GREATER THAN 800 DEG C (1472 DEG F) HYDROGEN CYANIDE CAN BE PRODUCED.

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

... CONTINUED ON NEXT PAGE ...

SECTION 9 TRANSPORTATION INFORMATION

* *

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
HEXAMETHYLENETETRAMINE UN1328 NMFC ITEM #43940	CLASS 4.1 (FLAMMABLE SOLID)

NOTE: I.A.T.A. FLAMMABLE SOLID YELLOW LABEL

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

The information set forth herein is furnished free of charge and is based on technical data which PLENCO believes to be reliable. It is intended for use by persons having technical skills and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, expressed or implied, and assume no liability in connection with your use of this information.

PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 11/17/10 TIME: 17:40

CHEMANOL

MATERIAL SAFETY DATA SHEET
HEXAMETHYLENETETRAMINE

SECTION I : PRODUCT & COMPANY IDENTIFICATION

Product	HEXAMETHYLENE TETRAMINE	**Label**	: Flammable Solid
		HAZCHEM code	: 1Z
		NFPA	: 2-1-0
Synonyms	Hexamine, Urotropine, Methenamine	**Contact Information**	: METHANOL CHEMICALS COMPANY P.O. Box 2101, Jubail Industrial City 31951, KSA www.chemanol.com
CAS Number	: 100-97-0	**Tel. No.**	: +966-3-358-9905/ 358-1111
U.N. Number	: 1328	**Emergency Tel. No.**	: +966-3-358-0384
EINECS number	: 202-905-8		

SECTION II : COMPOSITON/ INFORMATION ON INGREDIENTS

Formula	: $C_6H_{12}N_4$	**MOL. WT.**	: 140.22
Proportion	: 98.2 % min (stab) 99.5% min (unstab)	**Metal Content**	: N.T.

SECTION III : PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor	: White crystalline Powder & slight odor of amine	**Bulk Density**	: 700-800 gm/liter
		Melting Point	: 280° C(subl)
		Solubility in water	: Soluble
pH of 10% aq. solution	: 8 – 9		
Vapor Pressure	: 0.0035 mbar @20°C	**Specific gravity**	: 1.33 at 20° C

ARP-Taylor46598

SECTION IV : FIRE & EXPLOSION DATA

Flash Point	:	250°C	**Flammable limits**	: LEL : Not Available
Auto Ignition Temperature	:	390°C		UEL : Not Available
Fire and Explosion Hazard	:	Flammable /combustible material. May be ignited by friction, heat, sparks or flame. Burns rapidly with flare burning effect. Powders, dust shavings, borings, turnings, or cutting may explode or burn with explosive violence. May re-ignite after fire is extinguished. Concentrated dust may form a cloud & produce an explosion.		
Extinguishing Media	:	Water spray, foam, dry chemical powder and carbon dioxide. Sand in presence of electrical equipment		
Fire fighting procedure	:	Keep containers cool by spraying water. Fire fighters should wear self-contained breathing apparatus and protective clothing.		

SECTION V : STABILITY & REACTIVITY DATA

Instability	:	Stable
Hazardous de-composition products	:	Nitrogen Oxides(NOX) / Ammonia / CN- Formaldehyde
Incompatibility (Materials to avoid)	:	React with oxidizing materials, explosive reaction with Acetic Acid + Acetic Unhydride + Ammonium nitrate + Nitric Acid. Reaction with nitric Acid + Acetic Unhydride forms the military explosives RDX & HMX. Reacts violently with Na_2O_2, strong oxidizing agents.
Condition to Avoid	:	Avoid direct heat and naked flames. Ensure that equipment is earthed. Do not expose to air or moisture over prolonged period.
Recommended Material for Equipment	:	Stainless Steel

SECTION VI : HAZARD IDENTIFICATION

Primary routes of exposure	:	Eye, Skin and inhalation
Acute signs & symptoms of over exposure	:	Exposure to high concentrations causes irritation to eyes and rashes to the skin. Inhaling can irritate nose, throat & lungs causing coughing, wheezing & shortness of breath.
Chronic signs & symptoms	:	Hexamethylene Tetramine is a mild poison by sub-cutaneou route. It is moderately toxic.

ARP-Taylor46599

SECTION VII : EXPOSURES & FIRST AID MEASURES

General Advice	:	In case of accident or if you feel unwell, seek medical advice immediately. (show the level where possible)
Eye Contact	:	Contact with eyes may produce irritation. Wash gently with clean water.
Skin Contact	:	Contact with skin may cause rash. Wash affected skin with water.
Inhalation	:	In case of inhalation move patient to fresh air. Begin rescue breathing & CPR in case of a complicated scenario. Transfer to a medical facility.
Ingestion	:	If taken orally, make the victim drink large quantities of water or milk. Do not introduce vomiting without medical advice.

SECTION VIII : HANDLING AND STORAGE

Storage containers	:	Polypropylene woven bags with loose inner Polyethylene liner: 25 Kgs, 500 kgs & 1000 kgs net.
Storage recommendations & precautions	:	As it is sensitive to moisture it should be stored in dry cool and well-ventilated area (relative humidity below 60%). Keep away from any ignition sources, moisture, combustible & incompatible material. Smoking is strictly prohibited in storage area. Use only non sparking tools & equipment.

SECTION IX : EXPOSURE CONTROL / PERSONAL PROTECTION

Engineering Measures	:	Ensure adequate ventilation, especially in confined areas.
Personal Protection		
Eye Protection	:	Safety goggles or face shield.
Respiratory Protection	:	Wear dust mask or respirator .If > 30 mg/m3,use SCBA
Hand Protection	:	PVC disposable gloves
Skin & Body	:	Impervious long sleeved clothing
Exposure limits	:	PAC-1=30mg/m3 (mild health effect) PAC-2=50mg/m3 (serious health effect) PAC-3=500mg/m3(life threatening health effect)

ARP-Taylor46600

SECTION X : TOXICOLOGICAL INFORMATION

Acute Toxicity	:	RTECS Number : MN4725000 Oral, LD 50 , Mouse : 569 mg / kg
Chronic Toxicity	:	Chronic exposure may cause nausea & vomiting , higher exposure causes unconsciousness
Local effect	:	Symptoms of overexposure may be headache, dizziness, tiredness, nausea & vomiting.
Specific Effect	:	May include moderate to severe erythematic (redness) and moderate Edema (raised skin), nausea, vomiting & headache.
Carcinogenic effect	:	No data available
Mutagenic effect	:	No data available
Reproductive toxicity	:	No data available. May be harmful in case of pregnancy.

SECTION XI : ACCIDENTAL RELEASE MEASURES

Evacuate personnel. Eliminate all ignition sources. To clean up spill, the OSHA hazardous waste operations & emergency response standard (29 CFR 1910.120) may apply. Do not wash into sewer or surface water.

ARP-Taylor46601

SECTION XII: ECOLOGICAL INFORMATION

Mobility	:	No data available
Bio accumulation	:	No data available
Eco Toxicity Effect	:	No data available
Aquatic Toxicity	:	May cause long term adverse effects in the aquatic environment
US DOT-Appendix B-Marine Pollutant	:	Not listed
United Kingdom-the Red List	:	Not listed
WHO-Drinking water	:	Not listed
Ecotoxicity -Fish species data	:	Not listed
Ecotoxicity-Freshwater Algae data	:	Not listed
EPA-HPV Challenge program Chemical List	:	Indicator 2, not sponsored

SECTION XIII : DISPOSAL CONSIDERATION

Any waste or contaminated spills should be collected and disposed off in accordance with local and statutory regulations using a registered waste disposal contractor. Waste disposal is possible by total incineration. Do not reuse empty containers.

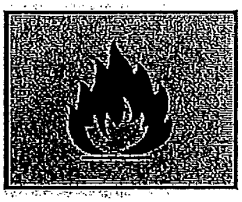
SECTION XIV : TRANSPORT INFORMATION

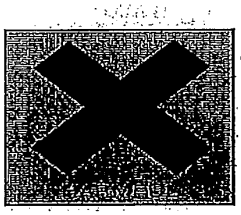
Proper Shipping Name	:	Hexamethylenetetramine
Packaging	:	Polypropylene sacks with liner.
Transport classification	:	Flammable solid.
DOT number	:	UN 1328
IMO class	:	4.1 flammable solids.
IMDG code (page no)	:	4150
Packing group	:	III
Emergency action code (Hazchem code)	:	1 Z

ARP-Taylor46602

SECTION XV : REGULATORY INFORMATION

Supply classification	:	Flammable solids
Risk phrases	:	❖ R 11 Highly flammable ❖ R 42/43 May cause sensitization by inhalation & skin contact
Safety phrases	:	❖ S 16 Keep away from source of ignition- no smoking ❖ S 22 Do not breathe dust ❖ S 37 Wear suitable gloves ❖ S 24 Avoid contact with skin
Indication of Danger	:	❖ F, Xn Flammable, Harmful



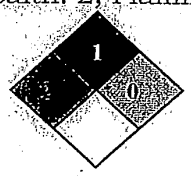


AICS (Australia)	:	Present
Inventory (China)	:	Present
EU EINECS List	:	202-905-8
KECL (Korea)	:	KE-18615
PICCS (Philippines)	:	Present

ARP-Taylor46603

ENCS (Japan) : Unknown

NFPA rating Health: 2, Flammable: 1, Instability: 0



HMIS(USA) : Health-2,Fire-1,Reactivity-0,Personal Protection-E

Health Hazard	2
Fire Hazard	1
Physical Hazard	0
Personal Protection	E

OSHA : Hazardous by definition of hazard communication standard (29CFR1910.1200)

WHMIS (CANADA) : Class B-4 Flammable solid
Class D-2B material causing other toxic effect(TOXIC)

SECTION XVI : OTHER INFORMATION

References: Not available.

Other Special considerations: Not available.

Last Updated: October 2009.

Information Contact: Technical Services Department.

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall CHEMANOL be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if CHEMANOL has been advised of the possibility of such damages.

FORMAT# MKT/F10 C Rev.02

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CHEMANOL

MATERIAL SAFETY DATA SHEET

(HEXAMETHYLENE TETRAMINE)

1.0 IDENTIFICATION

Product	:	**HEXAMETHYLENE TETRAMINE**
Formula	:	($C_6H_{12}N_4$) Molecular Wt. – 140.22
CAS NO.	:	100-97-0
HS Tariff No.	:	2933.90.000
Company	:	**METHANOL CHEMICALS COMPANY (CHEMANOL)**
		P.O. Box 2101, Jubail Industrial City 31951, K.S.A.
Tel. No.	:	00966 3 358 9905/ 358 1111
Emergency Contact Person	:	Shift Superintendent
Tel. No.	:	00966-3- 358 0384

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients

Chemical Name	CAS NO.	Proportion	Exposure Limit	Toxicity Data
Hexamethylene Tetramine	100-97-0	98.2-99.5%	N/A	Moderately toxic.

3.0 PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	White powder
Odour	:	Slight odour of Amine
Melting Point	:	280°C
Flash Point	:	250°C
Ignition Temp	:	390°C
Vapour Density at 20°C	:	0.0035 mbar
Density at 20°C	:	1.33 gm/cm³
Bulk Density	:	700-800 Kg/M³
pH	:	8-9
Solubility	:	Soluble in water

4.0 STABILITY AND REACTIVITY

Stability	:	Hexamethylene Tetramine is stable for a long period.
Conditions to avoid	:	Avoid direct heat & naked flames. Ensure that equipment is earthed to prevent static charge build-up.
Materials to avoid	:	Hexamethylene Tetramine is sensitive to moisture. It should be stored in an atmosphere at relative humidity less than 60%
Recommended materials for equipment	:	Stainless steel

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Hazardous decomposition products	:	Hexamethylene Tetramine decomposes when heated above 200°C releasing ammonia and hydrocyanic acid vapours. The substance sublimates between 230°C and 270°C without melting and with partial decomposition.

5.0 HAZARDS INFORMATION

FLAMMABLE SOLID

6.0 FIRE FIGHTING MEASURES

Extinguishing Media	:	Water spray, foam, chemical dry powder and carbon dioxide. Sand in presence of electrical equipment
Fire and Explosion Hazards	:	Hexamethylene is an inflammable solid material. Readily ignites in contact with flame.
Protective Measures	:	Keep containers cool by spraying with water. Fire fighters should wear self contained breathing apparatus and protective clothing.

7.0 HEALTH HAZARD DATA

ACUTE EFFECTS

Eye	:	Contact with eyes causes irritation in the eyes.
Skin	:	Contact with skin causes skin rash.
Ingestion	:	Pure Hexamethylene Tetramine may be taken internally in small amounts and has been used in medicines as a urinary antiseptic. When swallowed inflammation of the urogenital tracts may happen.
Chronic Effects	:	Hexamethylene Tetramine is a mild poison by sub-cutaneous route. It is moderately toxic and a questionable carcinogen.

8.0 EXPOSURE & FIRST AID MEASURES

Skin Contact	:	Contact with skin may cause rash. Wash affected skin with water.
Eyes Contact	:	Contact with eyes may produce irritation. Wash gently with clean water.
Ingestion	:	If taken orally, make the victim drink large quantities of liquid 'Diamox'

9.0 ACCIDENTAL RELEASE MEASURES.

Personal Precautions	:	Wear dust mask, protective overalls, safety goggles, chemical resistant gloves.
Environmental Precaution	:	Prevent material from entering into drains, water course or sewers. If the substance enters a water course or sewer, inform the Police, Fire Brigade & Local Health Authority immediately.

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Recovery	:	Collect the spilled material for disposal into suitable containers.

10.0 HANDLING AND STORAGE

Storage	:	Keep containers sealed. Store in a cool fire-resistant area. NO SMOKING in storage area.
Ventilation	:	General ventilation should be used to control airborne levels. A dust mask should be worn.
Handling	:	Avoid contact with skin, eyes and clothing. Do not eat or drink during handling. Observe normal standards in industrial hygiene.

11.0 EXPOSURE CONTROL/PERSONAL PROTECTION

Respiratory Protection	:	Wear suitable respiratory protection, if dusts are generated.
Hand Protection	:	Wear chemical resistant gloves.
Eye Protection	:	Wear goggles or face shield.
Other	:	Wear chemical resistant footwear, protective overalls.

12.0 ECOLOGICAL INFORMATION

Mobility	:	Soluble in water
Resistance and Degradability	:	Not readily biodegradable in soil and water.
Aquatic toxicity	:	The substance causes disturbances of equilibrium in fish (disturbance threshold 5 gm/lit).

13.0 DISPOSAL CONSIDERATION

Any waste or contaminated spills should be collected and disposed off in accordance with local and statutory regulations using a registered waste disposal contractor.

14.0 TRANSPORT INFORMATION

Packaging	:	Polythene sacks.
Transport classification	:	Flammable solid
Substance identification No.	:	1328
IMCO Class	:	4.1 flammable solids

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CHEMANOL

IMDG Code (Page No.)	:	4150
Packing Group	:	III

15.0 REGULATORY INFORMATION

Supply classification	:	Flammable solids	
Hazard Pictogram	:		
Risk phrases		❖ R 11	Highly flammable
		❖ R 43	May cause skin sensitization on contact.
Safety Phrases		❖ S 16	Keep away from source of ignition.
		❖ S 24	Avoid contact with skin.
Risk symbols		❖ F, Xi	

16.0 OTHER INFORMATION

This information, which describes our product with regard to possible security requirements is based on the present state of our knowledge and experience. SFCCL do not accept any liability arising out of the use of this information.

ARP-Taylor46608

HEXA METHYLENE TETRAMINE
(HEXAMINE)

A) APPEARANCE : WHITE CRYSTALLINE FREE FLOWING MATERIAL

B) GRADE : **WITH ANTICAKING AGENT**
(STABILIZED WITH BENZOIC ACID)

C) SPECIFICATIONS :

APPEARANCE	White Crystalline Powder
HEAVY METALS AS PB (WT %)	0.001 max
SULFATE (WT %)	0.02 max
CHLORIDE (WT %)	0.015 max
AMMONIA SALTS (WT %)	0.001 max
ASH (WT %)	0.050 max
WATER CONTENT (WT %)	0.30 max
PURITY (WT %)	98.80 min

HEXAMETHYLINE
TETRAMINE

Untreated, 25kg bags
CAS No. 100-97-0

SPECIFICATION

Appearance ..... White crystalline
Purity (%)..... 99,0 min
Water content (%) ..... 0.5 max
Ph ..... 7.5 min
Water Solution (APHA) ..... 10 max (10% solution)

20 max (20% solution)
Ammonium salt (%)..... 0.001 max (NH3)
Sulphates SO4 (%)..... 0.02 max
Chlorides CL (%)..... 0.015 max
Heavy metals PB (%) ..... 0.001 max
Ash content (%)..... 0.02 max

—plenco—

EXPERIMENTAL/LAB SAMPLE PRODUCT

MATERIAL SAFETY DATA SHEET

PLASTICS ENGINEERING COMPANY

modified

DATE: February 2012

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 14889	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 9003-35-4	CHEMICAL NAME AND SYNONYMS Two Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer of not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol and formaldehyde may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - irritant to eyes, lungs, and skin. May cause respiratory sensitization. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the state of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans. It is the opinion of the U.S. Dept of Health and Human Services that formaldehyde is "known to be a human carcinogen."

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Use with adequate ventilation. If breathing is affected, remove to fresh air. If breathing stops, apply mouth to mouth resuscitation. Get medical attention.

INGESTION:
Do not induce vomiting. If conscious, rinse mouth and provide small glass of water to help dilute. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III ? THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372	%	TLV (Units)
*Phenol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	<1.0	
Nuisance Particulates OSHA 15 Mg/M^3	100	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	N/A	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Yellow to amber colored pastilles with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
	UNSTABLE ☐	Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain – phenol, formaldehyde

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

SECTION VIII - CONTROL MEASURES

VENTILATION	LOCAL EXHAUST	SPECIAL
	Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	
	MECHANICALS (General) Use explosion proof motors.	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves recommended	Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life, Gas Blanket)
Store in a cool, dry place (below 75°F). Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Theodore N. Morrison EXT. 3822 TITLE Resin Application and Development Supervisor PLENCO 14889

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

Novolac

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 13983

CAS NO. : 9003-35-4

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : TWO STAGE PHENOLIC RESIN

REVISION DATE : 07/01/10 REVISION NUMBER : 2

S E C T I O N 1 HEALTH HAZARD DATA

S

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF GASEOUS PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATIONS OF THIS CHEMICAL SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PEL. THE ODOR OF PHENOL

... CONTINUED ON NEXT PAGE ...

BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL. IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

S E C T I O N 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

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SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

SECTION 5 PHYSICAL DATA

BOILING POINT: N/A
(760 MM HG)

SPECIFIC GRAVITY: 1.2 - 1.3
(H_2O = 1)

VAPOR PRESSURE: N/A
(MM HG 20 DEG C)

PERCENT VOLATILE: N/A
(BY WEIGHT)

... CONTINUED ON NEXT PAGE ...

VAPOR DENSITY: N/A
(AIR = 1)

EVAPORATION RATE: N/A
(BUTYL ACETATE = 1)

HEAT OF VAPORIZATION: N/A
(DELTA HV)

SOLUBILITY IN WATER: SLIGHT
(% BY WEIGHT)

APPEARANCE AND ODOR: FINELY GROUND CREAM-TAN POWDER WITH SLIGHT ODOR OF PHENOL

SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL	
*PHENOL	108-95-2	<1.5	ACGIH-TWA/SKIN	5 PPM
			OSHA-TWA/SKIN	5 PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		100	ACGIH-TWA/TOTAL	10 MG/M3
			OSHA-TWA/TOTAL	15 MG/M3
			OSHA-TWA/RESPIR	5 MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL OR FORMALDEHYDE.

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

... CONTINUED ON NEXT PAGE ...

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

The information set forth herein is furnished free of charge and is based on technical data which PLENCO believes to be reliable. It is intended for use by persons having technical skills and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, expressed or implied, and assume no liability in connection with your use of this information.

PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 09/20/10 TIME: 16:04

Old Formulation

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14664 Resol

CAS NO. : 37337-65-8

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : SINGLE STAGE PHENOLIC RESIN

REVISION DATE : 10/01/10 REVISION NUMBER : 1

SECTION 1 HEALTH HAZARD DATA

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATION SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. THE ODOR OF PHENOL BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL.

... CONTINUED ON NEXT PAGE ...

IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL, AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

SECTION 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

... CONTINUED ON NEXT PAGE ...

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

S E C T I O N 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

S E C T I O N 5 PHYSICAL DATA

BOILING POINT: N/A (760 MM HG)	SPECIFIC GRAVITY: 1.2 - 1.3 (H2O = 1)
VAPOR PRESSURE: N/A (MM HG 20 DEG C)	PERCENT VOLATILE: N/A (BY WEIGHT)
VAPOR DENSITY: N/A (AIR = 1)	EVAPORATION RATE: N/A (BUTYL ACETATE = 1)
HEAT OF VAPORIZATION: N/A (DELTA HV)	SOLUBILITY IN WATER: SLIGHT (% BY WEIGHT)

APPEARANCE AND ODOR: COURSE GROUND OR PASTILLE WITH SLIGHT ODOR OF PHENOL

... CONTINUED ON NEXT PAGE ...

SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL		
*FORMALDEHYDE	50-00-0	<1.7	ACGIH-C	0.3	PPM
			OSHA-TWA	0.75	PPM
			OSHA-STEL	2.0	PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		LESS THAN 5%	ACGIH-TWA/TOTAL	10	MG/M3
			OSHA-TWA/TOTAL	15	MG/M3
			OSHA-TWA/RESPIR	5	MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL AND FORMALDEHYDE

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

... CONTINUED ON NEXT PAGE ...

SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

The information set forth herein is furnished free of charge and is based on technical data which PLENCO believes to be reliable. It is intended for use by persons having technical skills and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, expressed or implied, and assume no liability in connection with your use of this information.

PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 10/19/10 TIME: 16:03

EXPERIMENTAL/LAB SAMPLE PRODUCT
MATERIAL SAFETY DATA SHEET
PLASTICS ENGINEERING COMPANY

Resol Resin

DATE: June 2011

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 14869	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 37337-65-8	CHEMICAL NAME AND SYNONYMS Single Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer is not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). The primary health risk from exposure to the product "as sold" is irritation. Ingestion and contact with skin and eyes should be avoided. "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol, formaldehyde and ammonia may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - irritant to eyes, lungs, and skin. May cause respiratory sensitization. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the state of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans. It is the opinion of the U.S. Dept of Health and Human Services that formaldehyde is "known to be a human carcinogen."

AMMONIA - Irritant to eyes, mucous membranes and respiratory tract.

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Material presents a nuisance dust hazard. See Section V for possible phenol hazard.

INGESTION:
Do not induce vomiting. If conscious, rinse mouth and provide small glass of water to help dillute. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372		%	TLV (Units)
*Phenol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	less than	0.9	
*Formaldehyde 50-00-0 ACGIH - 0.3 ppm; OSHA - 0.75 ppm; STEL 2 ppm	less than	3.0	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	No Data	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Coarse ground or pastille with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY	UNSTABLE ☐	CONDITIONS TO AVOID Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain -- phenol, formaldehyde or ammonia

HAZARDOUS POLYMERIZATION	MAY OCCUR ☐	CONDITIONS TO AVOID Heating, oxidizers
	WILL NOT OCCUR ☒	

SECTION VIII- CONTROL MEASURES

VENTILATION	LOCAL EXHAUST Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	SPECIAL
	MECHANICALS (General) Use explosion proof motors.	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES Gloves recommended	EYE PROTECTION Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life. Gas Blanket)
Store in a cool, dry place. Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices. Note: empty containers contain product residue. All safety warning labels must be observed. Do not refill empty containers.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Theodore N. Morrison EXT. 3822 TITLE Supervisor Resin Application & Development PLENCO 14869

Chemical Name: **Resin, Resol Plenco 14869 (RESOL RESIN)**

CAS#: 37337-65-8

Emergency Phone Number: (920) 458-2121

NFPA Code: Health= 2 Fire= 3 Reactivity= 1

REF:(0 = Not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme)

Hazards:

Irritant to eyes, lungs, and skin. Nuisance dust hazard. Avoid heat and oxidizers.

Exposure and Required PPE:

Wear MSHA/NIOSH breathing apparatus and full turn out gear to fight fires. Chemical resistant gloves, safety glasses with side shields, respirator. Practice good hygiene and maintain a clean work environment. Eye wash and shower should be available.

First Aid:

Rinse eyes for at least 15 minutes, remove contaminated clothing and thoroughly wash area with soap and water. **Do Not Induce Vomiting**. Rinse mouth and provide small glass of water to help dilute material. **Seek medical attention.**

Emergency Response Information:

Gives off irritating vapors, during a fire highly toxic gases may be generated by thermal decomposition. **Extinguishing media of water, foam, dry chemical, carbon dioxide.**

Handling and Storage:

Proper PPE, store in a cool dry well-ventilated area. Keep away from heat sources. Do not mix with acids or oxidizing materials. Avoid generating or breathing dust. Prevent skin contact. Observe good housekeeping practices.

Accidental Release and Clean-up

Remove all sources of ignition, Ventilate area, Wear proper PPE, Clean up in a manner not to disperse dust. Bury or incinerate according to local, state, and federal regulations. Incompatible and sensitive to strong oxidizing agents.

Physical Characteristics

Coarse ground or pastille with slight odor of phenol.

Chemical Properties

Melting Point: Boiling Point: Vapor Density: Flash Point: None

Solubility in water: Slight Specific Gravity: 1.2-1.3 Specific gravity of Water= 1.0

Other Information:

See attached MSDS.

Old formulation

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14664 Resol

CAS NO. : 37337-65-8

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : SINGLE STAGE PHENOLIC RESIN

REVISION DATE : 10/01/10 REVISION NUMBER : 1

S E C T I O N 1 HEALTH HAZARD DATA

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATION SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. THE ODOR OF PHENOL BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL.

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IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL, AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

SECTION 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

... CONTINUED ON NEXT PAGE ...

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

SECTION 5 PHYSICAL DATA

BOILING POINT: N/A (760 MM HG)	SPECIFIC GRAVITY: 1.2 - 1.3 (H_2O = 1)
VAPOR PRESSURE: N/A (MM HG 20 DEG C)	PERCENT VOLATILE: N/A (BY WEIGHT)
VAPOR DENSITY: N/A (AIR = 1)	EVAPORATION RATE: N/A (BUTYL ACETATE = 1)
HEAT OF VAPORIZATION: N/A (DELTA HV)	SOLUBILITY IN WATER: SLIGHT (% BY WEIGHT)

APPEARANCE AND ODOR: COURSE GROUND OR PASTILLE WITH SLIGHT ODOR OF PHENOL

... CONTINUED ON NEXT PAGE ...

S E C T I O N 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL	
*FORMALDEHYDE	50-00-0	<1.7	ACGIH-C	0.3 PPM
			OSHA-TWA	0.75 PPM
			OSHA-STEL	2.0 PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		LESS THAN 5%	ACGIH-TWA/TOTAL	10 MG/M3
			OSHA-TWA/TOTAL	15 MG/M3
			OSHA-TWA/RESPIR	5 MG/M3

S E C T I O N 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL AND FORMALDEHYDE

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

S E C T I O N 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

... CONTINUED ON NEXT PAGE ...

SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

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PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 10/19/10 TIME: 16:03

Material Safety Data Sheet

Rev. F – Revised August 26, 2010

Section 1 – Product Identification and Company Information

Trade Names:	Trademarks and product names include Badger Frac™, Badger Pac™, Badger Cast™, Badger Sand and Badger Enviromedia. Products also generally referred to as Taylor Silica, Fairwater Silica.
Common Names/Synonyms:	Silica Sand, Engine Sand
Product Use:	Frac Sands, Gravel Pack Sands, Resin Coating Base Sands, Foundry Core and Molding Sands, Industrial Sands, Glass Sands, Filtration Media, Environmental Sands, Grinding Media, Industrial Fillers, Testing Sands, Recreational and Agricultural Sands. **This product is not to be used for abrasive blasting. This material safety data sheet and the information contained herein were not developed for abrasive blasting.**
Manufacturer's Name:	Badger Mining Corporation
Manufacturer's Address:	P.O. Box 328 409 South Church Street Berlin, WI 54923
Manufacturer's Telephone:	800-932-7263 (7:30 am – 5 pm Central Time Monday-Friday) 920-361-2388
Manufacturer's Fax:	920-361-2826
Emergency Number:	800-932-7263 (7:30 am – 5 pm Central Time Monday-Friday) 920-361-2388

Section 2 – Hazards Identification

Emergency Overview

Badger Mining Corporation Silica Sand is a light buff to white sand with no odor. It is not flammable, combustible, or explosive. It can cause irritation to the eyes. A single exposure will not result in serious adverse health effects. Crystalline silica is not known to be an environmental hazard.

Potential Health Effects

ARP-Taylor46632

Primary routes(s) of exposure: ■ Inhalation ☐ Skin ☐ Ingestion

Inhalation:

a. Silicosis: Respirable crystalline silica (quartz) can cause chronic silicosis, a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death. Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as 6 months. The symptoms of acute silicosis include (but are not limited to) progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

b. Cancer: Crystalline silica (quartz) inhaled from occupational sources in sufficient concentrations is classified as carcinogenic to humans. In its Eleventh Annual Report on Carcinogens, National Toxicology Program (NTP) listed respirable crystalline silica as a known human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust. The International Agency for Research on Cancer (IARC) has evaluated crystalline silica and determined that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." Crystalline silica is not on the OSHA carcinogen list

c. Autoimmune Diseases: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

d. Tuberculosis: Silicosis increases the risk of tuberculosis.

e. Nephrotoxicity: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease.

Eye Contact: Crystalline silica (quartz) may cause abrasion of the cornea.

Skin Contact: May cause abrasion to skin.

Ingestion: No adverse effects expected for incidental ingestion. Ingestion of large amounts may cause gastrointestinal tract irritation.

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Acute Effects: One form of silicosis, Acute Silicosis, can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as 6 months. The symptoms of acute silicosis include (but are not limited to) progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

Chronic Effects: The adverse health effects -- lung disease, silicosis, cancer, autoimmune disease, tuberculosis, and nephrotoxicity -- are chronic effects.

Signs and Symptoms of Exposure: There are generally no signs or symptoms of exposure to crystalline silica (quartz). Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. The symptoms of acute silicosis are the same as those associated with chronic silicosis; additionally, weight loss and fever may also occur. The symptoms of scleroderma include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

Medical Conditions Generally Aggravated by Exposure: The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure.

HMIS:

Health:	See Section 11, Toxicological Information, for additional detail on potential adverse health effects.
Flammability:	0
Reactivity:	0
Protective Equipment:	E

NFPA

Health:	0
Flammability:	0
Reactivity:	0

Section 3 - Composition and Information on Ingredients

Hazardous Ingredients

Name:	Silica, Quartz, SiO_2
CAS Number:	14808 - 60- 7
Concentration (%)	89.0-99.9%

Section 4 - First Aid Procedures

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Inhalation – There is no specific treatment because the health effects associated with silica are chronic. If gross inhalation of silica occurs, remove the person to fresh air, perform artificial respiration as needed and obtain medical attention as needed.

Eye – Immediately wash the eye with plenty of water for at least 15 minutes, while holding eyelid(s) open. If irritation persists, seek medical attention.
Skin – If abrasion occurs wash with soap and water and seek medical attention if irritation persists or develops later.

Ingestion – If gastrointestinal discomfort occurs, give a large quantity of water. Never attempt to make an unconscious person drink or vomit. Seek medical attention.

Section 5 – Fire Fighting Measures

Flashpoint:	None
Upper/Lower Explosive Limit:	Not Combustible
Autoignition Temperature:	None
Unusual Fire and Explosion Habits:	None
Extinguishing Media:	Compatible with all media; use the medium appropriate to the surrounding fire.
Special Fire Fighting Procedures:	None with respect to this product.
Hazardous Combustion Products:	None

Section 6 – Accidental Release Measures

Wear appropriate personal protective equipment as described in Section 8 of this document. Collect the material using a method that does not produce dust [High-Efficiency Particulate Air (HEPA) vacuum or thoroughly wetting down the silica. Place the silica in a covered container appropriate for disposal. Dispose of the silica according to federal, state and local regulations.

This product is not subject to the reporting requirements of Title III of SARA, 1986, and 40 CFR 372.

Section 7 – Handling and Storage

This product is **not** to be used for abrasive blasting. Do not breathe dust, which may be created during the handling of this product. Do not rely on vision to determine whether respirable silica is present in the air, as it may be present without a visible cloud. Use good housekeeping procedures to prevent the accumulation of silica dust in the workplace. Avoid the creation of respirable dust. Avoid standing on piles of materials as they may be unstable.

Use adequate ventilation and dust collection equipment. Ensure that the dust collection system is adequate to reduce airborne dust levels to below the appropriate occupational health limit.

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Use respiratory protection during the establishment of engineering controls. Refer to Section 8 – Exposure Controls/Personal Protection for further information.

In accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21), state, and/or local right-to-know laws and regulations, familiarize your employees with this MSDS and the information contained herein. Warn your employees (and your customers in case of resale) of the potential health risks associated with the use of this product and train them in the appropriate use of personal protective equipment and engineering controls, which will reduce their risks of exposure.

See also ASTM International standard practice E 1132-06, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica."

Crystalline silica is listed by the Governor of the State of California, under Proposition 65, as requiring the following warning: "Detectable amounts of chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm may be found in this product."

Section 8 – Exposure Controls/Personal Protection

Exposure Limits (respirable fraction) in air for Crystalline Silica (quartz):

Standard	Exposure Limits
MSHA/OSHA PEL (8-Hour Time Weighted Average)	$\frac{10\ mg/m^3}{\%\ SiO_2+2}$
ACGIH TLV (8-Hour Time Weighted Average)	0.025 mg/m^3
NIOSH (10-Hour Time Weighted Average, 40-hour work week)	0.05 mg/m^3

Note: The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as cristobalite is equal to the TLV for crystalline silica as quartz. In 2005, ACGIH withdrew the TLV for crystalline silica as tridymite. Refer to Section 10 for thermal stability information for crystalline silica (quartz).

Occupational Exposure Limits (inert/nuisance dust) in air:

Standard	Respirable Dust	Total Dust
MSHA/OSHA PEL (as Inert or Nuisance Dust)	5 mg/m^3	15 mg/m^3
ACGIH TLV (as particles not otherwise specified)	3 mg/m^3	10 mg/m^3

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Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.

Engineering Controls:

Ventilation: Use local exhaust, general ventilation or natural ventilation adequate to maintain exposures below appropriate exposure limits.

Other control measures: Respirable dust and quartz levels should be monitored regularly. Dust and quartz levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including (but not limited to) dust suppression (wetting), ventilation, process enclosure, and enclosed employee work stations.

Respiratory Protection:

This product is <u>not</u> to be used for abrasive blasting. Consult with OSHA regulations and NIOSH recommendations to determine the appropriate respiratory protection during use of this product. Use only NIOSH-approved respiratory protection equipment. Avoid breathing dust produced during the use and handling of this product. If the workplace airborne crystalline silica concentration is unknown for a given task, conduct air monitoring to determine the appropriate level of respiratory protection. Consult with a certified industrial hygienist, your insurance risk manager, or the OSHA Consultative Services group for detailed information. Ensure appropriate respirators are worn during and following the task, including clean up or whenever airborne dust is present, to ensure worker exposures remain below occupational health limits. Provisions should be made for a respiratory protection training program (see 29 CFR 1910.134 - Respiratory Protection for minimum program requirements). See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

Respirator Recommendations:
For respirable quartz levels that exceed or are likely to exceed appropriate exposure limits, a NIOSH-approved 100 series particulate filter respirator must be worn. If respirable quartz levels exceed or are likely to exceed an 8 hour-TWA of 0.5 mg/m^3, a NIOSH-approved air purifying, full-face respirator with a 100 series particulate filter must be worn. Respirator use must comply with applicable MSHA or OSHA standards, which include

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provisions for a user training program, respirator maintenance and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-35-NIOSH or visit website: http://www.cdc.gov/niosh/npg (search for crystalline silica).

Emergency or planned entry into unknown concentrations or IDLH conditions (50mg/m³ for crystalline silica-quartz): Any self-contained breathing apparatus that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode or any supplied-air respirator that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape from unknown or IDLH conditions (50mg/m³ for crystalline silica-quartz): Any air-purifying, full-face piece respirator with a high-efficiency particulate filter or any appropriate escape-type, self-contained breathing apparatus.

Gloves: Recommended in situations where abrasion from sand may occur.

Eye/Face: Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively(visible) dusty conditions are present or are anticipated. There is a potential for severe eye irritation for those wearing contact lenses.

General Hygiene Considerations: There are no known hazards associated with this material when used as recommended. Following the guidelines in this MSDS are recognized as good industrial hygiene practices. Avoid breathing dust. Wash dust-exposed skin with soap and water before eating, drinking, smoking, and using toilet facilities.

Section 9 - Physical and Chemical Properties

Appearance:	Light Buff to White Sand
Odor:	None
Physical State:	Granular Solid
pH:	Not Applicable
Vapor Pressure	Not Applicable
Vapor Density:	Not Applicable

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Boiling Point or Range, °F:	2230°C (4046°F) for Quartz
Melting Point or Range, °F:	1710°C (3110°F) for Quartz
Solubility In Water:	Insoluble
Specific Gravity:	2.65 (Quartz)

Section 10 – Stability and Reactivity

Stability:	Stable
Thermal Stability:	If crystalline silica (quartz) is heated to more than 870°C (1598°F) it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470°C (2678°F), it can change to a form of crystalline silica known as cristobalite.
Materials to Avoid:	Strong Oxidizing Agents, such as fluorine, chlorine trifluoride, hydrogen fluoride, and oxygen difluoride.
Hazardous Decomposition Products:	Silica will dissolve in hydrofluoric acid and produce a corrosive gas – silicon tetrafluoride.
Hazardous Polymerization:	Not known to polymerize.

Section 11 – Toxicological Information

CAUTION: Crystalline silica exists in several forms, the most common of which is quartz. Crystalline silica as tridymite and cristobalite are more fibrogenic than crystalline silica as quartz.

A. SILICOSIS

The major concern is silicosis (lung disease), caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years of exposure to levels above the occupational exposure limits for airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis.

Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

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Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease (cor pumonale) secondary to the lung disease.

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

B. CANCER

IARC – The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans* (*Group 1*)." The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The monograph also stated that "[C]arcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates..." (1997).

NTP – In its Eleventh Annual Report on Carcinogens, concluded that respirable crystalline silica is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust.

OSHA – Crystalline silica is not on the OSHA carcinogen list.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information; the following are examples of recently published articles: (1) "Dose-response meta-analysis of silica and lung cancer", *Cancer Causes*

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Control, (20):925-33 (2009); (2) "Occupational silica exposure and lung cancer risk: a review of epidemiological studies 1996-2005', *Ann Oncol*, (17) 1039-50 (2006); (3) "Lung cancer among industrial sand workers exposed to crystalline silica", *Am J Epidemiol*, (153) 695-703 (2001); (4) "Crystalline Silica and the risk of lung cancer in the potteries", *Occup Environ Med*, (55) 779-785 (1998); (5) "Is Silicosis Required for Silica-Associated Lung Cancer?", *American Journal of Industrial Medicine*, (37) 252- 259 (2000); (6) " Silica, Silicosis, and Lung Cancer: A Risk Assessment", *American Journal of Industrial Medicine*, (38) 8-18 (2000); (7) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", *Journal of Occupational and Environmental Medicine*, (42) 704-720 (2000).

C. AUTOIMMUNE DISEASES

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted: (1) "Antinuclear antibody and rheumatoid factor in silica-exposed workers", *Arh Hig Rada Toksikol*, (60) 185-90 (2009); (2) "Occupational Exposure to Crystalline Silica and Autoimmune Disease", *Environmental Health Perspectives*, (107) Supplement 5, 793-802 (1999); (3) "Occupational Scleroderma", *Current Opinion in Rheumatology*, (11) 490-494 (1999); (4) "Connective tissue disease and silicosis", *Am J Ind Med*, (35), 375-381 (1999).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: (1) "Tuberculosis and silicosis: epidemiology, diagnosis and chemoprophylaxis", *J Bras Pneumol*, (34) 959-66 (2008); (2) *Occupational Lung Disorders*, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); (3) "Risk of pulmonary tuberculosis relative to silicosis and exposure to silica dust in South African gold miners," *Occup Environ Med*, (55) 496-502 (1998); (4) "Occupational risk factors for developing tuberculosis", *Am J Ind Med*, (30) 148-154 (1996).

E. KIDNEY DISEASE

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted: (1) "Mortality from lung and kidney disease in a cohort of North American industrial sand workers: an update", *Ann Occup Hyg*, (49) 367-73 (2005); (2) "Kidney Disease and Silicosis", *Nephron*, (85) 14-19 (2000); (3) "End stage renal disease among ceramic workers exposed to silica", *Occup Environ Med*, (56) 559-561 (1999); (4) "Kidney disease and arthritis in a cohort study of workers exposed to silica", *Epidemiology*, (12) 405-412 (2001).

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F. NON-MALIGNANT RESPIRATORY DISEASES

NIOSH has cited the results of studies that report an association between dusts found in various mining operations and non-malignant respiratory disease, particularly among smokers, including bronchitis, emphysema, and small airways disease. The results were not conclusive regarding an association among those with silicosis, only smokers, or the result of general mineral dust that does not contain silica. See *NIOSH Hazard Review - Health Effects of Occupational Exposure to Respirable Crystalline Silica*, published in April 2002, available from NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226, or at http://www.cdc.gov/niosh/02-129A.html.

Section 12 - Ecological Information

Crystalline silica is not known to be ecotoxic.

Section 13 - Disposal Considerations

General: Crystalline silica may be landfilled. Material should be placed in covered containers to minimize generation of airborne dust.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

The above information applies to Badger Mining Corporation Silica Sand only as sold. The product may be contaminated during use, and it is the responsibility of the user to assess the appropriate disposal method in this situation.

Section 14 - Transport Information

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

Section 15 - Regulatory Information

UNITED STATES (FEDERAL AND STATE)

Exposure Limits (respirable fraction) in Air for Crystalline Silica (quartz):

Standard	Exposure Limits
MSHA/OSHA PEL (8-Hour Time Weighted Average)	10 mg/m³ % SiO_2+2

Note: The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz). Please refer to Section 10 for information on thermal stability of crystalline silica (quartz).

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Exposure Limits (inert/nuisance dust) in Air:

Standard	Respirable Dust	Total Dust
MSHA/OSHA PEL (as Inert or Nuisance Dust)	5 mg/m³	15 mg/m³

Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.

OTHER US REGULATORY INFORMATION:

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.4

EPCRA (Emergency Planning and Community Right to Know Act): Crystalline silica (quartz) is not an extremely hazardous substance under regulations of the Emergency Planning and Community Right to Know Act, 40 CFR Part 355, Appendices A and B and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by Badger Mining Corporation was not processed with or does not contain any Class I or Class II ozone depleting substances.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3).(The FDA standard primarily applies to products containing silica used in the coatings of food contact surfaces).

NTP: Respirable crystalline silica (quartz) is classified as a known human carcinogen in the NTP's 11th Report on Carcinogens.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

California Proposition 65: Respirable crystalline silica (quartz) is classified as a substance known to the state of California to be a carcinogen.

California Inhalation Reference Exposure Limit (REL): The California chronic REL for respirable crystalline silica (quartz, cristobalite, tridymite) is 3 ug/m³. [Dated December 18, 2008] A chronic REL is an airborne level of a chemical at or below which no adverse health effects are anticipated in individuals indefinitely exposed to that level. [Dated 2/10/05]

Massachusetts Toxic Use Reduction Act: Respirable crystalline silica is considered toxic per the Massachusetts Toxic Use Reduction Act.

Pennsylvania Worker and Community Right to Know Act: Quartz is considered hazardous for purposes of the Act, but it is not a special hazardous substance or an environmental hazardous substance.

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CANADA

Domestic Substances List: Badger Mining Corporation products, as naturally occurring substances, are on the Canadian DSL.

WHMIS Classification: D-2A

Canadian OEL:

Canada Labour Code: 0.025 mg/m3 (respirable)
Alberta, British Columbia: 0.025 mg/m3 (respirable, quartz and cristobalite)
Saskatchewen: 2 mg/m3 (respirable, amorphous: silica fume); 0.1 mg/m3 (respirable, amorphous: silica fused); 0.05 mg/m3 (respirable, cristobalite); 0.05 mg/m3 (respirable tridymite); 0.1 mg/m3 (respirable, quartz); 0.1 mg/m3 (respirable, tripoli)
Manitoba, Newfoundland, Prince Edward Island: 0.025 mg/m3 (respirable)
Ontario: 0.05 mg/m3 (respirable cristobalite, tridymite); 0.1 mg/m3 (quartz, tripoli); 0.1 mg/m3 (silica fused); 2 mg/m3 (silica fume)
Quebec: 0.05 mg/m3 (respirable, cristobalite, tridymite); 0.1 mg/m3 (quartz, tripoli)
New Brunswick: 0.1 mg/m3 (quartz); 0.05 mg/m3 (cristobalite)
Nova Scotia: 0.025 mg/m3 (quartz, cristobalite)
Yukon: 2 mg/m3 (respirable, amorphous); 300 particles/ml measured with a konimeter (quartz, and tripoli); 150 particles/ML measured with a konimeter (cristobalite and tridymite)
Northwest Territories, Nunavut: 2 mg/m3 (respirable, amorphous); 0.05 mg/m3 (respirable, cristobalite, tridymite, silica flour); 0.1 mg/m3 (respirable, fused silica, quartz, tripoli)

OTHER

EINECS No.: 231-545-4 (for silica)
EEC Label (Risk/Safety Phrases): R 48/20, R 40/20, S22, S38 (for silica)
IARC: Silica dust, crystalline, in the form of quartz or cristobalite is classified in IARC Group 1. Silica, amorphous is classified in IARC Group 3.
National, state, provincial or local emergency planning, community right to know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

Section 16 - Other Information

ACGIH: American Conference of Governmental Industrial Hygienists
CFR: US Code of Federal Regulations

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DOT: US Department of Transportation
EEC: European Economic Community Guidelines
EINECS: European Inventory of Existing Commercial chemical Substances
FDA: Food and Drug Administration
HMIS: Hazardous Materials Identification Systems
IARC: International Agency for Research on Cancer
IDLH: Immediately Dangerous to Life and Health
MSHA: Mine Safety and Health Administration
NFPA: National Fire Protection Association
NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services
NTP: National Toxicology Program
OEL: Occupational exposure limit
OSHA: Occupational Safety and Health Administration, US Department of Labor
PEL: Permissible Exposure Limit
SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986
TLV: Threshold Limit Value
TSCA: Toxic Substance Control Act
TWA: Time-weighted Average

An electronic version of this MSDS is available at www.badgerminingcorp.com . More information on the effects of crystalline silica exposure may be obtained from OSHA (phone number: 1-800-321-OSHA; website: http://www.osha.gov) or from NIOSH (phone number: 1-800-35-NIOSH; website: http://www.cdc.gov/niosh).

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MATERIAL SAFETY DATA SHEET

SECTION 1 ♦ CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Trade Name:	**TRANS-724**
CAS Name & No.:	Mixture (NA)
Product Description:	Oil-Based Industrial-Grade Defoamer
DOT Proper Shipping Name:	Defoaming Compound 50140 Sub 1 Class 55 (LTL)
DOT Hazard Classification:	Non-Hazardous
Manufacturer's Name:	TRANS-CHEMCO, INC.
Address:	19235 84th St., Bristol, WI 53104 USA

Revision Date: 01-14-03

Emergency Phone No's: Day 262-857-2363
Night 262-857-7001
(for emergency use only)

SECTION 2 ♦ COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients:	CAS #	WT. %	PEL	TLV- STEL
Petroleum Distillate	64742-54-7	< 65.0%	5 mg/m^3	10 mg/ m^3

SECTION 3 ♦ HAZARDS IDENTIFICATION

NFPA HAZARD RATING

HEALTH -1 **FIRE - 1** **REACTIVITY - 0** **PERSONAL PROTECTION** - See Section 8

Primary Routes of Entry: Absorption through skin.

Potential Health Effects:

Eye: Eye contact with product may cause temporary irritation. Avoid eye contact with product at all times.

Skin: Effects of short-term exposure are expected to be minimal. Avoid prolonged and unnecessary skin contact with product, as defatting and drying may result and lead to irritation and dermatitis (rash).

Ingestion: Never taste or swallow product. This material may be harmful or fatal if swallowed.

Inhalation: Not expected to be an inhalation hazard. Avoid prolonged exposure to product vapors.

SECTION 4 ♦ FIRST AID MEASURES

Eyes: **Immediately flush eyes with a directed stream of water for at least 15 minutes while forcibly holding eyelids** apart to ensure complete irrigation of all eye and lid tissue. Get prompt medical attention if irritation develops.

Skin: Flush skin with water and wash with mild soap and water. Get prompt medical attention if irritation develops or rash occurs. Remove contaminated clothing and wash before reuse.

Ingestion: GET IMMEDIATE MEDICAL ATTENTION. Give victim a glass of water or milk. Do not induce vomiting except by physician's order. If spontaneous vomiting is inevitable, prevent aspiration by keeping victim's head below the knees. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, have trained person administer mouth-to-mouth resuscitation. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION 5 ♦ FIRE FIGHTING MEASURES

Flammable Properties:

Flash point, TCC:	380° F	193° C
Autoignition:	No Data	
Flammability Class:	No Data	
Lower Explosive Limit (%):	No Data	
Upper Explosive Limit (%):	No Data	

Hazardous Combustion Products: Combustion products may include fumes, smoke, and carbon monoxide.

MATERIAL SAFETY DATA SHEET

SECTION 5 ♦ FIRE FIGHTING MEASURES, CONT.

Extinguishing Media:	Dry chemical, carbon dioxide, and foam.
Fire Fighting Instructions:	Do not enter enclosed or confined workspaces without proper protective equipment. Fire fighting personnel should wear respiratory protection (positive pressure if available).
Unusual Fire/Explosion Hazards:	Combustible liquid. Can form explosive mixtures at temperatures at or above flashpoint.

SECTION 6 ♦ ACCIDENTAL RELEASE MEASURES

Build dike to contain flow. Remove free liquid. Contain spill and keep from entering waterways or sewers. Use personal protective equipment. Absorb on inert material. Shovel, sweep, or vacuum spill and place in closed container for disposal according to local, state, and federal regulations.

SECTION 7 ♦ HANDLING AND STORAGE

Storage Conditions:	Store this product in a cool, dry, well-ventilated area away from direct sources of heat, sparks, and flames. Do not store near strong oxidizing materials.
General Precautions:	Keep container tightly closed when handling or storing. Exercise good personal and industrial hygiene when handling antifoams and defoamers. Avoid unsanitary conditions, usage, & storage. Wash thoroughly after handling.

SECTION 8 ♦ EXPOSURE CONTROLS, PERSONAL PROTECTION

Personal Protection	
Gloves:	Neoprene rubber or other chemical resistant material such as nitrile or viton may be used.
Safety Glasses:	Always wear eye protection. Goggles or safety glasses with side shields are recommended.

SECTION 9 ♦ PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	No Data	***pH (neat @ 25 °C):***	Not Applicable
Vapor Density, (Air=1):	Heavier than air	***Boiling Point:***	No Data
Specific Gravity:	0.89 @ 25° C	***Freezing Point:***	No Data
Solubility in Water:	Dispersible	***Viscosity:***	1000 - 2000 cps @ 25° C
Volatile %:	No Data	***Evaporation Rate:***	Slower than ether
Appearance:	Opaque Amber Liquid	***Odor:***	Mild Odor

The physical data presented here are approximations, as the actual product's values may vary slightly.

SECTION 10 ♦ STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Hazardous Polymerization:	Hazardous polymerization will not occur.
Materials to Avoid:	Strong oxidizing materials.
Conditions to Avoid:	See Section 7.
Hazardous Decomposition Products:	Incomplete combustion may produce carbon monoxide and other asphyxiants.

SECTION 11 ♦ TRANSPORTATION / REGULATORY INFORMATION

Transportation Information:

DOT Proper Shipping Name:	Defoaming Compound 50140 Sub 1 Class 55 (LTL)
DOT Hazard Class:	Non-Hazardous
Hazard Technical Name:	Not Applicable

MATERIAL SAFETY DATA SHEET

SECTION 11 ♦ TRANSPORTATION / REGULATORY INFORMATION, CONT.

DOT Shipping Label: Not Required
UN/NA Number: No Data
Packing Group: No Data

Regulatory Information:

U.S. Federal Regulatory Information

SARA 302 Threshold Planning Quantity: Not Applicable
SARA 304 Reportable Quantity: Not Applicable

SARA 311 Categories:			
	Immediate (Acute) Health Effects:	N	Y = Yes; N = No
	Delayed (Chronic) Health Effects:	N	
	Fire Hazard:	N	
	Sudden Release of Pressure Hazard:	N	
	Reactivity Hazard:	N	

SARA Title III – Section 313:
The following chemicals are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:
None Listed

EPA Hazard Classification Code: Not Applicable
Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200
EPA/TSCA Inventory: The components of this product are listed on the EPA/TSCA inventory of chemicals
Canadian DSL: The components of this product are listed on the Canadian Domestic Substances List
CERCLA: No chemicals in this product are subject to the reporting requirements of CERCLA

SECTION 12 ♦ DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Disclaimer: This material safety data sheet (MSDS) was prepared in accordance with 29 CFR 1910.1200. The information contained herein is based upon data available to us and reflects our best professional judgment. However, no warranty is expressed or implied regarding the accuracy of such information or the results obtained from the use thereof. We assume no legal responsibility whatsoever for any damage resulting from reliance upon this information since it is being furnished upon the condition that the person receiving it shall make his or her own determination of the suitability of the material described herein for a particular application, storage, or disposal situation.

WACKER SILICONES

Material Safety Data Sheet

Material: 60078103 **WACKER® SG 3381**

Version: 1.0 (US) Date of print: 06/11/2012 Date of last alteration: 06/08/2012

1. Product and company identification

1.1 Identification of the substance or preparation:

Commercial product name: **WACKER® SG 3381**

Use of substance / preparation: Industrial.
Functional additive

1.2 Company/undertaking identification:

Manufacturer/distributor:
Wacker Chemical Corporation
3301 Sutton Road
Adrian, MI 49221-9397
USA

Customer information:
InfoLine:
Tel (517) 264-8240, Fax (517) 264-8740
Hours of operation:
Monday - Friday, 8 am to 5 pm (eastern standard time)
Corporate website: www.wacker.com

Emergency telephone no. (24h): (517) 264-8500
Transportation emergency: (800) 424-9300 (CHEMTREC, USA)
(703) 527-3887 (CHEMTREC, international)

This MSDS was prepared by the Regulatory Affairs and Product Safety Department (RAPS) of Wacker Chemical Corporation.

Composition/information on ingredients

2.1 Chemical characterization (preparation)

Chemical characteristics
Polysiloxane with polyether groups

2.2 Information on ingredients:

Type	CAS No.	Substance	Content [wt. %]		Note
			Lower	Upper	
VERU	556-67-2	Octamethyl cyclotetrasiloxane	0.1	<1.0	R

Type: HYD - by-product upon hydrolysis, INHA - ingredient, NEBE - by-product, MONO - residual monomer, VERU - impurity, VUL - by-product upon vulcanization. *** **Note:** C1 - IARC carcinogen, C2 - NTP carcinogen, C3 - OSHA carcinogen, NH - non-hazardous, R - reproductive toxin.

This material does not contain any OSHA reportable hazardous ingredients.

Substances listed in the Subsections "HAPS" and "California Proposition 65 Carcinogens / Reproductive Toxins" that are not listed in Section 2 are only present at quantities below 0.1% for California Proposition 65 listed toxins or below 1% for non-carcinogenic HAPS or they are inextricably bound in the product.

3. Hazards identification

3.1 Hazards classifications

HMIS® rating (product as packaged):
Health: 1 Fire: 1 Reactivity: 0 PPE: B

Hazardous Materials Identification System and HMIS are registered trademarks of the National Paint and Coatings Association. (HMIS codes are based on contact with the product as packaged and any hydrolysis by-products, if present.)

Canadian WHMIS Classification: D2A

3.2 Emergency overview and potential hazards

Physical Hazards:
No known physical hazards.

ARP-Taylor46650

Acute health effects
Route of entry or possible contact:
eyes , skin , ingestion .
Eye contact:
May cause slight eye irritation.
Skin contact:
No acute toxic effects are expected.
Inhalation:
Not expected due to high viscosity.
Ingestion:
Not expected in industrial use.

Additional information on acute health effects:
No additional information.

3.3 Further information:

Chronic health effects:
Prolonged or repeated inhalation of vapors may have adverse effects on the reproductive system, based on animal testing of a component of this material. Increased liver weights were seen in experimental animals exposed to high doses of a component (cyclosiloxane) of this material.

Medical conditions which may be aggravated by exposure:
unknown

Target organs affected:
Liver and Female Reproductive System.

Signs and Symptoms of Exposure:
Refer to Acute Health Effects, listed above.

Carcinogens/Reproductive toxins:
Based on animal tests. This material contains >= 0.1% of a substance which significantly increased the incidence of benign tumors in animal experiments. This material contains between 0.1% and 1% of a known reproductive toxin. Investigations of the mechanism of tumor formation are ongoing to evaluate the relevance to humans. Although animal testing has indicated that there is some limited carcinogenic potential for decamethylcyclopentasiloxane (D5) in rats, D5 has not been classified by IARC, NTP or OSHA as a known or potential human carcinogen. Further studies are ongoing to clarify the carcinogenic potential of D5 and the relevance to humans.

See Section 11 for Toxicological Information, if any.

4. First-aid measures

4.1 General information:

Get medical attention if irritation or other symptoms occur. Before seeking medical attention remove contaminated clothing and shoes. Take a copy of the Safety Data Sheet when going for medical treatment.

4.2 After inhalation

If inhaled remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen.

4.3 After contact with the skin

If contact with skin, immediately flush skin with plenty of water for at least 15 min.

4.4 After contact with the eyes

If contact with eyes, immediately hold eyelids apart and flush with plenty of water for at least 15 min.

4.5 After swallowing

For ingestion, if conscious, give several glasses of water but do not induce vomiting. If vomiting does occur, give additional fluids. Get medical attention. Designate the product. Show label if possible.

5. Fire-fighting measures

5.1 Flammable properties:

Property:	Value:	Method:

Flash point	100 °C (212 °F)	(ISO 3679)
Sustained combustibility	> 110 °C (> 230 °F)	(ISO 9038)
Boiling point / boiling range	> 150 °C (> 302 °F)	
Lower explosion limit (LEL)	not determined	
Upper explosion limit (UEL)	not determined	
Ignition temperature	approx. 380 °C (716 °F)	(DIN 51794)
NFPA Hazard Class (comb./flam.liquid)	IIIB	

5.2 Fire and explosion hazards:

This material will flash but does not sustain combustion.

5.3 Recommended extinguishing media:

water-spray , carbon dioxide, dry chemical or foam-type extinguishing media .

5.4 Unsuitable extinguishing media:

halones , sharp water jet .

5.5 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases

Hazardous decomposition products: carbon dioxide , carbon monoxide , formaldehyde , silicon dioxide and incompletely burnt hydrocarbons .

5.6 Fire fighting procedures:

Fire fighters should wear full protective clothing including a self-contained breathing apparatus. Cool endangered containers with water.

Accidental release measures

6.1 Precautions:

If material is released indicate risk of slipping.

HAZWOPER PPE Level: D

6.2 Containment:

Prevent material from entering surface waters, drains or sewers and soil. Contain any fluid that runs out using suitable material (e.g. earth).

Spills of material which could reach surface waters must be reported to the United States Coast Guard National Response Center's toll free phone number (800) 424-8802.

6.3 Methods for cleaning up

Take up mechanically and dispose of according to local/state/federal regulations. For small amounts: Absorb with a liquid binding material such as diatomaceous earth and dispose of according to local/state/federal regulations. Contain larger amounts and pump up into suitable containers. Clean any slippery coating that remains using a detergent / soap solution or another biodegradable cleaner.

7. Handling and storage

7.1 Handling

Precautions for safe handling:
Avoid formation of aerosols. In case of aerosol formation special protective measures are required (exhausting by suction, respiratory protection). Ensure adequate ventilation. Avoid contact with acids. Spilled substance increases risk of slipping.

Precautions against fire and explosion:
Observe the general rules for fire prevention.

7.2 Storage

Conditions for storage rooms and vessels:
none known

Advice for storage of incompatible materials:
not applicable

Further information for storage:
Keep container tightly closed.

8. Exposure controls and personal protection

8.1 Engineering controls

Ventilation:
Use only with adequate ventilation.

Local exhaust:
To control flammable/combustible vapors: Local exhaust ventilation which meets the requirements of ANSI Z9.2 is recommended to control airborne contaminants at the point of use.

8.2 Associate substances with specific control parameters such as limit values

none known .

Further information:
Maximum concentration at workplace recommended by producer: octamethylcyclotetrasiloxane (D4, CAS no. 556-67-2) = 10 ppm (123 mg/m3) .

8.3 Personal protection equipment (PPE)

Respiratory protection:
Respiratory protection is not normally required.

Hand protection:
Recommendation: butyl rubber protective gloves .

Eye protection:
Safety glasses with side shields or chemical safety goggles.

Other protective clothing or equipment:
Recommendation: Long pants and long sleeved shirts. Provide eye bath and safety shower.

8.4 General hygiene and protection measures:

Do not eat, drink or smoke when handling. Avoid contact with eyes. Wash thoroughly after handling.

9. Physical and chemical properties

9.1 Appearance

Physical state / form	liquid
Colour	colourless
Odour	slight

9.2 Safety parameters

Property:	Value:	Method:
Melting point / melting range	10 - 20 °C (50 - 68 °F)	
Boiling point / boiling range	> 150 °C (> 302 °F)	
Flash point	100 °C (212 °F)	(ISO 3679)
Sustained combustibility	> 110 °C (> 230 °F)	(ISO 9038)
Ignition temperature	approx. 380 °C (716 °F)	(DIN 51794)
Lower explosion limit (LEL)	not determined	
Upper explosion limit (UEL)	not determined	
Vapour pressure	14.9 hPa at 50 °C (122 °F)	
Density	approx. 1.04 g/cm³ at 25 °C (77 °F)	
Water solubility / miscibility	100 g/l at 25 °C (77 °F)	
Solubility in organic solvent	totally miscible with common organic solvents	
pH-Value	approx. 5.5	
Viscosity (dynamic)	200 - 250 mPa.s at 25 °C (77 °F)	

9.3 Further information

VOC	32 g/l	(EPA Method 24A)
Thermal decomposition	> 150 °C (> 302 °F)	

10. Stability and reactivity

10.1 General information:

If stored and handled in accordance with standard industrial practices no hazardous reactions are known.

10.2 Conditions to avoid

none known

10.3 Materials to avoid

none known

10.4 Hazardous decomposition products

If stored and handled properly: none known . Measurements have shown the formation of small amounts of formaldehyde at temperatures above about 150 °C (302 °F) through oxidation.

10.5 Further information:

Hazardous polymerization cannot occur.
Conditions to avoid hazardous polymerization: odourless

11. Toxicological information

11.1 Information on toxicological effects

11.1.1 General information

Data derived for the product as a whole are of higher priority than data for single ingredients.

The toxicology information listed below is based on the components of the material.

11.1.2 Acute toxicity

Assessment:

Assessed on the basis of constituents: LD50, oral, rat > 2000 mg/kg body weight

11.1.3 Skin corrosion/irritation

Assessment:

Based on the available data a clinically relevant skin irritation hazard is not expected.

Product details:

Result/Effect	Species/Test system	Source
not irritating	rabbit	Conclusion by analogy

11.1.4 Serious eye damage / eye irritation

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.5 Respiratory or skin sensitization

Assessment:

Based on the available data a sensitization reaction is not expected from this product.

Product details:

Route of exposure	Result/Effect	Species/Test system	Source
dermal	not sensitizing	no data available	Conclusion by analogy

11.1.6 Germ cell mutagenicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.7 Carcinogenicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

Data related to ingredients:

Decamethylcyclopentasiloxane (Impurity):

See Sect. "Further toxicological information".

11.1.8 Reproductive toxicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.9 Specific target organ toxicity (single exposure)

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.10 Specific target organ toxicity (repeated exposure)

Assessment:

By-product: Oral or inhalative exposure at relatively high dosages in animal test causes increases in liver weight.

For this endpoint no toxicological test data is available for the whole product.

11.1.11 Aspiration hazard

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.12 Further toxicological information

Toxicity to reproduction/fertility: Impurity: In a two generation reproductive study via inhalation with OMCTS/D4 rats, decreased mean live litter size and prolonged labor (dystocia) were observed at the 500 ppm and 700 ppm exposure levels. The relevance of these effects in humans cannot be determined at this time. Because these effects are only seen at very high exposure levels, it is unlikely that industrial, commercial and/or consumer uses of products containing OMCTS/D4 would result in a significant risk to humans. Based on animal experiments there is no indication of developmental effects.

Chronic toxicity / carcinogenicity: Impurity: In a two year combined chronic toxicity and carcinogenicity inhalation study with octamethylcyclotetrasiloxane (OMCTS/D4) in rats, an increased incidence of (uterine) endometrial cell hyperplasia and endometrial adenomas were observed at the highest exposure level of 700 ppm in female rats. These same effects were not seen at the other dose levels of 10, 30, and 150 ppm. Since these effects only occurred at 700 ppm, a level that greatly exceeds typical workplace or consumer exposure, it is unlikely that industrial, commercial or consumer uses of products containing OMCTS/D4 would result in a significant risk to humans. In a two year combined chronic toxicity and carcinogenicity inhalation study with decamethylcyclopentasiloxane (D5) in rats, an increased incidence for (uterine) endometrial tumors was observed in the highest exposure level of 160 ppm in female rats. The same effects were not seen at the other dose levels of 10 and 40 ppm. Whether or not this increase in incidence is truly related to the exposure to D5 is questionable and yet to be determined. Based on our present knowledge it is unlikely that industrial, commercial or consumer uses of products containing D5 would result in a significant risk to humans.

Other information: By eye contact: Slight irritation possible.

12. Ecological information

12.1 Toxicity

Assessment:

According to past experience toxicity to fish is improbable. According to current knowledge adverse effects on water purification plants are not expected.

12.2 Persistence and degradability

Assessment:

Polymer components: Biologically not degradable.

12.3 Bioaccumulative potential

Assessment:

Polymer component: Bioaccumulation is not expected to occur.

Data related to ingredients

Decamethylcyclopentasiloxane (Impurity):

Under controlled laboratory conditions D5 dissolved in water bioconcentrates in fish. However, available monitoring data indicate that the substance does not biomagnify in aquatic and terrestrial food webs in the environment.

12.4 Mobility in soil

Assessment:

No data known.

Data related to ingredients:

Decamethylcyclopentasiloxane (Impurity):

D5 has a very low water solubility, easily evaporates to air, and partitions to organic matter. It is degraded in air by reaction with hydroxyl radicals. In soil D5 is removed by several simultaneously occurring processes including volatilisation, hydrolysis, and clay-catalysed degradation.

12.5 Other adverse effects

none known

13. Disposal considerations

13.1 Product disposal

Recommendation:
Dispose of according to regulations by incineration in a special waste incinerator. Observe local/state/federal regulations.

13.2 Packaging disposal

Recommendation:
Completely discharge containers (no tear drops, no powder rest, scraped carefully). Containers may be recycled or re-used. Observe local/state/federal regulations.

14. Transport information

14.1 US DOT & CANADA TDG SURFACE

Valuation .....: Not regulated for transport
Other Information .....: This material has been tested and does not sustain combustion.
Protect from freezing, when exposed to cold temperatures approaching 0 °C (32 °F) or below.

14.2 Transport by sea IMDG-Code

Valuation .....: Not regulated for transport

14.3 Air transport ICAO-TI/IATA-DGR

Valuation .....: Not regulated for transport

15. Regulatory information

15.1 U.S. Federal regulations

TSCA inventory status and TSCA information:
This material or its components are listed on or are in compliance with the requirements of the TSCA Chemical Substance Inventory.

TSCA 12(b) Export Notification:
This material does not contain any TSCA 12(b) regulated chemicals.

CERCLA Regulated Chemicals:

ARP-Taylor46656

This material does not contain any CERCLA regulated chemicals.

SARA 302 EHS Chemicals:
This material does not contain any SARA extremely hazardous substances.

SARA 311/312 Hazard Class:
Fire hazard.

SARA 313 Chemicals:
This material does not contain any SARA 313 chemicals above de minimus levels.

HAPS (Hazardous Air Pollutants):
This material does not contain any hazardous air pollutants.

15.2 U.S. State regulations

California Proposition 65 Carcinogens:
This material does not contain any chemicals known to the state of California to cause cancer.

California Proposition 65 Reproductive Toxins:
This material does not contain any chemicals known to the state of California to cause reproductive effects.

Massachusetts Substance List:
This material contains no listed components.

New Jersey Right-to-Know Hazardous Substance List:
This material contains no listed components.

Pennsylvania Right-to-Know Hazardous Substance List:
This material contains no listed components.

15.3 Canadian regulations

This product has been classified in accordance with the Hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS Hazard Classes:
D2A

DSL Status:
This material or its components are listed on the Canadian Domestic Substances List. Contains a component subject to Ministerial Condition No. 14769 (CEPA 84(1)(a)). The Condition includes: Use restrictions, no release into the environment, record-keeping, information and notification requirements. However, the material or some of it's components are listed on the NDSL (Non-Domestic Substances List).

Non-DSL Chemicals:
This material does not contain any non-DSL chemicals.

Canadian Ingredient Disclosure List:
This material contains no listed components.

15.4 Other international regulations

EU Risk Phrases:

R-Phrase	Description
R-	-

EU Safety Phrases:

S-Phrase	Description
S-	-

Details of international registration status
Listed on or in accordance with the following inventories:
IECSC - China
EINECS - Europe
TSCA - USA
PICCS - Philippines
ENCS - Japan
ECL - Korea

DSL - Canada
AICS - Australia

16. Other information

16.1 Additional information:

This Material Safety Data Sheet (MSDS) meets the requirements of the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200). This product has been classified according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee expressed or implied, is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license under valid patents. This MSDS provides selected regulatory information on this product, including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

Vertical lines in the left-hand margin indicate changes compared with the previous version.

16.2 Glossary of Terms:

ACGIH - American Conference of Governmental Industrial Hygienists
DOT - Department of Transportation
hPa - Hectopascals
mPa*s - Milli Pascal-Seconds
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
ppm - Parts per Million
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
WHMIS - Canadian Workplace Hazardous Materials Identification System

Flash point determination methods	**Common name**
ASTM D56	Tagliabue (Tag) closed cup
ASTM D92, DIN 51376, ISO 2592	Cleveland open cup
ASTM D93, DIN 51758, ISO 2719	Pensky-Martens closed cup
ASTM D3278, DIN 55680, ISO 3679	Setaflash or Rapid closed cup
DIN 51755	Abel-Pensky closed cup

16.3 Conversion table:

Pressure: : 1 hPa * 0.75 = 1 mm Hg = 1 torr; 1 bar = 1000 hPa
Viscosity: : 1 mPa*s = 1 centipoise (cP)

ARP-Taylor46658

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

Novolac

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 13983

CAS NO. : 9003-35-4

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : TWO STAGE PHENOLIC RESIN

REVISION DATE : 07/01/10 REVISION NUMBER : 2

S E C T I O N 1 HEALTH HAZARD DATA

S

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF GASEOUS PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATIONS OF THIS CHEMICAL SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PEL. THE ODOR OF PHENOL

... CONTINUED ON NEXT PAGE ...

BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL. IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

S E C T I O N 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

... CONTINUED ON NEXT PAGE ...

SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

SECTION 5 PHYSICAL DATA

BOILING POINT: N/A
(760 MM HG)

SPECIFIC GRAVITY: 1.2 - 1.3
(H_2O = 1)

VAPOR PRESSURE: N/A
(MM HG 20 DEG C)

PERCENT VOLATILE: N/A
(BY WEIGHT)

... CONTINUED ON NEXT PAGE ...

VAPOR DENSITY: N/A
(AIR = 1)

EVAPORATION RATE: N/A
(BUTYL ACETATE = 1)

HEAT OF VAPORIZATION: N/A
(DELTA HV)

SOLUBILITY IN WATER: SLIGHT
(% BY WEIGHT)

APPEARANCE AND ODOR: FINELY GROUND CREAM-TAN POWDER WITH SLIGHT ODOR OF PHENOL

SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL	
*PHENOL	108-95-2	<1.5	ACGIH-TWA/SKIN	5 PPM
			OSHA-TWA/SKIN	5 PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		100	ACGIH-TWA/TOTAL	10 MG/M3
			OSHA-TWA/TOTAL	15 MG/M3
			OSHA-TWA/RESPIR	5 MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL OR FORMALDEHYDE.

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

... CONTINUED ON NEXT PAGE ...

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

The information set forth herein is furnished free of charge and is based on technical data which PLENCO believes to be reliable. It is intended for use by persons having technical skills and at their own discretion and risk. Since conditions of use are outside our control, we make no warranties, expressed or implied, and assume no liability in connection with your use of this information.

PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 09/20/10 TIME: 16:04

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(PRC)

—plenco—

PLASTICS ENGINEERING COMPANY
SHEBOYGAN, WISCONSIN 53082-0758 U.S.A

3518 LAKESHORE ROA
POST OFFICE BOX 75
PHONE 920-458-21
F A X 920-458-192

PROPANT SAND RESIN
Type 13983

DESCRIPTION

PLENCO 13983 is a product designed for use as a binder for propant sand used in the oil industry. The product contains proprietary additives, which are in the coating, and increase sand resin adhesion. The product is a reduced phenol content and pH adjusted to 6.5 - 7.5. This product can be supplied in either flake or pastille form.

PROPERTY	SPECIFICATION	TEST METHOD
Free Phenol %	< 1.5%	STMR 2A
Melt Point, °F	168° - 185° Typical	STMR 7
Mettler Index	108°-113°C	STMR 7D
Slurry pH	6.5 - 7.5	STMR 8A
Cone & Plate Viscosity @ 150°C	1400-2400	STMR 17B

SHIPPING CONTAINERS AND STORAGE

The standard package for PLENCO 13983 resin is a Gaylord of 1,000 - 1,500# net weight.
PLENCO 13983 is initially yellow to amber in color, and darkens with age. The change in color has no known effect on bonding properties.

December 2004

The Typical Values listed are results obtained from the testing of standard specimens using the stated test procedures, with said specimens molded under controlled laboratory conditions from representative samples of the product. Although Plastics Engineering Company at all times reserves the right to make changes in the materials, suppliers and processing, the Values listed as typical are those to be expected at the time of your manufacture. The final determination of the accuracy or completeness of any information, the suitability of the product for the use contemplated, the manner of its use, and the matter of any infringement of patents in uses, are all the sole responsibility of the user.

Sales of this product will be made only to the Terms and Conditions of Sale contained in Plastics Engineering Company's Acknowledgment. Except as provided there in, PLASTICS ENGINEERING COMPANY MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED (INCLUDING NO WARRANTY OF THE MERCHANTABILITY OR FITNESS OF THE GOODS FOR ANY PARTICULAR PURPOSE CONTEMPLATED BY ANY PURCHASER) CONCERNING THE PRODUCT DESCRIBED HEREIN, AND DISCLAIMS ANY LIABILITY FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES.

Plastics Engineering Company reserves at all times the right to discontinue the production of any or all of its products.

—plenco—

EXPERIMENTAL/LAB SAMPLE PRODUCT
MATERIAL SAFETY DATA SHEET
PLASTICS ENGINEERING COMPANY

DATE: December 2004

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 13983	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 9003-35-4	CHEMICAL NAME AND SYNONYMS Two Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer of not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol and formaldehyde may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - Irritant to eyes, lungs and skin. Has been shown to cause cancer in laboratory animals.

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Use with adequate ventilation. If breathing is affected, remove to fresh air. If breathing stops, apply mouth to mouth resuscitation. Get medical attention.

INGESTION:
If conscious, give water immediately and induce vomiting by placing finger down throat. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372	%	TLV (Units)
*Phenol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	<1.5	
Nuisance Particulates OSHA 15 Mg/M^3	<5	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	N/A	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Finely ground cream-tan powder with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
	UNSTABLE ☐	Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain – phenol, formaldehyde

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

SECTION VIII - CONTROL MEASURES

VENTILATION	LOCAL EXHAUST	SPECIAL
	Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	
	MECHANICALS (General)	OTHER
	Use explosion proof motors.	

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves recommended	Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life, Gas Blanket)
Store in a cool, dry place (below 75°F). Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Phillip A. Waitkus EXT. 3822 TITLE Director of Polymer Research PLENCO 13983

MATERIAL SAFETY DATA SHEET
PLASTICS ENGINEERING COMPANY

DATE: June 2012

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME	CHEMICAL FAMILY
RESIN 14899	Phenol-Formaldehyde Polymer
CAS# 9003-35-4	CHEMICAL NAME AND SYNONYMS Two Stage Phenolic Resin with Hexa

MANUFACTURER'S NAME	EMERGENCY TELEPHONE NO.
PLASTICS ENGINEERING COMPANY	(920) 458-2121

ADDRESS
P.O. BOX 0758, SHEBOYGAN, WI 53082-0758

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer is not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). The primary health risk from exposure to the product "as sold" is irritation. Ingestion and contact with skin and eyes should be avoided. "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol, formaldehyde and ammonia may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - irritant to eyes, lungs, and skin. May cause respiratory sensitization. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the state of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans. It is the opinion of the U.S. Dept of Health and Human Services that formaldehyde is "known to be a human carcinogen."

AMMONIA - Irritant to eyes, mucous membranes and respiratory tract.

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Use with adequate ventilation. If breathing is affected, remove to fresh air. If breathing stops, apply mouth to mouth resuscitation. Get medical attention.

INGESTION:
Do not induce vomiting. If conscious, rinse mouth and provide small glass of water to help dilute. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
If resin solids ignite - water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372	%	TLV (Units)
*Phenol [108-95-2]: ACGIH - 5 ppm; OSHA - 5 ppm	< 1.0%	
Nuisance Particulates ACGIH (total) - 10 mg/m3; OSHA (respirable): 5 mg/ m3; OSHA (total): 15 mg/m3	100	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2-1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	No Data	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Finely ground cream-tan powder with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY		
	UNSTABLE ☐	CONDITIONS TO AVOID Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain - phenol, formaldehyde or ammonia

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

SECTION VIII- CONTROL MEASURES

VENTILATION		
	LOCAL EXHAUST Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	SPECIAL
	MECHANICALS (General) Use explosion proof motors	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded.

PROTECTIVE GLOVES	EYE PROTECTION
Rubber gloves recommended	Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life. Gas Blanket)
Store in a cool, dry place. Keep containers closed to avoid contamination. Prevent accumulation of dust. Avoid excessive heat and sources of ignition. Observe good housekeeping practices.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powdered Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Dr. Joerg Junggebauer EXT. 3850 TITLE Senior Resin Product Development Chemist RESIN 14899

Old Formulation

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14664 Resol

CAS NO. : 37337-65-8

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : SINGLE STAGE PHENOLIC RESIN

REVISION DATE : 10/01/10 REVISION NUMBER : 1

SECTION 1 HEALTH HAZARD DATA

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATION SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. THE ODOR OF PHENOL BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL.

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IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL, AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

SECTION 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

... CONTINUED ON NEXT PAGE ...

EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

S E C T I O N 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

S E C T I O N 5 PHYSICAL DATA

BOILING POINT: N/A (760 MM HG)	SPECIFIC GRAVITY: 1.2 - 1.3 (H2O = 1)
VAPOR PRESSURE: N/A (MM HG 20 DEG C)	PERCENT VOLATILE: N/A (BY WEIGHT)
VAPOR DENSITY: N/A (AIR = 1)	EVAPORATION RATE: N/A (BUTYL ACETATE = 1)
HEAT OF VAPORIZATION: N/A (DELTA HV)	SOLUBILITY IN WATER: SLIGHT (% BY WEIGHT)

APPEARANCE AND ODOR: COURSE GROUND OR PASTILLE WITH SLIGHT ODOR OF PHENOL

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SECTION 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL		
*FORMALDEHYDE	50-00-0	<1.7	ACGIH-C	0.3	PPM
			OSHA-TWA	0.75	PPM
			OSHA-STEL	2.0	PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		LESS THAN 5%	ACGIH-TWA/TOTAL	10	MG/M3
			OSHA-TWA/TOTAL	15	MG/M3
			OSHA-TWA/RESPIR	5	MG/M3

SECTION 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL AND FORMALDEHYDE

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

SECTION 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

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SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

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PLASTICS ENGINEERING COMPANY

THIS IS THE LAST PAGE PRINT DATE: 10/19/10 TIME: 16:03

EXPERIMENTAL/LAB SAMPLE PRODUCT
MATERIAL SAFETY DATA SHEET
PLASTICS ENGINEERING COMPANY

Resol Resin

DATE: June 2011

SECTION I - PRODUCT IDENTIFICATION

PRODUCT NAME/TRADE NAME PLENCO 14869	CHEMICAL FAMILY Phenol-Formaldehyde Polymer
CAS# 37337-65-8	CHEMICAL NAME AND SYNONYMS Single Stage Phenolic Resin
MANUFACTURER'S NAME PLASTICS ENGINEERING COMPANY	EMERGENCY TELEPHONE NO. (920) 458-2121
ADDRESS P.O. BOX 758, SHEBOYGAN, WI 53082-0758	

SECTION II - ACUTE HEALTH HAZARD DATA

Product is a polymer not believed or known to be hazardous. If this box is marked ☐ product also contains one or more solvents or additional ingredients that are hazardous and could pose an acute health hazard (see Section V and any attached sheets for the identity, amount and acute health hazards of such ingredients). Otherwise, ordinary use of this product is unlikely to produce significant exposure to hazardous chemicals. "As sold" the polymer is not yet completely "cured" or reacted and contains some unreacted ingredients that, in a different form, may be considered hazardous (see Section V). The primary health risk from exposure to the product "as sold" is irritation. Ingestion and contact with skin and eyes should be avoided. "As used," during polymerization (e.g., normal curing) or decomposition (e.g., overheating or burning) small amounts of gaseous phenol, formaldehyde and ammonia may be evolved. PELS for these chemicals are set at levels designed to avoid any significant health risk and are achievable with proper ventilation. Nevertheless, per OSHA requirement, we list the following possible acute health hazards if one were exposed to the following chemicals at levels much higher, or in a different form, than expected from ordinary use of this product:

PHENOL - Highly toxic, poisoning may occur via skin absorption, vapor inhalation, or ingestion. Inhalation of vapors may cause severe irritation to the nose, throat and respiratory tract.

FORMALDEHYDE - irritant to eyes, lungs, and skin. May cause respiratory sensitization. Has been shown to cause cancer in laboratory animals. Listed as an IARC carcinogen. California law requires the following statement be included: contains a chemical (formaldehyde) known to the state of California to cause cancer. National Cancer Institute study finds little evidence to connect formaldehyde exposure with cancer in humans. It is the opinion of the U.S. Dept of Health and Human Services that formaldehyde is "known to be a human carcinogen."

AMMONIA - Irritant to eyes, mucous membranes and respiratory tract.

EMERGENCY AND FIRST AID PROCEDURES:

EYES:
Immediately flush eyes with copious amounts of water for at least 15 minutes. Get medical attention.

SKIN:
Wash thoroughly with soap and water.

INHALATION:
Material presents a nuisance dust hazard. See Section V for possible phenol hazard.

INGESTION:
Do not induce vomiting. If conscious, rinse mouth and provide small glass of water to help dillute. Never give anything by mouth to an unconscious person. Get medical attention.

SECTION III - FIRE AND EXPLOSION HAZARD DATA

FLASHPOINT (Method Used)	FLAMMABLE LIMITS IN AIR % BY VOLUME	LOWER	UPPER
No Flash Point		.025 oz/ft^3	N/A

EXTINGUISHING MEDIA
Water, foam, dry chemicals, carbon dioxide

SPECIFIC FIRE FIGHTING PROCEDURES
MSHA/NIOSH approved self-contained breathing apparatus recommended. Avoid inhalation of gases.

UNUSUAL FIRE AND EXPLOSION HAZARDS
Organic dust/air mixtures are highly flammable (explosive). Avoid dust accumulations or dust laden atmospheres and sources of ignition.

SECTION IV - SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED (Including recommended neutralizing chemicals)
Vacuum or sweep with sweeping compound, sawdust or sand. Avoid generating dust. Vacuums with explosion proof motors are recommended. This product contains free phenol which is subject to effluent limits under the Clean Water Act.

WASTE DISPOSAL METHOD
Bury or incinerate in accordance with local, state, and federal regulations.

SECTION V - HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PARTS 372		%	TLV (Units)
*Phenol CAS # 108-95-2; ACGIH - 5 ppm; OSHA - 5 ppm	less than	0.9	
*Formaldehyde 50-00-0 ACGIH - 0.3 ppm; OSHA - 0.75 ppm; STEL 2 ppm	less than	3.0	

SECTION VI - PHYSICAL DATA

BOILING POINT (760mm Hg)	N/A	SPECIFIC GRAVITY (Water =1)	1.2 - 1.3
VAPOR PRESSURE (mm Hg @ 25 C)	N/A	PERCENT VOLATILE By Weight (%)	N/A
VAPOR DENSITY (AIR =1)	N/A	EVAPORATION RATE (BUTYLACETATE =1)	N/A
HEAT OF VAPORIZATION	No Data	SOLUBILITY IN WATER (% BY WEIGHT)	Slight

APPEARANCE AND ODOR
Coarse ground or pastille with slight odor of phenol.

SECTION VII - REACTIVITY DATA

STABILITY		CONDITIONS TO AVOID
	UNSTABLE ☐	Avoid contamination, exposure to flame or heat, or storage at temperatures in excess of 100°F.
	STABLE ☒	

INCOMPATIBILITY (Materials to avoid)
Like most organic materials, this product is sensitive to strong oxidizing agents and may either decompose or ignite when mixed with same.

HAZARDOUS DECOMPOSITION PRODUCTS
Vapors evolved during polymerization may contain -- phenol, formaldehyde or ammonia

HAZARDOUS POLYMERIZATION		CONDITIONS TO AVOID
	MAY OCCUR ☐	Heating, oxidizers
	WILL NOT OCCUR ☒	

SECTION VIII- CONTROL MEASURES

VENTILATION	LOCAL EXHAUST	SPECIAL
	Point source exhaust recommended to remove dust and vapors evolved during use (Dust Collection System).	
	MECHANICALS (General) Use explosion proof motors.	OTHER

RESPIRATORY PROTECTION (Specify Type)
NIOSH approved respirators recommended if TLVs are exceeded

PROTECTIVE GLOVES	EYE PROTECTION
Gloves recommended	Safety glasses with side shields

WORK/HYGIENIC PRACTICES
Eye wash and shower facility should be available. Practice good hygiene and maintain a clean work environment.

SECTION IX - SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING (e.g., Storage Temperature, Storage Life. Gas Blanket)
Store in a cool, dry place. Keep containers closed to avoid contamination. Avoid dust accumulations, heat and sources of ignition. Observe good housekeeping practices. Note: empty containers contain product residue. All safety warning labels must be observed. Do not refill empty containers.

OTHER PRECAUTIONS INCLUDING TRANSPORTATION INFORMATION

Shipping Classification	D.O.T. Hazard Class
Plastic Materials Viz:	Non-hazardous

Powder Form NMFC Item #156200

THIS MSDS IS DESIGNED TO BE USED ONLY FOR EXPERIMENTAL OR LABORATORY SAMPLE PRODUCTS. THEREFORE, INFORMATION IS GENERALLY NOT PROVIDED ON CHRONIC HEALTH HAZARDS AS IT WOULD BE ON AN MSDS FOR A REGULAR PRODUCTION PRODUCT. IF SUCH INFORMATION IS DESIRED, PLEASE CONTACT THE UNDERSIGNED.

THE INFORMATION SET FORTH HEREIN IS FURNISHED FREE OF CHARGE AND IS BASED ON TECHNICAL DATA WHICH PLENCO BELIEVES TO BE RELIABLE. IT IS INTENDED FOR USE BY PERSONS HAVING TECHNICAL SKILLS 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 YOUR USE OF THIS INFORMATION.

PREPARED BY Theodore N. Morrison EXT. 3822 TITLE Supervisor Resin Application & Development PLENCO 14869

Chemical Name: **Resin, Resol Plenco 14869 (RESOL RESIN)**

CAS#: 37337-65-8

Emergency Phone Number: (920) 458-2121

NFPA Code: Health= 2 Fire= 3 Reactivity= 1

REF:(0 = Not significant, 1 = Slight, 2 = Moderate, 3 = High, 4 = Extreme)

Hazards:

Irritant to eyes, lungs, and skin. Nuisance dust hazard. Avoid heat and oxidizers.

Exposure and Required PPE:

Wear MSHA/NIOSH breathing apparatus and full turn out gear to fight fires. Chemical resistant gloves, safety glasses with side shields, respirator. Practice good hygiene and maintain a clean work environment. Eye wash and shower should be available.

First Aid:

Rinse eyes for at least 15 minutes, remove contaminated clothing and thoroughly wash area with soap and water. **Do Not Induce Vomiting**. Rinse mouth and provide small glass of water to help dilute material. **Seek medical attention.**

Emergency Response Information:

Gives off irritating vapors, during a fire highly toxic gases may be generated by thermal decomposition. **Extinguishing media of water, foam, dry chemical, carbon dioxide.**

Handling and Storage:

Proper PPE, store in a cool dry well-ventilated area. Keep away from heat sources. Do not mix with acids or oxidizing materials. Avoid generating or breathing dust. Prevent skin contact. Observe good housekeeping practices.

Accidental Release and Clean-up

Remove all sources of ignition, Ventilate area, Wear proper PPE, Clean up in a manner not to disperse dust. Bury or incinerate according to local, state, and federal regulations. Incompatible and sensitive to strong oxidizing agents.

Physical Characteristics

Coarse ground or pastille with slight odor of phenol.

Chemical Properties

Melting Point: Boiling Point: Vapor Density: Flash Point: None

Solubility in water: Slight Specific Gravity: 1.2-1.3 Specific gravity of Water= 1.0

Other Information:

See attached MSDS.

Old formulation

PLASTICS ENGINEERING COMPANY
3518 Lakeshore Rd.
Sheboygan, WI 53083

EMERGENCY TELEPHONE NUMBER: (920) 458-2127

For effective hazard communication, this MSDS must be made available to those who handle or use the product and to those who control conditions of handling or use. Please send this MSDS to all appropriate individuals in your organization, especially those responsible for health and safety.

PRODUCT INFORMATION

PRODUCT NAME : PLENCO 14664 Resol

CAS NO. : 37337-65-8

CHEMICAL FAMILY: PHENOL-FORMALDEHYDE POLYMER

CHEMICAL NAME : SINGLE STAGE PHENOLIC RESIN

REVISION DATE : 10/01/10 REVISION NUMBER : 1

S E C T I O N 1 HEALTH HAZARD DATA

AS SOLD:

THE PRODUCT IS A POLYMER NOT BELIEVED OR KNOWN TO BE HAZARDOUS. HOWEVER, "AS SOLD" THE PRODUCT IS NOT YET COMPLETELY "CURED" OR REACTED AND CONTAINS SOME UNREACTED INGREDIENTS THAT MAY BE CONSIDERED HAZARDOUS (SEE SECTION 6). UNDER NORMAL CONDITIONS OF STORAGE AND HANDLING, NO SIGNIFICANT AMOUNT OF HAZARDOUS VAPORS SHOULD EVOLVE FROM THE "AS SOLD" PRODUCT. BECAUSE OF THE FORM IN WHICH PHENOL IS PRESENT, THERE IS NO LIKELY SIGNIFICANT HEALTH HAZARD THROUGH SKIN ABSORPTION. THE PRIMARY HEALTH RISK FROM EXPOSURE TO THE PRODUCT "AS SOLD" IS IRRITATION. INGESTION AND CONTACT WITH SKIN AND EYES SHOULD BE AVOIDED.

AS USED:

DURING POLYMERIZATION (E.G., CURING OF THE PRODUCT DURING NORMAL PROCESSING) OR DECOMPOSITION (E.G., OVERHEATING OR BURNING OF THE PRODUCT) SMALL AMOUNTS OF PHENOL AND FORMALDEHYDE (AS WELL AS WATER VAPOR, CARBON MONOXIDE AND CARBON DIOXIDE) ARE EVOLVED. BREATHING OF THE FUMES CAN BE HARMFUL. IF THE ODOR OF FORMALDEHYDE IS NOTICEABLE, THEN THE AIRBORNE CONCENTRATION SHOULD BE CAREFULLY MONITORED AND VENTILATION IMPROVEMENTS CONSIDERED; THIS CHEMICAL BEGINS TO BE DETECTABLE BY ODOR AT CONCENTRATIONS APPROACHING OR EXCEEDING THE PELS. THE ODOR OF PHENOL BEGINS TO BE NOTICEABLE AT A CONCENTRATION ABOUT ONE-FIFTH THE PEL.

... CONTINUED ON NEXT PAGE ...

IN ANY CASE, ADEQUACY OF VENTILATION CAN BEST BE DETERMINED BY USE OF INSTRUMENTS TO MONITOR AIRBORNE CONCENTRATIONS OF PHENOL, AND FORMALDEHYDE.

ACUTE OR CHRONIC HEALTH HAZARD INFORMATION

ORDINARY USE OF THIS PRODUCT IS UNLIKELY TO PRODUCE SIGNIFICANT EXPOSURE TO HAZARDOUS CHEMICALS. PELS FOR THESE CHEMICALS ARE SET AT LEVELS DESIGNED TO AVOID ANY SIGNIFICANT HEALTH RISK AND ARE ACHIEVABLE WITH PROPER VENTILATION. NEVERTHELESS, PER OSHA REQUIREMENT, WE LIST THE FOLLOWING POSSIBLE HEALTH HAZARDS IF ONE WERE EXPOSED TO THE FOLLOWING CHEMICALS AT LEVELS MUCH HIGHER, OR IN A DIFFERENT FORM, THAN EXPECTED FROM ORDINARY USE OF THIS PRODUCT:

1. PHENOL - HIGHLY TOXIC. POISONING MAY OCCUR VIA SKIN ABSORPTION, VAPOR INHALATION, OR INGESTION. INHALATION OF THE VAPORS MAY CAUSE SEVERE IRRITATION TO THE NOSE, THROAT, AND RESPIRATORY TRACT. MAY CAUSE LIVER, KIDNEY AND HEART DAMAGE.

2. FORMALDEHYDE - IRRITANT TO EYES, LUNGS, AND SKIN. HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS. LISTED AS AN IARC CARCINOGEN. CALIFORNIA LAW REQUIRES THE FOLLOWING STATEMENT BE INCLUDED: CONTAINS A CHEMICAL (FORMALDEHYDE) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. NATIONAL CANCER INSTITUTE STUDY FINDS LITTLE EVIDENCE TO CONNECT FORMALDEHYDE EXPOSURE WITH CANCER IN HUMANS.

SECTION 2 FIRST AID

EYES : IMMEDIATELY FLUSH EYES WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION.

SKIN : WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION : USE WITH ADEQUATE VENTILATION. IF BREATHING IS AFFECTED, REMOVE TO FRESH AIR. IF BREATHING STOPS, APPLY MOUTH TO MOUTH RESUSCITATION. GET MEDICAL ATTENTION.

INGESTION : DO NOT INDUCE VOMITING. IF CONSCIOUS, RINSE MOUTH AND PROVIDE SMALL GLASS OF WATER TO HELP DILUTE MATERIAL. SEEK MEDICAL ATTENTION.

SECTION 3 FIRE AND EXPLOSION DATA

FLASH POINT: NO FLASH POINT
FLAMMABLE LIMITS - LEL: DUST .025 OZ./PER CUBIC FOOT UEL: NO DATA

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EXTINGUISHING MEDIA: WATER SPRAY, FOAM, DRY CHEMICAL, CARBON DIOXIDE

SPECIAL FIRE FIGHTING PROCEDURES: MSHA/NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS RECOMMENDED. AVOID INHALATION OF GASES.

UNUSUAL FIRE AND EXPLOSION HAZARDS: ORGANIC DUST/AIR MIXTURES ARE HIGHLY FLAMMABLE (EXPLOSIVE); AVOID DUST ACCUMULATIONS OR DUST-LADEN ATMOSPHERES AND SOURCES OF IGNITION.

SECTION 4 CONTROL MEASURES

WORK/HYGIENIC PRACTICES: EYE WASH AND SHOWER FACILITY SHOULD BE AVAILABLE. PRACTICE GOOD HYGIENE AND MAINTAIN A CLEAN WORK ENVIRONMENT.

VENTILATION: POINT SOURCE EXHAUST RECOMMENDED TO REMOVE DUST AND VAPORS EVOLVED DURING USE (DUST COLLECTION SYSTEM). USE EXPLOSION PROOF MOTORS.

RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORS RECOMMENDED IF TLVS ARE EXCEEDED.

PROTECTIVE CLOTHING: GLOVES RECOMMENDED.

EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

STORAGE: STORE IN A COOL, DRY PLACE. KEEP CONTAINERS CLOSED TO AVOID CONTAMINATION. PREVENT ACCUMULATIONS OF DUST. AVOID EXCESSIVE HEAT AND SOURCES OF IGNITION. OBSERVE GOOD HOUSEKEEPING PRACTICES.

SECTION 5 PHYSICAL DATA

BOILING POINT: N/A (760 MM HG)	SPECIFIC GRAVITY: 1.2 - 1.3 (H_2O = 1)
VAPOR PRESSURE: N/A (MM HG 20 DEG C)	PERCENT VOLATILE: N/A (BY WEIGHT)
VAPOR DENSITY: N/A (AIR = 1)	EVAPORATION RATE: N/A (BUTYL ACETATE = 1)
HEAT OF VAPORIZATION: N/A (DELTA HV)	SOLUBILITY IN WATER: SLIGHT (% BY WEIGHT)

APPEARANCE AND ODOR: COURSE GROUND OR PASTILLE WITH SLIGHT ODOR OF PHENOL

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S E C T I O N 6 HAZARDOUS INGREDIENTS/SARA TITLE III

CHEMICALS MARKED WITH AN ASTERISK (*) ARE SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT OF 1986 AND 40 CFR PART 372.

	CAS#	PERCENT	TLV/PEL		
*FORMALDEHYDE	50-00-0	<1.7	ACGIH-C	0.3	PPM
			OSHA-TWA	0.75	PPM
			OSHA-STEL	2.0	PPM
PARTICULATES NOT OTHERWISE CLASSIFIED (PNOC)		LESS THAN 5%	ACGIH-TWA/TOTAL	10	MG/M3
			OSHA-TWA/TOTAL	15	MG/M3
			OSHA-TWA/RESPIR	5	MG/M3

S E C T I O N 7 REACTIVITY DATA

STABILITY: STABLE. AVOID CONTAMINATION, EXPOSURE TO FLAME OR HEAT, OR STORAGE AT TEMPERATURES IN EXCESS OF 100 DEGREES F.

INCOMPATIBILITY: LIKE MOST ORGANIC MATERIALS, THIS PRODUCT IS SENSITIVE TO STRONG OXIDIZING AGENTS AND MAY EITHER DECOMPOSE OR IGNITE WHEN MIXED WITH SAME.

HAZARDOUS DECOMPOSITION PRODUCTS: VAPORS EVOLVED DURING POLYMERIZATION MAY CONTAIN - PHENOL AND FORMALDEHYDE

HAZARDOUS POLYMERIZATION: SHOULD NOT OCCUR.

S E C T I O N 8 SPILL, LEAK, AND DISPOSAL

SPILL OR LEAK PROCEDURE: VACUUM OR SWEEP WITH SWEEPING COMPOUND, SAWDUST OR SAND. AVOID GENERATING DUST. VACUUMS WITH EXPLOSION PROOF MOTORS ARE RECOMMENDED. THIS PRODUCT CONTAINS FREE PHENOL WHICH IS SUBJECT TO EFFLUENT LIMITS UNDER THE CLEAN WATER ACT.

WASTE DISPOSAL: BURY OR INCINERATE IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS.

... CONTINUED ON NEXT PAGE ...

SECTION 9 TRANSPORTATION INFORMATION

SHIPPING CLASSIFICATION	D.O.T. HAZARD CLASS
PLASTIC MATERIALS VIZ: POWDERED FORM NMFC ITEM #156200	NON-HAZARDOUS

SECTION 10 ADDITIONAL INFORMATION

N/A = NOT APPLICABLE
TOTAL = TOTAL DUST
RESPIR. = RESPIRABLE DUST

FOR ADDITIONAL INFORMATION CALL: (920) 458-2127

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PLASTICS ENGINEERING COMPANY

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Material Safety Data Sheet

Rev. F – Revised August 26, 2010

Section 1 – Product Identification and Company Information

Trade Names:	Trademarks and product names include Badger Frac™, Badger Pac™, Badger Cast™, Badger Sand and Badger Enviromedia. Products also generally referred to as Taylor Silica, Fairwater Silica.
Common Names/Synonyms:	Silica Sand, Engine Sand
Product Use:	Frac Sands, Gravel Pack Sands, Resin Coating Base Sands, Foundry Core and Molding Sands, Industrial Sands, Glass Sands, Filtration Media, Environmental Sands, Grinding Media, Industrial Fillers, Testing Sands, Recreational and Agricultural Sands. **This product is not to be used for abrasive blasting. This material safety data sheet and the information contained herein were not developed for abrasive blasting.**
Manufacturer's Name:	Badger Mining Corporation
Manufacturer's Address:	P.O. Box 328 409 South Church Street Berlin, WI 54923
Manufacturer's Telephone:	800-932-7263 (7:30 am – 5 pm Central Time Monday-Friday) 920-361-2388
Manufacturer's Fax:	920-361-2826
Emergency Number:	800-932-7263 (7:30 am – 5 pm Central Time Monday-Friday) 920-361-2388

Section 2 – Hazards Identification

Emergency Overview

Badger Mining Corporation Silica Sand is a light buff to white sand with no odor. It is not flammable, combustible, or explosive. It can cause irritation to the eyes. A single exposure will not result in serious adverse health effects. Crystalline silica is not known to be an environmental hazard.

Potential Health Effects

ARP-Taylor46684

Primary routes(s) of exposure: ■ Inhalation ☐ Skin ☐ Ingestion

Inhalation:

a. Silicosis: Respirable crystalline silica (quartz) can cause chronic silicosis, a fibrosis (scarring) of the lungs. Silicosis may be progressive; it may lead to disability and death. Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as 6 months. The symptoms of acute silicosis include (but are not limited to) progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

b. Cancer: Crystalline silica (quartz) inhaled from occupational sources in sufficient concentrations is classified as carcinogenic to humans. In its Eleventh Annual Report on Carcinogens, National Toxicology Program (NTP) listed respirable crystalline silica as a known human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust. The International Agency for Research on Cancer (IARC) has evaluated crystalline silica and determined that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is carcinogenic to humans (Group 1)." Crystalline silica is not on the OSHA carcinogen list

c. Autoimmune Diseases: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys.

d. Tuberculosis: Silicosis increases the risk of tuberculosis.

e. Nephrotoxicity: There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease.

Eye Contact: Crystalline silica (quartz) may cause abrasion of the cornea.

Skin Contact: May cause abrasion to skin.

Ingestion: No adverse effects expected for incidental ingestion. Ingestion of large amounts may cause gastrointestinal tract irritation.

ARP-Taylor46685

Acute Effects: One form of silicosis, Acute Silicosis, can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as 6 months. The symptoms of acute silicosis include (but are not limited to) progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

Chronic Effects: The adverse health effects -- lung disease, silicosis, cancer, autoimmune disease, tuberculosis, and nephrotoxicity -- are chronic effects.

Signs and Symptoms of Exposure: There are generally no signs or symptoms of exposure to crystalline silica (quartz). Often, chronic silicosis has no symptoms. The symptoms of chronic silicosis, if present, are shortness of breath, wheezing, cough and sputum production. The symptoms of acute silicosis are the same as those associated with chronic silicosis; additionally, weight loss and fever may also occur. The symptoms of scleroderma include thickening and stiffness of the skin, particularly in the fingers, shortness of breath, difficulty swallowing and joint problems.

Medical Conditions Generally Aggravated by Exposure: The condition of individuals with lung disease (e.g., bronchitis, emphysema, chronic obstructive pulmonary disease) can be aggravated by exposure.

HMIS:

Health:	See Section 11, Toxicological Information, for additional detail on potential adverse health effects.
Flammability:	0
Reactivity:	0
Protective Equipment:	E

NFPA

Health:	0
Flammability:	0
Reactivity:	0

Section 3 - Composition and Information on Ingredients

Hazardous Ingredients

Name:	Silica, Quartz, SiO_2
CAS Number:	14808 - 60- 7
Concentration (%)	89.0-99.9%

Section 4 - First Aid Procedures

ARP-Taylor46686

Inhalation – There is no specific treatment because the health effects associated with silica are chronic. If gross inhalation of silica occurs, remove the person to fresh air, perform artificial respiration as needed and obtain medical attention as needed.

Eye – Immediately wash the eye with plenty of water for at least 15 minutes, while holding eyelid(s) open. If irritation persists, seek medical attention.
Skin – If abrasion occurs wash with soap and water and seek medical attention if irritation persists or develops later.

Ingestion – If gastrointestinal discomfort occurs, give a large quantity of water. Never attempt to make an unconscious person drink or vomit. Seek medical attention.

Section 5 – Fire Fighting Measures

Flashpoint:	None
Upper/Lower Explosive Limit:	Not Combustible
Autoignition Temperature:	None
Unusual Fire and Explosion Habits:	None
Extinguishing Media:	Compatible with all media; use the medium appropriate to the surrounding fire.
Special Fire Fighting Procedures:	None with respect to this product.
Hazardous Combustion Products:	None

Section 6 – Accidental Release Measures

Wear appropriate personal protective equipment as described in Section 8 of this document. Collect the material using a method that does not produce dust [High-Efficiency Particulate Air (HEPA) vacuum or thoroughly wetting down the silica. Place the silica in a covered container appropriate for disposal. Dispose of the silica according to federal, state and local regulations.

This product is not subject to the reporting requirements of Title III of SARA, 1986, and 40 CFR 372.

Section 7 – Handling and Storage

This product is **not** to be used for abrasive blasting. Do not breathe dust, which may be created during the handling of this product. Do not rely on vision to determine whether respirable silica is present in the air, as it may be present without a visible cloud. Use good housekeeping procedures to prevent the accumulation of silica dust in the workplace. Avoid the creation of respirable dust. Avoid standing on piles of materials as they may be unstable.

Use adequate ventilation and dust collection equipment. Ensure that the dust collection system is adequate to reduce airborne dust levels to below the appropriate occupational health limit.

ARP-Taylor46687

Use respiratory protection during the establishment of engineering controls. Refer to Section 8 – Exposure Controls/Personal Protection for further information.

In accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200, 1915.99, 1917.28, 1918.90, 1926.59, 1928.21), state, and/or local right-to-know laws and regulations, familiarize your employees with this MSDS and the information contained herein. Warn your employees (and your customers in case of resale) of the potential health risks associated with the use of this product and train them in the appropriate use of personal protective equipment and engineering controls, which will reduce their risks of exposure.

See also ASTM International standard practice E 1132-06, "Standard Practice for Health Requirements Relating to Occupational Exposure to Respirable Crystalline Silica."

Crystalline silica is listed by the Governor of the State of California, under Proposition 65, as requiring the following warning: "Detectable amounts of chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm may be found in this product."

Section 8 – Exposure Controls/Personal Protection

Exposure Limits (respirable fraction) in air for Crystalline Silica (quartz):

Standard	Exposure Limits
MSHA/OSHA PEL (8-Hour Time Weighted Average)	$\frac{10\ mg/m^3}{\%\ SiO_2+2}$
ACGIH TLV (8-Hour Time Weighted Average)	0.025 mg/m^3
NIOSH (10-Hour Time Weighted Average, 40-hour work week)	0.05 mg/m^3

Note: The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz); the ACGIH TLV for crystalline silica as cristobalite is equal to the TLV for crystalline silica as quartz. In 2005, ACGIH withdrew the TLV for crystalline silica as tridymite. Refer to Section 10 for thermal stability information for crystalline silica (quartz).

Occupational Exposure Limits (inert/nuisance dust) in air:

Standard	Respirable Dust	Total Dust
MSHA/OSHA PEL (as Inert or Nuisance Dust)	5 mg/m^3	15 mg/m^3
ACGIH TLV (as particles not otherwise specified)	3 mg/m^3	10 mg/m^3

ARP-Taylor46688

Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.

Engineering Controls:

Ventilation: Use local exhaust, general ventilation or natural ventilation adequate to maintain exposures below appropriate exposure limits.

Other control measures: Respirable dust and quartz levels should be monitored regularly. Dust and quartz levels in excess of appropriate exposure limits should be reduced by all feasible engineering controls, including (but not limited to) dust suppression (wetting), ventilation, process enclosure, and enclosed employee work stations.

Respiratory Protection:

This product is <u>not</u> to be used for abrasive blasting. Consult with OSHA regulations and NIOSH recommendations to determine the appropriate respiratory protection during use of this product. Use only NIOSH-approved respiratory protection equipment. Avoid breathing dust produced during the use and handling of this product. If the workplace airborne crystalline silica concentration is unknown for a given task, conduct air monitoring to determine the appropriate level of respiratory protection. Consult with a certified industrial hygienist, your insurance risk manager, or the OSHA Consultative Services group for detailed information. Ensure appropriate respirators are worn during and following the task, including clean up or whenever airborne dust is present, to ensure worker exposures remain below occupational health limits. Provisions should be made for a respiratory protection training program (see 29 CFR 1910.134 - Respiratory Protection for minimum program requirements). See also ANSI standard Z88.2 (latest revision) "American National Standard for Respiratory Protection," 29 CFR 1910.134 and 1926.103, and 42 CFR 84.

Respirator Recommendations:

For respirable quartz levels that exceed or are likely to exceed appropriate exposure limits, a NIOSH-approved 100 series particulate filter respirator must be worn. If respirable quartz levels exceed or are likely to exceed an 8 hour-TWA of 0.5 mg/m^3, a NIOSH-approved air purifying, full-face respirator with a 100 series particulate filter must be worn. Respirator use must comply with applicable MSHA or OSHA standards, which include

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provisions for a user training program, respirator maintenance and cleaning, respirator fit testing, and other requirements. For additional information contact NIOSH at 1-800-35-NIOSH or visit website: http://www.cdc.gov/niosh/npg (search for crystalline silica).

Emergency or planned entry into unknown concentrations or IDLH conditions (50mg/m³ for crystalline silica-quartz): Any self-contained breathing apparatus that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode or any supplied-air respirator that has a full-face piece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus.

Escape from unknown or IDLH conditions (50mg/m³ for crystalline silica-quartz): Any air-purifying, full-face piece respirator with a high-efficiency particulate filter or any appropriate escape-type, self-contained breathing apparatus.

Gloves: Recommended in situations where abrasion from sand may occur.

Eye/Face: Safety glasses with side shields should be worn as minimum protection. Dust goggles should be worn when excessively(visible) dusty conditions are present or are anticipated. There is a potential for severe eye irritation for those wearing contact lenses.

General Hygiene Considerations: There are no known hazards associated with this material when used as recommended. Following the guidelines in this MSDS are recognized as good industrial hygiene practices. Avoid breathing dust. Wash dust-exposed skin with soap and water before eating, drinking, smoking, and using toilet facilities.

Section 9 - Physical and Chemical Properties

Appearance:	Light Buff to White Sand
Odor:	None
Physical State:	Granular Solid
pH:	Not Applicable
Vapor Pressure	Not Applicable
Vapor Density:	Not Applicable

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Boiling Point or Range, °F:	2230°C (4046°F) for Quartz
Melting Point or Range, °F:	1710°C (3110°F) for Quartz
Solubility In Water:	Insoluble
Specific Gravity:	2.65 (Quartz)

Section 10 – Stability and Reactivity

Stability:	Stable
Thermal Stability:	If crystalline silica (quartz) is heated to more than 870°C (1598°F) it can change to a form of crystalline silica known as tridymite, and if crystalline silica (quartz) is heated to more than 1470°C (2678°F), it can change to a form of crystalline silica known as cristobalite.
Materials to Avoid:	Strong Oxidizing Agents, such as fluorine, chlorine trifluoride, hydrogen fluoride, and oxygen difluoride.
Hazardous Decomposition Products:	Silica will dissolve in hydrofluoric acid and produce a corrosive gas – silicon tetrafluoride.
Hazardous Polymerization:	Not known to polymerize.

Section 11 – Toxicological Information

CAUTION: Crystalline silica exists in several forms, the most common of which is quartz. Crystalline silica as tridymite and cristobalite are more fibrogenic than crystalline silica as quartz.

A. SILICOSIS

The major concern is silicosis (lung disease), caused by the inhalation and retention of respirable crystalline silica dust. Silicosis can exist in several forms, chronic (or ordinary), accelerated, or acute.

Chronic or Ordinary Silicosis is the most common form of silicosis, and can occur after many years of exposure to levels above the occupational exposure limits for airborne respirable crystalline silica dust. It is further defined as either simple or complicated silicosis.

Simple silicosis is characterized by lung lesions (shown as radiographic opacities) less than 1 centimeter in diameter, primarily in the upper lung zones. Often, simple silicosis is not associated with symptoms, detectable changes in lung function or disability. Simple silicosis may be progressive and may develop into complicated silicosis or progressive massive fibrosis (PMF).

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Complicated silicosis or PMF is characterized by lung lesions (shown as radiographic opacities) greater than 1 centimeter in diameter. Although there may be no symptoms associated with complicated silicosis or PMF, the symptoms, if present, are shortness of breath, wheezing, cough and sputum production. Complicated silicosis or PMF may be associated with decreased lung function and may be disabling. Advanced complicated silicosis or PMF may lead to death. Advanced complicated silicosis or PMF can result in heart disease (cor pumonale) secondary to the lung disease.

Accelerated Silicosis can occur with exposure to high concentrations of respirable crystalline silica over a relatively short period; the lung lesions can appear within five (5) years of the initial exposure. The progression can be rapid. Accelerated silicosis is similar to chronic or ordinary silicosis, except that the lung lesions appear earlier and the progression is more rapid.

Acute Silicosis can occur with exposures to very high concentrations of respirable crystalline silica over a very short time period, sometimes as short as a few months. The symptoms of acute silicosis include progressive shortness of breath, fever, cough and weight loss. Acute silicosis is fatal.

B. CANCER

IARC – The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz and cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans* (*Group 1*)." The IARC evaluation noted that not all industrial circumstances studied evidenced carcinogenicity. The monograph also stated that "[C]arcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates..." (1997).

NTP – In its Eleventh Annual Report on Carcinogens, concluded that respirable crystalline silica is known to be a human carcinogen, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to respirable crystalline silica and increased lung cancer rates in workers exposed to crystalline silica dust.

OSHA – Crystalline silica is not on the OSHA carcinogen list.

There have been many articles published on the carcinogenicity of crystalline silica, which the reader should consult for additional information; the following are examples of recently published articles: (1) "Dose-response meta-analysis of silica and lung cancer", *Cancer Causes*

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Control, (20):925-33 (2009); (2) "Occupational silica exposure and lung cancer risk: a review of epidemiological studies 1996-2005', *Ann Oncol*, (17) 1039-50 (2006); (3) "Lung cancer among industrial sand workers exposed to crystalline silica", *Am J Epidemiol*, (153) 695-703 (2001); (4) "Crystalline Silica and the risk of lung cancer in the potteries", *Occup Environ Med*, (55) 779-785 (1998); (5) "Is Silicosis Required for Silica-Associated Lung Cancer?", *American Journal of Industrial Medicine*, (37) 252- 259 (2000); (6) " Silica, Silicosis, and Lung Cancer: A Risk Assessment", *American Journal of Industrial Medicine*, (38) 8-18 (2000); (7) "Silica, Silicosis, and Lung Cancer: A Response to a Recent Working Group Report", *Journal of Occupational and Environmental Medicine*, (42) 704-720 (2000).

C. AUTOIMMUNE DISEASES

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis may be associated with the increased incidence of several autoimmune disorders, -- scleroderma, systemic lupus erythematosus, rheumatoid arthritis and diseases affecting the kidneys. For a review of the subject, the following may be consulted: (1) "Antinuclear antibody and rheumatoid factor in silica-exposed workers", *Arh Hig Rada Toksikol*, (60) 185-90 (2009); (2) "Occupational Exposure to Crystalline Silica and Autoimmune Disease", *Environmental Health Perspectives*, (107) Supplement 5, 793-802 (1999); (3) "Occupational Scleroderma", *Current Opinion in Rheumatology*, (11) 490-494 (1999); (4) "Connective tissue disease and silicosis", *Am J Ind Med*, (35), 375-381 (1999).

D. TUBERCULOSIS

Individuals with silicosis are at increased risk to develop pulmonary tuberculosis, if exposed to persons with tuberculosis. The following may be consulted for further information: (1) "Tuberculosis and silicosis: epidemiology, diagnosis and chemoprophylaxis", *J Bras Pneumol*, (34) 959-66 (2008); (2) *Occupational Lung Disorders*, Third Edition, Chapter 12, entitled "Silicosis and Related Diseases", Parkes, W. Raymond (1994); (3) "Risk of pulmonary tuberculosis relative to silicosis and exposure to silica dust in South African gold miners," *Occup Environ Med*, (55) 496-502 (1998); (4) "Occupational risk factors for developing tuberculosis", *Am J Ind Med*, (30) 148-154 (1996).

E. KIDNEY DISEASE

There is evidence that exposure to respirable crystalline silica (without silicosis) or that the disease silicosis is associated with the increased incidence of kidney diseases, including end stage renal disease. For additional information on the subject, the following may be consulted: (1) "Mortality from lung and kidney disease in a cohort of North American industrial sand workers: an update", *Ann Occup Hyg*, (49) 367-73 (2005); (2) "Kidney Disease and Silicosis", *Nephron*, (85) 14-19 (2000); (3) "End stage renal disease among ceramic workers exposed to silica", *Occup Environ Med*, (56) 559-561 (1999); (4) "Kidney disease and arthritis in a cohort study of workers exposed to silica", *Epidemiology*, (12) 405-412 (2001).

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F. NON-MALIGNANT RESPIRATORY DISEASES

NIOSH has cited the results of studies that report an association between dusts found in various mining operations and non-malignant respiratory disease, particularly among smokers, including bronchitis, emphysema, and small airways disease. The results were not conclusive regarding an association among those with silicosis, only smokers, or the result of general mineral dust that does not contain silica. See *NIOSH Hazard Review - Health Effects of Occupational Exposure to Respirable Crystalline Silica*, published in April 2002, available from NIOSH, 4676 Columbia Parkway, Cincinnati, OH 45226, or at http://www.cdc.gov/niosh/02-129A.html.

Section 12 - Ecological Information

Crystalline silica is not known to be ecotoxic.

Section 13 - Disposal Considerations

General: Crystalline silica may be landfilled. Material should be placed in covered containers to minimize generation of airborne dust.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

The above information applies to Badger Mining Corporation Silica Sand only as sold. The product may be contaminated during use, and it is the responsibility of the user to assess the appropriate disposal method in this situation.

Section 14 - Transport Information

Crystalline silica (quartz) is not a hazardous material for purposes of transportation under the U. S. Department of Transportation Table of Hazardous Materials, 49 CFR §172.101.

Section 15 - Regulatory Information

UNITED STATES (FEDERAL AND STATE)

Exposure Limits (respirable fraction) in Air for Crystalline Silica (quartz):

Standard	Exposure Limits
MSHA/OSHA PEL (8-Hour Time Weighted Average)	10 mg/m³ % SiO_2+2

Note: The OSHA PEL for crystalline silica as tridymite and cristobalite is one-half the PEL for crystalline silica (quartz). Please refer to Section 10 for information on thermal stability of crystalline silica (quartz).

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Exposure Limits (inert/nuisance dust) in Air:

Standard	Respirable Dust	Total Dust
MSHA/OSHA PEL (as Inert or Nuisance Dust)	5 mg/m³	15 mg/m³

Note: The limits for Inert Dust are provided as guidelines. Nuisance dust is limited to particulates not known to cause systemic injury or illness.

OTHER US REGULATORY INFORMATION:

TSCA No.: Crystalline silica (quartz) appears on the EPA TSCA inventory under the CAS No. 14808-60-7.

RCRA: Crystalline silica (quartz) is not classified as a hazardous waste under the Resource Conservation and Recovery Act, or its regulations, 40 CFR §261 et seq.

CERCLA: Crystalline silica (quartz) is not classified as a hazardous substance under regulations of the Comprehensive Environmental Response Compensation and Liability Act (CERCLA), 40 CFR §302.4

EPCRA (Emergency Planning and Community Right to Know Act): Crystalline silica (quartz) is not an extremely hazardous substance under regulations of the Emergency Planning and Community Right to Know Act, 40 CFR Part 355, Appendices A and B and is not a toxic chemical subject to the requirements of Section 313.

Clean Air Act: Crystalline silica (quartz) mined and processed by Badger Mining Corporation was not processed with or does not contain any Class I or Class II ozone depleting substances.

FDA: Silica is included in the list of substances that may be included in coatings used in food contact surfaces, 21 CFR §175.300(b)(3).(The FDA standard primarily applies to products containing silica used in the coatings of food contact surfaces).

NTP: Respirable crystalline silica (quartz) is classified as a known human carcinogen in the NTP's 11th Report on Carcinogens.

OSHA Carcinogen: Crystalline silica (quartz) is not listed.

California Proposition 65: Respirable crystalline silica (quartz) is classified as a substance known to the state of California to be a carcinogen.

California Inhalation Reference Exposure Limit (REL): The California chronic REL for respirable crystalline silica (quartz, cristobalite, tridymite) is 3 ug/m³. [Dated December 18, 2008] A chronic REL is an airborne level of a chemical at or below which no adverse health effects are anticipated in individuals indefinitely exposed to that level. [Dated 2/10/05]

Massachusetts Toxic Use Reduction Act: Respirable crystalline silica is considered toxic per the Massachusetts Toxic Use Reduction Act.

Pennsylvania Worker and Community Right to Know Act: Quartz is considered hazardous for purposes of the Act, but it is not a special hazardous substance or an environmental hazardous substance.

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CANADA

Domestic Substances List: Badger Mining Corporation products, as naturally occurring substances, are on the Canadian DSL.

WHMIS Classification: D-2A

Canadian OEL:

Canada Labour Code: 0.025 mg/m3 (respirable)
Alberta, British Columbia: 0.025 mg/m3 (respirable, quartz and cristobalite)
Saskatchewen: 2 mg/m3 (respirable, amorphous: silica fume); 0.1 mg/m3 (respirable, amorphous: silica fused); 0.05 mg/m3 (respirable, cristobalite); 0.05 mg/m3 (respirable tridymite); 0.1 mg/m3 (respirable, quartz); 0.1 mg/m3 (respirable, tripoli)
Manitoba, Newfoundland, Prince Edward Island: 0.025 mg/m3 (respirable)
Ontario: 0.05 mg/m3 (respirable cristobalite, tridymite); 0.1 mg/m3 (quartz, tripoli); 0.1 mg/m3 (silica fused); 2 mg/m3 (silica fume)
Quebec: 0.05 mg/m3 (respirable, cristobalite, tridymite); 0.1 mg/m3 (quartz, tripoli)
New Brunswick: 0.1 mg/m3 (quartz); 0.05 mg/m3 (cristobalite)
Nova Scotia: 0.025 mg/m3 (quartz, cristobalite)
Yukon: 2 mg/m3 (respirable, amorphous); 300 particles/ml measured with a konimeter (quartz, and tripoli); 150 particles/ML measured with a konimeter (cristobalite and tridymite)
Northwest Territories, Nunavut: 2 mg/m3 (respirable, amorphous); 0.05 mg/m3 (respirable, cristobalite, tridymite, silica flour); 0.1 mg/m3 (respirable, fused silica, quartz, tripoli)

OTHER

EINECS No.: 231-545-4 (for silica)
EEC Label (Risk/Safety Phrases): R 48/20, R 40/20, S22, S38 (for silica)
IARC: Silica dust, crystalline, in the form of quartz or cristobalite is classified in IARC Group 1. Silica, amorphous is classified in IARC Group 3.
National, state, provincial or local emergency planning, community right to know or other laws, regulations or ordinances may be applicable--consult applicable national, state, provincial or local laws.

Section 16 - Other Information

ACGIH: American Conference of Governmental Industrial Hygienists
CFR: US Code of Federal Regulations

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DOT: US Department of Transportation
EEC: European Economic Community Guidelines
EINECS: European Inventory of Existing Commercial chemical Substances
FDA: Food and Drug Administration
HMIS: Hazardous Materials Identification Systems
IARC: International Agency for Research on Cancer
IDLH: Immediately Dangerous to Life and Health
MSHA: Mine Safety and Health Administration
NFPA: National Fire Protection Association
NIOSH: National Institute for Occupational Safety and Health, US Department of Health and Human Services
NTP: National Toxicology Program
OEL: Occupational exposure limit
OSHA: Occupational Safety and Health Administration, US Department of Labor
PEL: Permissible Exposure Limit
SARA Title III: Title III of the Superfund Amendments and Reauthorization Act, 1986
TLV: Threshold Limit Value
TSCA: Toxic Substance Control Act
TWA: Time-weighted Average

An electronic version of this MSDS is available at www.badgerminingcorp.com . More information on the effects of crystalline silica exposure may be obtained from OSHA (phone number: 1-800-321-OSHA; website: http://www.osha.gov) or from NIOSH (phone number: 1-800-35-NIOSH; website: http://www.cdc.gov/niosh).

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MATERIAL SAFETY DATA SHEET

SECTION 1 ♦ CHEMICAL PRODUCT & COMPANY IDENTIFICATION

Trade Name:	**TRANS-724**
CAS Name & No.:	Mixture (NA)
Product Description:	Oil-Based Industrial-Grade Defoamer
DOT Proper Shipping Name:	Defoaming Compound 50140 Sub 1 Class 55 (LTL)
DOT Hazard Classification:	Non-Hazardous
Manufacturer's Name:	TRANS-CHEMCO, INC.
Address:	19235 84th St., Bristol, WI 53104 USA

Revision Date: 01-14-03

Emergency Phone No's: Day 262-857-2363
Night 262-857-7001
(for emergency use only)

SECTION 2 ♦ COMPOSITION / INFORMATION ON INGREDIENTS

Ingredients:	**CAS #**	**WT. %**	**PEL**	**TLV- STEL**
Petroleum Distillate	64742-54-7	< 65.0%	5 mg/m^3	10 mg/ m^3

SECTION 3 ♦ HAZARDS IDENTIFICATION

NFPA HAZARD RATING

HEALTH -1 **FIRE - 1** **REACTIVITY - 0** **PERSONAL PROTECTION** - See Section 8

Primary Routes of Entry: Absorption through skin.

Potential Health Effects:

Eye: Eye contact with product may cause temporary irritation. Avoid eye contact with product at all times.

Skin: Effects of short-term exposure are expected to be minimal. Avoid prolonged and unnecessary skin contact with product, as defatting and drying may result and lead to irritation and dermatitis (rash).

Ingestion: Never taste or swallow product. This material may be harmful or fatal if swallowed.

Inhalation: Not expected to be an inhalation hazard. Avoid prolonged exposure to product vapors.

SECTION 4 ♦ FIRST AID MEASURES

Eyes: **Immediately flush eyes with a directed stream of water for at least 15 minutes while forcibly holding eyelids** apart to ensure complete irrigation of all eye and lid tissue. Get prompt medical attention if irritation develops.

Skin: Flush skin with water and wash with mild soap and water. Get prompt medical attention if irritation develops or rash occurs. Remove contaminated clothing and wash before reuse.

Ingestion: GET IMMEDIATE MEDICAL ATTENTION. Give victim a glass of water or milk. Do not induce vomiting except by physician's order. If spontaneous vomiting is inevitable, prevent aspiration by keeping victim's head below the knees. Never give anything by mouth to an unconscious person.

Inhalation: Remove to fresh air. If breathing is difficult, have trained person administer oxygen. If respiration stops, have trained person administer mouth-to-mouth resuscitation. GET MEDICAL ATTENTION IMMEDIATELY.

SECTION 5 ♦ FIRE FIGHTING MEASURES

Flammable Properties:

Flash point, TCC:	380° F	193° C
Autoignition:	No Data	
Flammability Class:	No Data	
Lower Explosive Limit (%):	No Data	
Upper Explosive Limit (%):	No Data	

Hazardous Combustion Products: Combustion products may include fumes, smoke, and carbon monoxide.

MATERIAL SAFETY DATA SHEET

SECTION 5 ♦ FIRE FIGHTING MEASURES, CONT.

Extinguishing Media:	Dry chemical, carbon dioxide, and foam.
Fire Fighting Instructions:	Do not enter enclosed or confined workspaces without proper protective equipment. Fire fighting personnel should wear respiratory protection (positive pressure if available).
Unusual Fire/Explosion Hazards:	Combustible liquid. Can form explosive mixtures at temperatures at or above flashpoint.

SECTION 6 ♦ ACCIDENTAL RELEASE MEASURES

Build dike to contain flow. Remove free liquid. Contain spill and keep from entering waterways or sewers. Use personal protective equipment. Absorb on inert material. Shovel, sweep, or vacuum spill and place in closed container for disposal according to local, state, and federal regulations.

SECTION 7 ♦ HANDLING AND STORAGE

Storage Conditions:	Store this product in a cool, dry, well-ventilated area away from direct sources of heat, sparks, and flames. Do not store near strong oxidizing materials.
General Precautions:	Keep container tightly closed when handling or storing. Exercise good personal and industrial hygiene when handling antifoams and defoamers. Avoid unsanitary conditions, usage, & storage. Wash thoroughly after handling.

SECTION 8 ♦ EXPOSURE CONTROLS, PERSONAL PROTECTION

Personal Protection	
Gloves:	Neoprene rubber or other chemical resistant material such as nitrile or viton may be used.
Safety Glasses:	Always wear eye protection. Goggles or safety glasses with side shields are recommended.

SECTION 9 ♦ PHYSICAL AND CHEMICAL PROPERTIES

Vapor Pressure:	No Data	***pH (neat @ 25 °C):***	Not Applicable
Vapor Density, (Air=1):	Heavier than air	***Boiling Point:***	No Data
Specific Gravity:	0.89 @ 25° C	***Freezing Point:***	No Data
Solubility in Water:	Dispersible	***Viscosity:***	1000 - 2000 cps @ 25° C
Volatile %:	No Data	***Evaporation Rate:***	Slower than ether
Appearance:	Opaque Amber Liquid	***Odor:***	Mild Odor

The physical data presented here are approximations, as the actual product's values may vary slightly.

SECTION 10 ♦ STABILITY AND REACTIVITY

Stability:	Stable under normal conditions.
Hazardous Polymerization:	Hazardous polymerization will not occur.
Materials to Avoid:	Strong oxidizing materials.
Conditions to Avoid:	See Section 7.
Hazardous Decomposition Products:	Incomplete combustion may produce carbon monoxide and other asphyxiants.

SECTION 11 ♦ TRANSPORTATION / REGULATORY INFORMATION

Transportation Information:

DOT Proper Shipping Name:	Defoaming Compound 50140 Sub 1 Class 55 (LTL)
DOT Hazard Class:	Non-Hazardous
Hazard Technical Name:	Not Applicable

MATERIAL SAFETY DATA SHEET

SECTION 11 ♦ TRANSPORTATION / REGULATORY INFORMATION, CONT.

DOT Shipping Label: Not Required
UN/NA Number: No Data
Packing Group: No Data

Regulatory Information:

U.S. Federal Regulatory Information

SARA 302 Threshold Planning Quantity: Not Applicable
SARA 304 Reportable Quantity: Not Applicable

SARA 311 Categories:			
	Immediate (Acute) Health Effects:	N	Y = Yes; N = No
	Delayed (Chronic) Health Effects:	N	
	Fire Hazard:	N	
	Sudden Release of Pressure Hazard:	N	
	Reactivity Hazard:	N	

SARA Title III – Section 313:
The following chemicals are subject to the reporting requirements of Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 and 40 CFR Part 372:
None Listed

EPA Hazard Classification Code: Not Applicable
Contents of this MSDS comply with the OSHA Hazard Communication Standard 29 CFR 1910.1200
EPA/TSCA Inventory: The components of this product are listed on the EPA/TSCA inventory of chemicals
Canadian DSL: The components of this product are listed on the Canadian Domestic Substances List
CERCLA: No chemicals in this product are subject to the reporting requirements of CERCLA

SECTION 12 ♦ DISCLAIMER OF EXPRESSED AND IMPLIED WARRANTIES

Disclaimer: This material safety data sheet (MSDS) was prepared in accordance with 29 CFR 1910.1200. The information contained herein is based upon data available to us and reflects our best professional judgment. However, no warranty is expressed or implied regarding the accuracy of such information or the results obtained from the use thereof. We assume no legal responsibility whatsoever for any damage resulting from reliance upon this information since it is being furnished upon the condition that the person receiving it shall make his or her own determination of the suitability of the material described herein for a particular application, storage, or disposal situation.

WACKER SILICONES

Material Safety Data Sheet

Material: 60078103 **WACKER® SG 3381**

Version: 1.0 (US) Date of print: 06/11/2012 Date of last alteration: 06/08/2012

1. Product and company identification

1.1 Identification of the substance or preparation:

Commercial product name: **WACKER® SG 3381**

Use of substance / preparation: Industrial.
Functional additive

1.2 Company/undertaking identification:

Manufacturer/distributor:
Wacker Chemical Corporation
3301 Sutton Road
Adrian, MI 49221-9397
USA

Customer information:
InfoLine:
Tel (517) 264-8240, Fax (517) 264-8740
Hours of operation:
Monday - Friday, 8 am to 5 pm (eastern standard time)
Corporate website: www.wacker.com

Emergency telephone no. (24h): (517) 264-8500
Transportation emergency: (800) 424-9300 (CHEMTREC, USA)
(703) 527-3887 (CHEMTREC, international)

This MSDS was prepared by the Regulatory Affairs and Product Safety Department (RAPS) of Wacker Chemical Corporation.

Composition/information on ingredients

2.1 Chemical characterization (preparation)

Chemical characteristics
Polysiloxane with polyether groups

2.2 Information on ingredients:

Type	CAS No.	Substance	Content [wt. %]		Note
			Lower	Upper	
VERU	556-67-2	Octamethyl cyclotetrasiloxane	0.1	<1.0	R

Type: HYD - by-product upon hydrolysis, INHA - ingredient, NEBE - by-product, MONO - residual monomer, VERU - impurity, VUL - by-product upon vulcanization. *** **Note:** C1 - IARC carcinogen, C2 - NTP carcinogen, C3 - OSHA carcinogen, NH - non-hazardous, R - reproductive toxin.

This material does not contain any OSHA reportable hazardous ingredients.

Substances listed in the Subsections "HAPS" and "California Proposition 65 Carcinogens / Reproductive Toxins" that are not listed in Section 2 are only present at quantities below 0.1% for California Proposition 65 listed toxins or below 1% for non-carcinogenic HAPS or they are inextricably bound in the product.

3. Hazards identification

3.1 Hazards classifications

HMIS® rating (product as packaged):
Health: 1 Fire: 1 Reactivity: 0 PPE: B

Hazardous Materials Identification System and HMIS are registered trademarks of the National Paint and Coatings Association. (HMIS codes are based on contact with the product as packaged and any hydrolysis by-products, if present.)

Canadian WHMIS Classification: D2A

3.2 Emergency overview and potential hazards

Physical Hazards:
No known physical hazards.

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Acute health effects
Route of entry or possible contact:
eyes , skin , ingestion .
Eye contact:
May cause slight eye irritation.
Skin contact:
No acute toxic effects are expected.
Inhalation:
Not expected due to high viscosity.
Ingestion:
Not expected in industrial use.

Additional information on acute health effects:
No additional information.

3.3 Further information:

Chronic health effects:
Prolonged or repeated inhalation of vapors may have adverse effects on the reproductive system, based on animal testing of a component of this material. Increased liver weights were seen in experimental animals exposed to high doses of a component (cyclosiloxane) of this material.

Medical conditions which may be aggravated by exposure:
unknown

Target organs affected:
Liver and Female Reproductive System.

Signs and Symptoms of Exposure:
Refer to Acute Health Effects, listed above.

Carcinogens/Reproductive toxins:
Based on animal tests. This material contains >= 0.1% of a substance which significantly increased the incidence of benign tumors in animal experiments. This material contains between 0.1% and 1% of a known reproductive toxin. Investigations of the mechanism of tumor formation are ongoing to evaluate the relevance to humans. Although animal testing has indicated that there is some limited carcinogenic potential for decamethylcyclopentasiloxane (D5) in rats, D5 has not been classified by IARC, NTP or OSHA as a known or potential human carcinogen. Further studies are ongoing to clarify the carcinogenic potential of D5 and the relevance to humans.

See Section 11 for Toxicological Information, if any.

4. First-aid measures

4.1 General information:

Get medical attention if irritation or other symptoms occur. Before seeking medical attention remove contaminated clothing and shoes. Take a copy of the Safety Data Sheet when going for medical treatment.

4.2 After inhalation

If inhaled remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult give oxygen.

4.3 After contact with the skin

If contact with skin, immediately flush skin with plenty of water for at least 15 min.

4.4 After contact with the eyes

If contact with eyes, immediately hold eyelids apart and flush with plenty of water for at least 15 min.

4.5 After swallowing

For ingestion, if conscious, give several glasses of water but do not induce vomiting. If vomiting does occur, give additional fluids. Get medical attention. Designate the product. Show label if possible.

5. Fire-fighting measures

5.1 Flammable properties:

Property:	Value:	Method:

Flash point	: 100 °C (212 °F)	(ISO 3679)
Sustained combustibility	: > 110 °C (> 230 °F)	(ISO 9038)
Boiling point / boiling range	: > 150 °C (> 302 °F)	
Lower explosion limit (LEL)	: not determined	
Upper explosion limit (UEL)	: not determined	
Ignition temperature	: approx. 380 °C (716 °F)	(DIN 51794)
NFPA Hazard Class (comb./flam.liquid)	: IIIB	

5.2 Fire and explosion hazards:

This material will flash but does not sustain combustion.

5.3 Recommended extinguishing media:

water-spray , carbon dioxide, dry chemical or foam-type extinguishing media .

5.4 Unsuitable extinguishing media:

halones , sharp water jet .

5.5 Special exposure hazards arising from the substance or preparation itself, combustion products, resulting gases

Hazardous decomposition products: carbon dioxide , carbon monoxide , formaldehyde , silicon dioxide and incompletely burnt hydrocarbons .

5.6 Fire fighting procedures:

Fire fighters should wear full protective clothing including a self-contained breathing apparatus. Cool endangered containers with water.

Accidental release measures

6.1 Precautions:

If material is released indicate risk of slipping.

HAZWOPER PPE Level: D

6.2 Containment:

Prevent material from entering surface waters, drains or sewers and soil. Contain any fluid that runs out using suitable material (e.g. earth).

Spills of material which could reach surface waters must be reported to the United States Coast Guard National Response Center's toll free phone number (800) 424-8802.

6.3 Methods for cleaning up

Take up mechanically and dispose of according to local/state/federal regulations. For small amounts: Absorb with a liquid binding material such as diatomaceous earth and dispose of according to local/state/federal regulations. Contain larger amounts and pump up into suitable containers. Clean any slippery coating that remains using a detergent / soap solution or another biodegradable cleaner.

7. Handling and storage

7.1 Handling

Precautions for safe handling:
Avoid formation of aerosols. In case of aerosol formation special protective measures are required (exhausting by suction, respiratory protection). Ensure adequate ventilation. Avoid contact with acids. Spilled substance increases risk of slipping.

Precautions against fire and explosion:
Observe the general rules for fire prevention.

7.2 Storage

Conditions for storage rooms and vessels:
none known

Advice for storage of incompatible materials:
not applicable

Further information for storage:
Keep container tightly closed.

8. Exposure controls and personal protection

8.1 Engineering controls

Ventilation:
Use only with adequate ventilation.

Local exhaust:
To control flammable/combustible vapors: Local exhaust ventilation which meets the requirements of ANSI Z9.2 is recommended to control airborne contaminants at the point of use.

8.2 Associate substances with specific control parameters such as limit values

none known .

Further information:
Maximum concentration at workplace recommended by producer: octamethylcyclotetrasiloxane (D4, CAS no. 556-67-2) = 10 ppm (123 mg/m3) .

8.3 Personal protection equipment (PPE)

Respiratory protection:
Respiratory protection is not normally required.

Hand protection:
Recommendation: butyl rubber protective gloves .

Eye protection:
Safety glasses with side shields or chemical safety goggles.

Other protective clothing or equipment:
Recommendation: Long pants and long sleeved shirts. Provide eye bath and safety shower.

8.4 General hygiene and protection measures:

Do not eat, drink or smoke when handling. Avoid contact with eyes. Wash thoroughly after handling.

9. Physical and chemical properties

9.1 Appearance

Physical state / form	liquid
Colour	colourless
Odour	slight

9.2 Safety parameters

Property:	Value:	Method:
Melting point / melting range	10 - 20 °C (50 - 68 °F)	
Boiling point / boiling range	> 150 °C (> 302 °F)	
Flash point	100 °C (212 °F)	(ISO 3679)
Sustained combustibility	> 110 °C (> 230 °F)	(ISO 9038)
Ignition temperature	approx. 380 °C (716 °F)	(DIN 51794)
Lower explosion limit (LEL)	not determined	
Upper explosion limit (UEL)	not determined	
Vapour pressure	14.9 hPa at 50 °C (122 °F)	
Density	approx. 1.04 g/cm³ at 25 °C (77 °F)	
Water solubility / miscibility	100 g/l at 25 °C (77 °F)	
Solubility in organic solvent	totally miscible with common organic solvents	
pH-Value	approx. 5.5	
Viscosity (dynamic)	200 - 250 mPa.s at 25 °C (77 °F)	

9.3 Further information

VOC	32 g/l	(EPA Method 24A)
Thermal decomposition	> 150 °C (> 302 °F)	

10. Stability and reactivity

10.1 General information:

If stored and handled in accordance with standard industrial practices no hazardous reactions are known.

10.2 Conditions to avoid

none known

10.3 Materials to avoid

none known

10.4 Hazardous decomposition products

If stored and handled properly: none known . Measurements have shown the formation of small amounts of formaldehyde at temperatures above about 150 °C (302 °F) through oxidation.

10.5 Further information:

Hazardous polymerization cannot occur.
Conditions to avoid hazardous polymerization: odourless

11. Toxicological information

11.1 Information on toxicological effects

11.1.1 General information

Data derived for the product as a whole are of higher priority than data for single ingredients.

The toxicology information listed below is based on the components of the material.

11.1.2 Acute toxicity

Assessment:

Assessed on the basis of constituents: LD50, oral, rat > 2000 mg/kg body weight

11.1.3 Skin corrosion/irritation

Assessment:

Based on the available data a clinically relevant skin irritation hazard is not expected.

Product details:

Result/Effect	Species/Test system	Source
not irritating	rabbit	Conclusion by analogy

11.1.4 Serious eye damage / eye irritation

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.5 Respiratory or skin sensitization

Assessment:

Based on the available data a sensitization reaction is not expected from this product.

Product details:

Route of exposure	Result/Effect	Species/Test system	Source
dermal	not sensitizing	no data available	Conclusion by analogy

11.1.6 Germ cell mutagenicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.7 Carcinogenicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

Data related to ingredients:

Decamethylcyclopentasiloxane (Impurity):

See Sect. "Further toxicological information".

11.1.8 Reproductive toxicity

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.9 Specific target organ toxicity (single exposure)

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.10 Specific target organ toxicity (repeated exposure)

Assessment:

By-product: Oral or inhalative exposure at relatively high dosages in animal test causes increases in liver weight.

For this endpoint no toxicological test data is available for the whole product.

11.1.11 Aspiration hazard

Assessment:

For this endpoint no toxicological test data is available for the whole product.

11.1.12 Further toxicological information

Toxicity to reproduction/fertility: Impurity: In a two generation reproductive study via inhalation with OMCTS/D4 rats, decreased mean live litter size and prolonged labor (dystocia) were observed at the 500 ppm and 700 ppm exposure levels. The relevance of these effects in humans cannot be determined at this time. Because these effects are only seen at very high exposure levels, it is unlikely that industrial, commercial and/or consumer uses of products containing OMCTS/D4 would result in a significant risk to humans. Based on animal experiments there is no indication of developmental effects.

Chronic toxicity / carcinogenicity: Impurity: In a two year combined chronic toxicity and carcinogenicity inhalation study with octamethylcyclotetrasiloxane (OMCTS/D4) in rats, an increased incidence of (uterine) endometrial cell hyperplasia and endometrial adenomas were observed at the highest exposure level of 700 ppm in female rats. These same effects were not seen at the other dose levels of 10, 30, and 150 ppm. Since these effects only occurred at 700 ppm, a level that greatly exceeds typical workplace or consumer exposure, it is unlikely that industrial, commercial or consumer uses of products containing OMCTS/D4 would result in a significant risk to humans. In a two year combined chronic toxicity and carcinogenicity inhalation study with decamethylcyclopentasiloxane (D5) in rats, an increased incidence for (uterine) endometrial tumors was observed in the highest exposure level of 160 ppm in female rats. The same effects were not seen at the other dose levels of 10 and 40 ppm. Whether or not this increase in incidence is truly related to the exposure to D5 is questionable and yet to be determined. Based on our present knowledge it is unlikely that industrial, commercial or consumer uses of products containing D5 would result in a significant risk to humans.

Other information: By eye contact: Slight irritation possible.

12. Ecological information

12.1 Toxicity

Assessment:

According to past experience toxicity to fish is improbable. According to current knowledge adverse effects on water purification plants are not expected.

12.2 Persistence and degradability

Assessment:

Polymer components: Biologically not degradable.

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12.3 Bioaccumulative potential

Assessment:

Polymer component: Bioaccumulation is not expected to occur.

Data related to ingredients

Decamethylcyclopentasiloxane (Impurity):

Under controlled laboratory conditions D5 dissolved in water bioconcentrates in fish. However, available monitoring data indicate that the substance does not biomagnify in aquatic and terrestrial food webs in the environment.

12.4 Mobility in soil

Assessment:

No data known.

Data related to ingredients:

Decamethylcyclopentasiloxane (Impurity):

D5 has a very low water solubility, easily evaporates to air, and partitions to organic matter. It is degraded in air by reaction with hydroxyl radicals. In soil D5 is removed by several simultaneously occurring processes including volatilisation, hydrolysis, and clay-catalysed degradation.

12.5 Other adverse effects

none known

13. Disposal considerations

13.1 Product disposal

Recommendation:
Dispose of according to regulations by incineration in a special waste incinerator. Observe local/state/federal regulations.

13.2 Packaging disposal

Recommendation:
Completely discharge containers (no tear drops, no powder rest, scraped carefully). Containers may be recycled or re-used. Observe local/state/federal regulations.

14. Transport information

14.1 US DOT & CANADA TDG SURFACE

Valuation .....: Not regulated for transport
Other Information .....: This material has been tested and does not sustain combustion.
Protect from freezing, when exposed to cold temperatures approaching 0 °C (32 °F) or below.

14.2 Transport by sea IMDG-Code

Valuation .....: Not regulated for transport

14.3 Air transport ICAO-TI/IATA-DGR

Valuation .....: Not regulated for transport

15. Regulatory information

15.1 U.S. Federal regulations

TSCA inventory status and TSCA information:
This material or its components are listed on or are in compliance with the requirements of the TSCA Chemical Substance Inventory.

TSCA 12(b) Export Notification:
This material does not contain any TSCA 12(b) regulated chemicals.

CERCLA Regulated Chemicals:

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This material does not contain any CERCLA regulated chemicals.

SARA 302 EHS Chemicals:
This material does not contain any SARA extremely hazardous substances.

SARA 311/312 Hazard Class:
Fire hazard.

SARA 313 Chemicals:
This material does not contain any SARA 313 chemicals above de minimus levels.

HAPS (Hazardous Air Pollutants):
This material does not contain any hazardous air pollutants.

15.2 U.S. State regulations

California Proposition 65 Carcinogens:
This material does not contain any chemicals known to the state of California to cause cancer.

California Proposition 65 Reproductive Toxins:
This material does not contain any chemicals known to the state of California to cause reproductive effects.

Massachusetts Substance List:
This material contains no listed components.

New Jersey Right-to-Know Hazardous Substance List:
This material contains no listed components.

Pennsylvania Right-to-Know Hazardous Substance List:
This material contains no listed components.

15.3 Canadian regulations

This product has been classified in accordance with the Hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

WHMIS Hazard Classes:
D2A

DSL Status:
This material or its components are listed on the Canadian Domestic Substances List. Contains a component subject to Ministerial Condition No. 14769 (CEPA 84(1)(a)). The Condition includes: Use restrictions, no release into the environment, record-keeping, information and notification requirements. However, the material or some of it's components are listed on the NDSL (Non-Domestic Substances List).

Non-DSL Chemicals:
This material does not contain any non-DSL chemicals.

Canadian Ingredient Disclosure List:
This material contains no listed components.

15.4 Other international regulations

EU Risk Phrases:

R-Phrase	Description
R-	-

EU Safety Phrases:

S-Phrase	Description
S-	-

Details of international registration status
Listed on or in accordance with the following inventories:
IECSC - China
EINECS - Europe
TSCA - USA
PICCS - Philippines
ENCS - Japan
ECL - Korea

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DSL - Canada
AICS - Australia

16. Other information

16.1 Additional information:

This Material Safety Data Sheet (MSDS) meets the requirements of the Federal OSHA Hazard Communication Standard (29 CFR 1910.1200). This product has been classified according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief accurate and reliable as of the date compiled. However, no representation, warranty or guarantee expressed or implied, is made as to its accuracy, reliability or completeness. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information. Nothing herein shall be construed as a recommendation for uses which infringe valid patents or as extending a license under valid patents. This MSDS provides selected regulatory information on this product, including its components. This is not intended to include all regulations. It is the responsibility of the user to know and comply with all applicable rules, regulations and laws relating to the product being used.

Vertical lines in the left-hand margin indicate changes compared with the previous version.

16.2 Glossary of Terms:

ACGIH - American Conference of Governmental Industrial Hygienists
DOT - Department of Transportation
hPa - Hectopascals
mPa*s - Milli Pascal-Seconds
OSHA - Occupational Safety and Health Administration
PEL - Permissible Exposure Limit
ppm - Parts per Million
SARA - Superfund Amendments and Reauthorization Act
STEL - Short Term Exposure Limit
TSCA - Toxic Substances Control Act
TWA - Time Weighted Average
WHMIS - Canadian Workplace Hazardous Materials Identification System

Flash point determination methods	**Common name**
ASTM D56	Tagliabue (Tag) closed cup
ASTM D92, DIN 51376, ISO 2592	Cleveland open cup
ASTM D93, DIN 51758, ISO 2719	Pensky-Martens closed cup
ASTM D3278, DIN 55680, ISO 3679	Setaflash or Rapid closed cup
DIN 51755	Abel-Pensky closed cup

16.3 Conversion table:

Pressure: : 1 hPa * 0.75 = 1 mm Hg = 1 torr; 1 bar = 1000 hPa
Viscosity: : 1 mPa*s = 1 centipoise (cP)

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