Doc # 8

SAFETY DATA SHEET

According to OSHA Hazard Communication Standard, 29 CFR 1910.1200

Version 30.0 | Revision Date: 05/18/2015 | Print Date: 08/27/2015

SECTION 1. IDENTIFICATION

Product name : Ethylene Oxide

Product code : U1111

Manufacturer or supplier's details

Company : **Shell Chemical LP**
PO Box 2463
HOUSTON TX 77252-2463
USA

SDS Request : 1-800-240-6737
Customer Service : 1-855-697-4355

Emergency telephone number

Chemtrec Domestic (24 hr) : 1-800-424-9300
Chemtrec International (24 hr) : 1-703-527-3887

Recommended use of the chemical and restrictions on use

Recommended use : Chemical intermediate.

Restrictions on use : This product must not be used in applications other than the above without first seeking the advice of the supplier.

SECTION 2. HAZARDS IDENTIFICATION

GHS Classification

Flammable gases : Category 1

Gases under pressure : Liquefied gas

Acute toxicity (Oral) : Category 4

Skin irritation : Category 2

Eye irritation : Category 2

Acute toxicity (Inhalation) : Category 3

Specific target organ toxicity - single exposure : Category 3 (Respiratory system)

Germ cell mutagenicity : Category 1B

Carcinogenicity : Category 1B

Specific target organ toxicity - repeated exposure : Category 1 (Nervous system)

P312 Call a POISON CENTER or doctor/ physician if you feel unwell.
Storage:
P410 Protect from sunlight.
P403 + P233 Store in a well-ventilated place. Keep container tightly closed.
P405 Store locked up.
Disposal:
P501 Dispose of contents and container to appropriate waste site or reclaimer in accordance with local and national regulations.

Other hazards which do not result in classification
Even with proper grounding and bonding, this material can still accumulate an electrostatic charge.
If sufficient charge is allowed to accumulate, electrostatic discharge and ignition of flammable air-vapour mixtures can occur.
Dangerous polymerisation can occur on contact with highly catalytic surfaces.
Highly reactive.
This material is shipped under pressure.
Exposure to rapidly expanding gases may cause frost burns to eyes and/or skin.
Liquid solutions of ethylene oxide cause serious chemical burns of the skin and eye lesions. The severity of injury will vary depending on the concentration and duration of skin contact. Concentrations of around 50% are the most dangerous, however a 1% solution of EO in water and gaseous EO dissolved in sweat can also cause damage to the skin. The onset of effects may be delayed for several hours.
Causes burns.
The classification of this material is based on OSHA HCS 2012 criteria.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : EO (Ethylene Oxide), Oxirane

Hazardous components

Chemical Name	Synonyms	CAS-No.	Concentration (%)
Ethylene Oxide	ethylene oxide (Vapour and gas)	75-21-8	100

SECTION 4. FIRST-AID MEASURES

General advice : DO NOT attempt to rescue the victim unless proper respiratory protection is worn.
Take appropriate steps to avoid fire, explosion and inhalation hazards.
Contaminated leather articles including shoes cannot be decontaminated and should be destroyed to prevent reuse.

If inhaled : DO NOT DELAY.
Remove to fresh air. Do not attempt to rescue the victim unless proper respiratory protection is worn. If the victim has difficulty breathing or tightness of the chest, is dizzy, vomiting, or unresponsive, give 100% oxygen with rescue breathing or

ods

Further information	:	Clear fire area of all non-emergency personnel. If the fire cannot be extinguished the only course of action is to evacuate immediately. Large fires should only be fought by properly trained fire fighters. Evacuate the area of all non-essential personnel.
Special protective equipment for firefighters	:	Wear full protective clothing and self-contained breathing apparatus. Proper protective equipment including chemical resistant gloves are to be worn; chemical resistant suit is indicated if large contact with spilled product is expected. Self-Contained Breathing Apparatus must be worn when approaching a fire in a confined space. Select fire fighter's clothing approved to relevant Standards (e.g. Europe: EN469).

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Avoid contact with spilled or released material. For guidance on selection of personal protective equipment see Chapter 8 of this Material Safety Data Sheet. Isolate hazard area and deny entry to unnecessary or unprotected personnel. Stay upwind and keep out of low areas. Extinguish any naked flames. Do not smoke. Remove ignition sources. Avoid sparks. Note - Since the danger of fire is so great, bunker gear worn over protective clothing is highly recommended.
Environmental precautions	:	Shut off leaks, if possible without personal risks. Remove all possible sources of ignition in the surrounding area and evacuate all personnel. Attempt to disperse the gas or to direct its flow to a safe location for example by using fog sprays. Take precautionary measures against static discharge. Ensure electrical continuity by bonding and grounding (earthing) all equipment. Monitor area with combustible gas meter. Prevent from spreading or entering into waterways, sewers, basements or confined areas. Use water spray barriers (curtains) to contain the toxic clouds.
Methods and materials for containment and cleaning up	:	Use water spray (fog) to reduce vapours or divert vapour cloud drift. Do not use water in a jet. Alcohol foam applied to surface of liquid pools may slow release of EO vapours into the atmosphere.
Additional advice	:	For personal protection see section 8. See Chapter 13 for information on disposal. Observe all relevant local regulations.

Product Transfer	:	Refer to guidance under Handling section. Lines should be purged with nitrogen before and after product transfer. Refer to supplier for further product transfer instructions if required.

Storage

Conditions for safe storage, including any incompatibilities	:	Refer to section 15 for any additional specific legislation covering the packaging and storage of this product.
Other data	:	Ethylene oxide (EO), an extremely flammable and toxic gas, and other hazardous vapours may evolve and collect in the headspace of storage tanks, transport vessels and other enclosed containers. Tanks must be specifically designed for use with this product. Tanks must be clean, dry and rust-free. Keep container tightly closed. Vapours form tanks should not be released to atmosphere. Breathing losses during storage should be controlled by a suitable vapour treatment system. Nitrogen blanket recommended. Cleaning, inspection and maintenance of storage tanks is a specialist operation, which requires the implementation of strict procedures and precautions. Keep away from flammables, oxidizing agents, and corrosives. Storage Temperature: 30 °C / 86 °F maximum. Potential exists for runaway reaction at elevated temperatures in the presence of strong bases and salts of strong bases. Must be stored in a diked (bunded) well- ventilated area, away from sunlight, ignition sources and other sources of heat. A reliable fixed sprinkler/deluge system should be installed.
Packaging material	:	Suitable material: Stainless steel., Mild steel., Carbon steel Unsuitable material: Compatibility should be checked with the manufacturer.
Container Advice	:	Containers, even those that have been emptied, can contain explosive vapours. Do not cut, drill, grind, weld or perform similar operations on or near containers.
Specific use(s)	:	Not applicable

Ensure that all local regulations regarding handling and storage facilities are followed.
See additional references that provide safe handling practices: American Petroleum Institute 2003 (Protection Against Ignitions Arising out of Static, Lightning and Stray Currents) or National Fire Protection Agency 77 (Recommended Practices on Static Electricity).
CENELEC CLC/TR 50404 (Electrostatics – Code of practice for the avoidance of hazards due to static electricity).

ing life threatening health effects.
Firewater monitors and deluge systems are recommended.
Eye washes and showers for emergency use.

General Information:
Consider technical advances and process upgrades (including automation) for the elimination of releases.Minimise exposure using measures such as closed systems, dedicated facilities and suitable general/local exhaust ventilation.Drain down systems and clear transfer lines prior to breaking containment. Clean/flush equipment, where possible, prior to maintenance.Where there is potential for exposure: restrict access to authorised persons; provide specific activity training to operators to minimise exposures; wear suitable gloves and coveralls to prevent skin contamination; wear respiratory protection when there is potential for inhalation; clear up spills immediately and dispose of wastes safely.Ensure safe systems of work or equivalent arrangements are in place to manage risks.Regularly inspect, test and maintain all control measures.Consider the need for risk based health surveillance.
Do not ingest. If swallowed then seek immediate medical assistance
Items that cannot be decontaminated should be destroyed (see Chapter 13).

Personal protective equipment

Respiratory protection : If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, select respiratory protection equipment suitable for the specific conditions of use and meeting relevant legislation.
Check with respiratory protective equipment suppliers.
Where air-filtering respirators are unsuitable (e.g. airborne concentrations are high, risk of oxygen deficiency, confined space) use appropriate positive pressure breathing apparatus.
Where air-filtering respirators are suitable, select an appropriate combination of mask and filter.
If air-filtering respirators are suitable for conditions of use:

Select a filter suitable for organic gases and vapours [Type AX boiling point ≤65°C (149°F)].

An approved respirator should be used when making or breaking connections to an ethylene oxide rail car or when sampling this material.
The odour threshold for ethylene oxide is above 250 ppm. This is much greater than the OSHA exposure limits. Therefore, do not depend on sense of smell for warning. If you smell ethylene oxide, you are in danger. Absence of odour, though, does not assure low enough exposure levels; its vapour may deaden the sense of smell.

Respirator selection, use and maintenance should be in ac-

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid under pressure.
Colour	:	clear
Odour	:	Ethereal, sweet
Odour Threshold	:	no data available
pH	:	Not applicable
Melting point/freezing point	:	-112 °C / -170 °F
Boiling point/boiling range	:	10.6 °C / 51.1 °F
Flash point	:	-57 °C / -71 °F
Evaporation rate	:	Data not available
Flammability (solid, gas)	:	Extremely flammable.
Upper explosion limit	:	99.99 %(V)
Lower explosion limit	:	2.6 %(V)
Vapour pressure	:	144.6 kPa (20 °C / 68 °F)
Relative vapour density	:	ca. 1.5
Relative density	:	no data available
Density	:	898 kg/m3 (0 °C / 32 °F)
Solubility(ies)		
Water solubility	:	completely miscible
Solubility in other solvents	:	Data not available
Partition coefficient: n-octanol/water	:	log Pow: -0.3
Auto-ignition temperature	:	428 °C / 802 °F
Decomposition temperature	:	Data not available
Viscosity		
Viscosity, dynamic	:	0.41 mPa.s (0 °C / 32 °F)
Viscosity, kinematic	:	Data not available
Explosive properties	:	Not applicable

Exposure may occur via inhalation, ingestion, skin absorption, skin or eye contact, and accidental ingestion.
This material penetrates the intact skin and eye rapidly as a liquid or mist, producing severe burns.

Acute toxicity

Product:

Acute oral toxicity : LD50 : >300 - <=2000 mg/kg
Remarks: Harmful if swallowed.

Acute inhalation toxicity : LC 50 : 2 - 10 mg/l
Remarks: Toxic if inhaled
High concentrations may cause central nervous system depression resulting in headaches, dizziness and nausea; continued inhalation may result in unconsciousness and/or death.

Acute dermal toxicity : Remarks: Not applicable

Skin corrosion/irritation

Product:
Remarks: Causes skin irritation.

Serious eye damage/eye irritation

Product:
Remarks: Causes serious eye irritation.

Respiratory or skin sensitisation

Product:
Remarks: Not expected to be a sensitiser.

Germ cell mutagenicity

Product:

: Remarks: May cause heritable genetic damage

Germ cell mutagenicity- Assessment : Category 1B

Carcinogenicity

Product:
Remarks: Known human carcinogen.

Carcinogenicity - Assessment : Category 1B

IARC Group 1: Carcinogenic to humans

Ethylene Oxide 75-21-8

Ecotoxicity

Product:

Toxicity to fish (Acute toxicity)	:	Remarks: Harmful: LL/EL/IL50 >10 <= 100 mg/l
Toxicity to daphnia and other aquatic invertebrates (Acute toxicity)	:	Remarks: Practically non toxic: LC/EC/IC50 > 100 mg/l
Toxicity to algae (Acute toxicity)	:	Remarks: Practically non toxic: LC/EC/IC50 > 100 mg/l
Toxicity to bacteria (Acute toxicity)	:	Remarks: Harmful: LL/EL/IL50 >10 <= 100 mg/l

Persistence and degradability

Product:

Biodegradability	:	Remarks: Readily biodegradable. Rapidly hydrolyses in water and soil.

Bioaccumulative potential

Product:

Bioaccumulation	:	Remarks: Does not have the potential to bioaccumulate significantly.

Mobility in soil

Product:

Mobility	:	Remarks: When released to air, transfers to soil or water by wet and dry deposition. Dissolves in water.

Other adverse effects

no data available

Product:

Additional ecological information	:	Data not available

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues	:	Do not dispose into the environment, in drains or in water courses Waste product should not be allowed to contaminate soil or water. Waste arising from a spillage or tank cleaning should be dis-

Additional Information : SHUNT WITH CARE (Label nr. 13 - for RID only) This product may be transported under nitrogen blanketing. Nitrogen is an odourless and invisible gas. Exposure to nitrogen may cause asphyxiation or death. Personnel must observe strict safety precautions when involved with a confined space entry.

SECTION 15. REGULATORY INFORMATION

OSHA Hazards : This material is hazardous under the criteria of the Federal OSHA Hazard Communication Standard 29CFR 1910.1200.

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Ethylene oxide	75-21-8	10	10

SARA 304 Extremely Hazardous Substances Reportable Quantity

Components	CAS-No.	Component RQ (lbs)	Calculated product RQ (lbs)
Ethylene oxide	75-21-8	10	10

SARA 311/312 Hazards : Fire Hazard
Reactivity Hazard
Sudden Release of Pressure Hazard
Acute Health Hazard
Chronic Health Hazard

SARA 302 : The following components are subject to reporting levels established by SARA Title III, Section 302:

Ethylene Oxide 75-21-8 100 %

SARA 313 : The following components are subject to reporting levels established by SARA Title III, Section 313:

Ethylene Oxide 75-21-8 100 %

Clean Water Act

This product does not contain any Hazardous Chemicals listed under the U.S. CleanWater Act, Section 311, Table 117.3.

Pennsylvania Right To Know

Ethylene Oxide 75-21-8

New Jersey Right To Know

Ethylene Oxide 75-21-8

California Prop 65 WARNING! This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive

CAS = Chemical Abstracts Service
CEFIC = European Chemical Industry Council
CLP = Classification Packaging and Labelling
COC = Cleveland Open-Cup
DIN = Deutsches Institut fur Normung
DMEL = Derived Minimal Effect Level
DNEL = Derived No Effect Level
DSL = Canada Domestic Substance List
EC = European Commission
EC50 = Effective Concentration fifty
ECETOC = European Center on Ecotoxicology and Toxicology Of Chemicals
ECHA = European Chemicals Agency
EINECS = The European Inventory of Existing Commercial Chemical Substances
EL50 = Effective Loading fifty
ENCS = Japanese Existing and New Chemical Substances Inventory
EWC = European Waste Code
GHS = Globally Harmonised System of Classification and Labelling of Chemicals
IARC = International Agency for Research on Cancer
IATA = International Air Transport Association
IC50 = Inhibitory Concentration fifty
IL50 = Inhibitory Level fifty
IMDG = International Maritime Dangerous Goods
INV = Chinese Chemicals Inventory
IP346 = Institute of Petroleum test method N° 346 for the determination of polycyclic aromatics DMSO-extractables
KECI = Korea Existing Chemicals Inventory
LC50 = Lethal Concentration fifty
LD50 = Lethal Dose fifty per cent.
LL/EL/IL = Lethal Loading/Effective Loading/Inhibitory loading
LL50 = Lethal Loading fifty
MARPOL = International Convention for the Prevention of Pollution From Ships
NOEC/NOEL = No Observed Effect Concentration / No Observed Effect Level
OE_HPV = Occupational Exposure - High Production Volume
PBT = Persistent, Bioaccumulative and Toxic
PICCS = Philippine Inventory of Chemicals and Chemical Substances
PNEC = Predicted No Effect Concentration
REACH = Registration Evaluation And Authorisation Of Chemicals
RID = Regulations Relating to International Carriage of Dangerous Goods by Rail
SKIN_DES = Skin Designation
STEL = Short term exposure limit
TRA = Targeted Risk Assessment
TSCA = US Toxic Substances Control Act
TWA = Time-Weighted Average
vPvB = very Persistent and very Bioaccumulative

Sources of key data used to compile the Safety Data : The quoted data are from, but not limited to, one or more sources of information (e.g. toxicological data from Shell

Shell Chemicals

Shell Chemical LP

PO Box 2463
HOUSTON TX 77252-2463
USA

BCP Ingredients INC
299 Extension Street
Verona MO 65769
USA

08/27/2015

Reference: 403.310

Safety information

Dear Madam/Sir

Please find enclosed the latest Material Safety Data Sheet (MSDS) for the product(s), indicated below.

Please use the information provided in the document(s) to update the guidelines you have implemented for the safe handling of this product/these products. Please make sure to update your safety information for formulations containing these product(s). Note that by mid-2015, all SDS will have been updated to reflect the new OSHA Hazard Communication Standard (Hazcom 2012 standard. Please fully review the information so that you are familiar with these updates, and make any needed changes to your safe handling guidelines and safety information.

We also ask you to provide this information to all your customers, contractors and other persons who might handle the product(s) as a result of your activities.

If you received this by mail but would like to receive future MSDS updates via e-mail or fax, please send an email to SCC-SDS-Addresses@shell.com. Include the following three pieces of information only:

1) preferred method (example: email or fax)
2) the email address or fax number
3) the reference number found at the top of this letter

Please contact us if we can be of any further assistance.

Yours sincerely
Shell Chemical LP

Enclosure

Ethylene Oxide	U1111	30.0	05/18/2015

Doc #9

Material Safety Data Sheet

TRIMETHYLAMINE anhydrous

Revision Date 13-Jan-2011

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND THE COMPANY/UNDERTAKING

Product Name	TRIMETHYLAMINE anhydrous
Use of the Substance/Preparation	Chemical intermediate
Company/Undertaking Identification	Taminco, Inc. Two Windsor Plaza, Suite 411 7540 Windsor Drive Allentown, PA 18195 (800) 223-3258
Emergency telephone number	In case of emergency call CHEMTREC 1-800-424-9300 703-527-3887 (International Calls), 02-8014-4880 (Australia local calls)

2. HAZARDS IDENTIFICATION

Appearance

Clear, Colorless gas; Ammoniacal odor

Emergency Overview

- DANGER!
- Extremely flammable gas
- Vapors may cause flash fire or explosion
- Corrosive
- Causes skin and eye burns
- Severe respiratory irritant
- Inhalation may cause severe mucous membrane and respiratory irritation, shortness of breath and pulmonary edema
- Harmful if swallowed
- Symptoms may be delayed
- The substance is identified as a hazardous chemical according to the criteria of the OSHA Hazard Communication Standard (29 CFR 1910.1200)

Principal Routes of Exposure

- Inhalation
- Skin contact
- Eye contact

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS-No	Weight %
Trimethylamine	75-50-3	100

4. FIRST AID MEASURES

Ingestion

- Never give anything by mouth to an unconscious person
- Do not induce vomiting without medical advice
- If victim is conscious
- Rinse mouth
- drink 1 or 2 glasses of water
- Immediate medical attention is required

Skin Contact

- Immediately flush skin with running water for 30 minutes or until no traces remain. Wash with soap and water. Remove contaminated clothing immediately.
- Seek immediate medical attention/advice

Eye Contact

- Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 30 minutes.
- Immediate medical attention is required

Inhalation

- Move to fresh air
- Do not give mouth-to-mouth
- If breathing is difficult, give oxygen
- If breathing is irregular or stopped, administer artificial respiration
- Consult a physician after significant exposure
- Symptoms may be delayed

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

- Alcohol-resistant foam
- carbon dioxide (CO2)
- dry chemical
- water spray

Specific methods

- In case of fire, stop leak if safe to do so
- DO NOT extinguish a gas fire unless effective immediate shut-off of gas flow is possible
- Evacuate area and fight fire from a safe distance
- Keep people away from and upwind of spill/leak
- Suppress (knock down) gases/vapors/mists with a water spray jet
- In the event of fire, cool tanks with water spray
- Do not allow run-off from fire fighting to enter drains or water courses

Special protective equipment for fire-fighters

- Firefighters and others who may be exposed to products of combustion should wear full fire fighting turn out gear (full Bunker Gear) and self-contained breathing apparatus (pressure demand NIOSH approved or equivalent)

Specific hazards

- Extremely flammable
- Eliminate all ignition sources if safe to do so
- Pay attention to the spreading of gases especially at ground level (heavier than air) and to the direction of the wind
- Pay attention to flashback
- Fire or intense heat may cause violent rupture of packages
- In case of fire hazardous decomposition products may be produced such as
- Nitrogen oxides (NOx)
- Ammonia
- Carbon monoxide

6. ACCIDENTAL RELEASE MEASURES

Personal Precautions

- Avoid contact with skin, eyes and clothing
- In case of inadequate ventilation wear respiratory protection
- Remove all sources of ignition
- Evacuate personnel to safe areas
- Keep people away from and upwind of spill/leak
- Take precautionary measures against static discharges
- Pay attention to flashback
- Suppress (knock down) gases/vapours/mists with a water spray jet
- Do not use sparking tools

Environmental Precautions

- Should not be released into the environment
- Prevent product from entering drains

Methods for Clean-up

- Ventilate the area
- Allow vapors to dissipate
- Use spark-proof tools and explosion-proof equipment
- Dispose of as special waste in compliance with local and national regulations

7. HANDLING AND STORAGE

Storage

Technical measures/Precautions

- In accordance with local and national regulations
- Keep containers tightly closed in a dry, cool and well-ventilated place
- Keep away from open flames, hot surfaces and sources of ignition
- Protect containers from physical damage
- To avoid ignition of vapors by static electricity discharge, all metal parts of the equipment must be grounded

Incompatible products

- Materials to avoid
- Oxidizing agents
- Mineral acid
- organic acids
- Peroxides
- alcohols

Handling

Technical measures/Precautions

- In accordance with local and national regulations
- Use only in area provided with appropriate exhaust ventilation
- Ensure that eyewash stations and safety showers are close to the workstation location

Safe handling advice

- Wear personal protective equipment
- Ensure adequate ventilation
- Use spark-proof tools and explosion-proof equipment
- In case of insufficient ventilation, wear suitable respiratory equipment
- Do not breathe vapors or spray mist
- Take necessary action to avoid static electricity discharge (which might cause ignition of organic vapors)
- Ground and bond containers when transferring material
- Do not use sodium nitrite or other nitro sating agents in product
- Empty containers retain product residue and may be hazardous
- Wash thoroughly after handling

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL
Trimethylamine	TWA: 5 ppm; STEL: 15 ppm	None Established

Respiratory Protection

- In accordance with local and national regulations
- Use only in area provided with appropriate exhaust ventilation
- Avoid breathing dust/fume/gas/mist/vapors/spray
- In case of insufficient ventilation, wear suitable respiratory equipment
- In case of higher concentration
- wear a positive-pressure supplied-air respirator with full facepiece
- The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace

Engineering measures

- Local exhaust
- Use explosion-proof equipment

Personal Protective Equipment

Eye Protection

- Face-shield
- Chemical resistant goggles must be worn
- Ensure that eyewash stations and safety showers are close to the workstation location

Hand protection

- Impervious gloves
- Solvent-resistant gloves
- Request information on glove permeation properties from the glove supplier

Skin Protection

- Solvent-resistant apron and boots
- Wash contaminated clothing before re-use
- Choose body protection according to the amount and concentration of the dangerous substance at the work place

Environmental exposure controls

- Prevent product from entering drains
- Do not contaminate surface water
- Avoid subsoil penetration

9. PHYSICAL AND CHEMICAL PROPERTIES

9. PHYSICAL AND CHEMICAL PROPERTIES

General Information

Physical State	Compressed liquefied gas
Color	Colorless
Odor	Ammoniacal

Important Health Safety and Environmental Information

Boiling Point/Range	2.9 - 3.5°C 37.2 - 38.3°F
Flash Point	-6.7°C 20°F
Viscosity	0.177 mPas @ 25°C
Vapor Pressure	1909 hPa @ 20 °C
Vapor Density	2.03 (Air =1.0)
Partition Coefficient (n-octanol/water)	log Pow , : 0.245
pH	11.2 (40 % solution)
Water solubility	Completely soluble
Oxidizing Properties	Not applicable
Explosion Limits	
Explosive Properties	2.0 - 11.6 vol. %
Melting Point/Range	-117.3 - -117°C -179.1 - -178.6°F
Density	0.63 - 0.67 g/cm3 @ 20 °C
Flammability	extremely flammable
Autoignition Temperature	165°C 329°F
Flammability Limits in Air	
lower flammability limit	3.5 vol. %
upper flammability limit	14 vol. %

10. STABILITY AND REACTIVITY

Stability	• Stable under recommended storage conditions
Conditions to Avoid	• Keep away from open flames, hot surfaces and sources of ignition • Incompatible with strong acids and oxidizing agents • Peroxides • Do not use sodium nitrite or other nitro sating agents in product • Product slowly corrodes copper, aluminum, zinc and galvanized surfaces
Hazardous Decomposition Products	• None under normal use • Thermal decomposition can lead to release of irritating gases and vapours • Nitrogen oxides (NOx) • Carbon monoxide • Carbon dioxide (CO_2) • Ammonia
Hazardous Polymerization	Hazardous polymerization does not occur.

11. TOXICOLOGICAL INFORMATION

11. TOXICOLOGICAL INFORMATION

Eye Contact Contact may cause eye burns. May cause blindness. Vapors may cause severe irritation and conjunctivitis with possible cornea edema. May cause a perception of a "blue haze" or "fog" around lights.

Skin Contact Causes skin burns. May cause sensitization by skin contact.

Inhalation Inhalation may cause severe mucous membrane and respiratory irritation, shortness of breath and pulmonary edema. May cause delayed lung injury. Risk of serious damage to the lungs (by inhalation).

Ingestion If ingested, severe burns of the mouth and throat, as well as a danger of perforation of the esophagus and the stomach. Harmful if swallowed.

Chronic Effects Chronic exposure may cause dermatitis. May cause damage to organs through prolonged or repeated exposure. May cause disorder and damage to the spleen. Liver and kidney injuries may occur. Repeated exposure may produce kidney damage and adverse effects on the developing fetus based on studies in animals.

Carcinogenicity The table below indicates whether each agency has listed any ingredient as a carcinogen.

Chemical Name	IARC	ACGIH	OSHA	NTP
Trimethylamine	Not Listed	Not Listed	Not Listed	Not Listed

Aggravated Medical Conditions Eye disease. Skin disorders. Respiratory disorders.

Product Information

LD50/oral/rat =	766 mg/kg
LD50/dermal/rat =	5000 mg/kg
LC50/inhalation/4h/rat =	> 5900 ppm
Eye irritation	Risk of serious damage to eyes
Skin irritation	Severe skin irritation
Sensitization	Not applicable : Corrosive Material
Mutagenic Effects	Did not show mutagenic effects in animal experiments
Reproductive toxicity	Did not show teratogenic effects in animal experiments
Carcinogenic effects	Not expected

12. ECOLOGICAL INFORMATION

Ecotoxicity

LC50/48h/golden orfe =	610 mg/l
EC50/48h/daphnia =	139 mg/l (45 % solution)
EC50/72h/algae =	150 mg/l (45 % solution)
Toxicity to bacteria	208 mg/l (45 % solution)

Mobility

Koc =14.68
Volatile

Persistence and Degradability

According to the results of tests of biodegradability this product is considered as being readily biodegradable

Bioaccumulative Potential

Bioconcentration factor (BCF) = < 1

13. DISPOSAL CONSIDERATIONS

Waste disposal methods	Dispose of in accordance with local regulations
Contaminated Packaging	In accordance with local and national regulations. Empty containers should be taken for local recycling, recovery or waste disposal. Empty containers retain product residue and may be hazardous.

14. TRANSPORT INFORMATION

DOT

Shipping Description	UN1083, Trimethylamine, anhydrous, 2.1
Hazard Class	2.1
UN-No	UN1083
Reportable Quantity (RQ)	100 lbs (45 kg)
Marine Pollutant	No
Labelling	Flammable gas

IMDG/IMO

Shipping Description	UN1083, Trimethylamine, anhydrous, 2.1
Hazard Class	2.1
UN-No	UN1083
Marine Pollutant	No
Labelling	Flammable gas

IATA

UN-No	UN1083
Shipping Description	UN1083, Trimethylamine, anhydrous, 2.1
Hazard Class	2.1

Labelling Flammable gas: ICAO / IATA cargo aircraft only labels

15. REGULATORY INFORMATION

International Inventories

All of the components in the product are on the following inventory lists: U.S.A. (TSCA), Europe (EINECS/ELINCS/NLP), Canada (DSL/NDSL), Japan (ENCS), Japan Bioaccum (MITI), Australia (AICS), Philippines (PICCS), China (IECSC), Korea (KECL), New Zealand (NZIoC).

NOTE: X = Listed

Chemical Name	TSCA	EINECS	DSL	ENCS	MITI	AICS	PICCS	IECSC	KECL	NZIoC
Trimethylamine	X	200-875-0	X	2-140	(2)-140	X	X	X	KE-11508	X

OSHA HAZARD CLASSIFICATION: This material is classified as hazardous under Federal OSHA regulation: Corrosive, Flammable gas, Toxic, Target Organ Effects

SARA 311/312 Hazardous Categorization
Acute Health Hazard, Chronic Health Hazard, Fire Hazard, Sudden Release of Pressure

SARA TITLE III SECTION 313 INFORMATION:
Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372.

NOTE: X = Listed

CERCLA Hazardous Substances
This product has the following CERCLA/SARA TPQ and RQ:

Chemical Name	TPQ	RQ
Trimethylamine 75-50-3		100 LBS

State Right-to-Know

NOTE: X = Listed

Chemical Name	PA	NJ	MA
Trimethylamine 75-50-3	X	X	X

California Proposition 65 This product does not contain any Proposition 65 chemicals.

WHMIS Hazard Class
B1 Flammable gas
D1B Toxic materials
D2B Toxic materials
E Corrosive material

Canadian Environmental Protection Act This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR

16. OTHER INFORMATION

HMIS	Health 3	Flammability 4	Physical Hazard 0
NFPA	Health 3	Fire 4	Instability 0

Legend: 0 - Minimal; 1 - Slight; 2 - Moderate; 3 - Serious; 4 - Severe

Literary Reference -Chemiekaarten : 25th ed. - 2010 -Taminco Proprietary Studies

Disclaimer: The information provided on this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guide for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered as a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other material or in any process, unless specified in the text.

End of Safety Data Sheet