SAFETY DATA SHEET

Section 1: Product and Company Identification

Product Name: Triethanolamine 85 N.F. Grade

Product Code: 87723

Product Use: Chemical raw material

Supplier: INEOS Oxide
Block 5501
21255 A Louisiana Hwy. 1 South
Plaquemine, LA 70764
www.ineosoxide.com

Phone Number: (866) 865-4767

24-hour Emergency: CHEMTREC: (800) 424-9300

* Indicates a Trademark of INEOS Oxide.

Section 2: Hazard Identification

2.1 Classification of the substance or mixture according to GHS classifications (UNECE 3rd Revised Edition):

Eye Damage Cat. 1
Skin Irritant Cat. 2

2.2 Label elements:

Danger.
Causes serious eye damage.
Causes skin irritation.

P280: Wear eye/face protection and protective gloves.
P264: Wash exposed skin thoroughly after handling.

P305+P351+P338: IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. P310: Immediately call a POISON CENTER or doctor/physician.

P302+P352: IF ON SKIN: Wash with plenty of soap and water. P332+P313: If skin irritation occurs: Get medical advice/attention. P362: Take off contaminated clothing and wash before reuse.

2.3 Other hazards:

Product contains Diethanolamine (DEA), a substance which may cause damage to blood, liver and kidney through prolonged or repeated exposure if swallowed. Misuse of the product may be harmful.

2.4 Other hazard classifications:

USA: The product is a hazardous chemical as defined by 29 CFR1910.1200, OSHA Hazard Communication Standard.

Canada: This is a controlled product under WHMIS.

Section 3: Composition / Information on Ingredients

Hazardous Ingredients:

Chemical Name	CAS No.	EINECS	Wt.%	GHS Classifications according to UNECE 3rd Revised Edition
2,2',2''-nitrilotriethanol (TEA)	102-71-6	203-049-8	85 - 88	Not classified
2,2'-iminodiethanol (DEA)	111-42-2	203-868-0	12 - 15	Acute Tox. 4; H302 Skin Irrit. 2; H315 Eye Dam. 1; H318

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Section 4: First-Aid Measures

4.1 Description of first aid measures

Inhalation: Remove source of contamination or move victim to fresh air and keep at rest in a position comfortable for breathing. If breathing is difficult, obtain medical attention.

Eye Contact: Immediately rinse eyes cautiously with water for several minutes. Neutral saline solution may be used as soon as it is available. Remove contact lenses, if present and easy to do. Immediately call a POISON CENTER or doctor/physician.

Skin Contact: As quickly as possible, remove contaminated clothing, shoes and leather goods (e.g. watchbands, belts). Immediately wash with plenty of soap and water. Discard contaminated clothing, shoes and leather goods. If skin irritation occurs: Get medical advice/attention.

Ingestion: Never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Do not induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water. Quickly transport victim to an emergency care facility. Immediately obtain medical advice or contact a Poison Control Center.

4.2 Most important symptoms and effects, both acute and delayed

Inhalation: Symptoms of exposure may include coughing, wheezing, sore throat, difficult breathing.

Eye Contact: Causes eye irritation. Irritation may be severe and may cause eye damage. Symptoms include redness, pain and tearing.

Skin Contact: Causes skin irritation. Symptoms include local redness and dryness.

Ingestion: Swallowing can cause irritation of the digestive tract, abdominal and chest pain, nausea, vomiting and diarrhea.

4.3 Indication of any immediate medical attention and special treatment needed

If swallowed, immediately call a POISON CENTER or doctor/physician.

Section 5: Fire-Fighting Measures

5.1 Suitable extinguishing media

Water fog or fine spray, alcohol-resistant foam or dry chemical. Use water spray to cool fire-exposed containers.
Violent steam generation or eruption may occur upon application of direct water stream to hot product. High pressure water streams may scatter hot liquid.

5.2 Specific hazards arising from the substance

Product can burn if heated (Flash point = > 200°C (393°F)). No flashpoint observed up to the boiling point.
Auto-ignition temperature of TEA=350°C (662°F)
Product will burn if involved in a fire.
Hazardous decomposition may occur above 200°C. During a fire, smoke may contain vaporized TEA in addition to unidentified toxic and/or irritating compounds. Combustion products may include toxic nitrogen oxide, hydrogen cyanide, formaldehyde carbon monoxide, carbon dioxide and ammonia gases. Heat from a fire can cause a rapid build-up of pressure inside containers, which may cause explosive rupture.

5.3 Special protective actions for fire-fighters

Evacuate the area and fight fire from a safe distance or a protected location. Thermal decomposition products such as nitrogen oxides and hydrogen cyanide are hazardous to health. Do not enter without specialized protective equipment suitable for the situation. Approach the fire from upwind to avoid hazardous vapors. Burning liquids may be extinguished by dilution with water. Water spray may be used to flush spills away from ignition sources.
Avoid all contact with this material during fire-fighting operations. Wear chemical resistant clothing (chemical splash suit) and positive-pressure self-contained breathing apparatus.
Contain water run-off if possible.

Section 6: Accidental Release Measures

6.1 Personal precautions, protective equipment and emergency procedures

Isolate the area; keep all unprotected people away from the spill area. Ventilate the area. Wear protective gloves/protective clothing/eye protection/face protection (See Section 8). Prevent inhalation exposures, skin and possible eye contact. Ensure clean-up is conducted by trained personnel only. Do not touch or walk through the spilled material. Extinguish or remove all ignition sources. Spilled material may pose a slipping hazard.

6.2 Environmental precautions

Prevent material from contaminating soil and from entering sewers or waterways.

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Section 6: Accidental Release Measures, continued

6.3 Methods and materials for containment and cleaning up

Stop the spill if it is safe to do so. Contain the spill with earth, sand or other suitable non-combustible absorbent. Keep materials which can burn away from spilled product. Do not absorb with sawdust, woodchips or other cellulose materials. Clean up spills immediately. Scoop up spilled product and any contaminated absorbents into appropriate, labeled containers. Contaminated absorbent may pose the same hazards as the spilled product. Flush the area with water and collect wash-water for proper disposal.

6.4 Additional information

See Section 8 for information on selection of personal protective equipment.
See Section 13 for information on disposal of spilled product and contaminated absorbents.

Section 7: Handling and Storage

7.1 Precautions for safe handling

Wear personal protective gloves, clothing and other equipment required for the workplace.
Avoid breathing fume/gas/mist/vapors/spray.
Avoid generating airborne fumes/vapors/mist from this product.
Handle this product with adequate ventilation.
Wash exposed skin thoroughly, immediately after exposure to product and at the end of the work-shift.
Do not eat or drink when using this product.
Keep away from flames and hot surfaces. – No smoking.
Prevent handling with incompatible materials such as strong acids and oxidizing agents.
Prevent release of this material to the environment; prevent spills and keep away from drains.
Never perform any welding, cutting, soldering, drilling or other hot work on an empty vessel, container or piping until all liquid and vapors have been cleared.
Inspect containers for leaks before handling. Prevent damage to containers. Keep containers closed when not in use.
Assume that empty containers contain residues which are hazardous.

7.2 Conditions for safe storage, including any incompatibilities

Keep containers tightly closed when not in use. Store in a cool, dry and well-ventilated place. Store away from sunlight, heat and ignition sources. Keep storage area away from work areas. Store away from strong oxidants, strong acids and other incompatible materials (see Section 10). Do not store in containers made of aluminum, copper, brass or other copper alloys. Store separated from food and feedstuffs.

Section 8: Exposure Controls/Personal Protection

8.1 Control parameters

Occupational Exposure Limits: Consult local authorities for acceptable exposure limits.

Ingredient	ACGIH TLV 8-hr. TWA (mg/m^3)	U.S. OSHA PEL 8-hr. TWA (mg/m^3)	Germany MAK TWA (mg/m^3)
Triethanolamine	5	Not available	5
Diethanolamine (Inhalable fraction and vapor)	1, Skin	15 (3 ppm)	Not established

8.2 Engineering controls

Exposure control measures: Facilities utilizing or storing this material should be equipped with general or local exhaust ventilation, eyewash facilities and a safety shower. Ventilation system should be made of corrosion-resistant material.
Maintain air concentrations below occupational exposure standards using engineering controls.
Personal Protective Equipment (PPE) should be used as back-up protection to engineering controls.

8.3 Individual protection measures (PPE)

Personal protection: Workers must comply with the Personal Protective Equipment (PPE) requirements of the workplace in which this product is handled.

Eye/Face protection: Wear chemical safety goggles. If splashing is possible wear a face shield.

Skin protection: Wear impervious, chemical protective gloves. Wear clean, body-covering, protective coveralls to prevent skin exposure. If spill or splashing is possible, wear impervious apron and chemical protective boots.
Recommended materials for protective clothing include butyl rubber, neoprene rubber. Resistance of specific materials can vary from product to product; evaluate resistance under conditions of use and maintain clothing carefully.

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Section 8: Exposure Controls/Personal Protection, continued

Respiratory protection: If concentrations in air exceed the occupational exposure limits, then wear respiratory protection. Respiratory protection should not be necessary unless the product is heated to release vapors or a mist is created. If airborne vapor or mist exposure is likely wear a chemical cartridge respirator with cartridges to protect against ethanolamine, or a powered air-purifying respirator with cartridges to protect against ethanolamine, or a full-face self-contained breathing apparatus.

If respiratory protection is required, institute a complete respiratory protection program including selection, fit testing, training, maintenance and inspection. Consult with respirator manufacturer to determine respirator selection, use and limitations. For spills or uncontrolled releases, wear a supplied-air respirator.

A respiratory protection program that meets the regulatory standard, such as Canadian Standards Association (CSA) Standard Z94.4-2002, or OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements, must be followed whenever workplace conditions warrant a respirator's use.

Other protection: Workplaces should have a safety shower, hand-wash station and eye-wash fountain readily available in the immediate work area.
Remove contaminated clothing promptly. Keep contaminated clothing in closed containers; discard or launder before rewearing. Wash hands thoroughly and promptly after handling this material. Maintain good housekeeping. Inform laundry personnel of contaminant's hazards. Do not take working clothes home. Do not eat, drink or smoke in work areas.

Section 9: Physical and Chemical Properties

9.1 Information on basic physical and chemical properties:	
Appearance:	Liquid. Colorless, viscous.
Odor:	Slight ammonia, fish-like disagreeable odor.
Odor threshold:	Not available
pH:	10.5 (10% aqueous solution)
Melting point/freezing point:	17°C (63°F)
Initial boiling point and boiling range:	325°C (617°F)
Flash point:	No flashpoint up to the boiling point.
Flammability:	Combustible when strongly heated.
Auto-ignition temperature:	324°C (615°F) [DIN 51794]
Upper/lower flammability or explosive limits:	Lower: 1.5% Upper: Not available
Explosive properties:	Not available
Oxidizing properties:	Not available
Sensitivity to mechanical impact:	Not applicable
Sensitivity to static discharge:	Not applicable
Vapor pressure:	<0.1 mmHg @ 20 °C
Vapor density:	5.14 (for TEA)
Evaporation Rate:	< 0.01 (n-Butyl Acetate = 1) (for TEA)
Relative density:	1.1 @ 20°C
Solubility (ies):	Completely soluble in water.
Partition coefficient (n-octanol/water):	-1.75 K_{ow}
Decomposition temperature:	200°C (392°F) (for TEA)
Viscosity:	Not available

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Section 10: Stability and Reactivity

10.1 Reactivity

Not classified for reactivity hazards.

10.2 Chemical stability

Stable under normal temperature and pressure.

10.3 Possibility of hazardous reactions

Heating above 60°C in aluminum can result in corrosion and generation of flammable hydrogen gas.
Reacts with cellulose nitrate causing fire and explosion hazard.
Reacts violently with strong acids and strong oxidants (e.g. nitric acid, hydrogen peroxide).
Contact with nitrosating agents, under acidic conditions such as nitrous acid, nitrite or nitrogen oxides, can form nitrosamines some of which are potent carcinogens.
Alkanolamine substances are decomposed by light and slowly oxidized by air, turning yellow and then brown. This reaction is accelerated by heat and the presence of metals.
Alkanolamine substances are oxidized by air slowly with evolution of heat. This reaction may lead to spontaneous combustion if the substance is on an adsorbent or on a high surface area material (e.g. absorbent material or thermal insulation).

10.4 Conditions to Avoid

Avoid high temperatures and contact with sources of ignition. Avoid exposing product to air, light and moisture. Avoid direct sunlight.

10.5 Incompatible materials

Avoid contact with strong acids, strong oxidizing agents, halogenated hydrocarbons, nitrating agents, alkali metals, metal hydrides and aluminum.
Product may be corrosive to aluminum alloys at elevated temperatures, many 400 series stainless steel alloys, copper, zinc, and aluminum bronze.
In combination with water, the product may be corrosive to copper and copper alloys (e.g. brass), some aluminum alloys, zinc, zinc alloys, and galvanized surfaces.
Triethanolamine attacks some polymers including polyvinylchloride, polyurethane, polyamide imide, high-density polyethylene and polyacetal at elevated temperatures.

10.6 Hazardous decomposition products

Decomposition products may include nitrogen oxides, ammonia, irritating aldehydes and ketones. Hazardous decomposition products depend upon temperature, air supply and the presence of other materials.
Oxidation in air may form transient, organic peroxides or thermally unstable N-oxides such as hydroxylamines and carbamates form as well as nitrosamines, which are suspected cancer causing chemicals. Oxidation of triethanolamine and decomposition of products is accelerated by light, heat, and/or presence of metals or metal oxides.

Section 11: Toxicological Information

11.1 Information on toxicological effects

Acute toxicity data for the ingredients:

Ingredient	LD_{50} Oral (mg/kg)	LD_{50} Dermal (mg/kg)	LC_{50} Inhalation (mg/L, 4 hrs.)
Triethanolamine (TEA)	4 190 (rat)	>2 000 (rabbit)	Not available
Diethanolamine (DEA)	680 (rabbit)	8 180 (rabbit)	Not available

Skin corrosion / irritation:

Data are not available for the mixture. Results from tests performed according to OECD Guideline 404 (Acute Dermal Irritation / Corrosion) demonstrated that TEA was not irritating to skin. DEA is classified as a Skin irritant in Category 2.

Serious eye damage / irritation:

Data are not available for the mixture. Results from tests performed according to OECD Guideline 405 (Acute Eye Irritation / Corrosion) demonstrated that TEA was not irritating to eyes. DEA is classified for Eye Damage in Category 1.

Sensitization:

Contact skin allergy has been reported in people occupationally exposed to TEA in the textile industry and in metalworking fluids and to people non-occupationally exposed to TEA in cosmetics and medicines. Negative results have been obtained in animal skin sensitization tests performed according to OECD Guideline 406 (Skin Sensitization).

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Section 11: Toxicological Information, continued

Neurological effects:
None reported

Germ cell mutagenicity:
Evidence from animal studies, cultured mammalian cells, and bacterial studies does not indicate that TEA is a mutagen.

Carcinogenicity:
IARC (International Agency for Research on Cancer) lists TEA in Group 3 – The agent is not classifiable as to carcinogenicity in humans.
Information for Diethanolamine (DEA):
NTP Report: Under the conditions of 2 year dermal studies, there was no evidence of carcinogenic activity of DEA in F344/N rats admin 16, 32 or 64 mg/kg DEA or in female F344/N rats admin 8, 16 or 32 mg/kg. There was clear evidence of carcinogenic activity of DEA in male and female B6C3F1 mice based on increased incidences of liver neoplasms in males and females and increased incidences of renal tubule neoplasms in males. IARC monograph Volume101 reports a mechanism for liver tumor induction in mice exposed to DEA that involves the inhibition of choline uptake in the liver. As humans are less susceptible to choline deficiency than rats or mice, the results may not be predictive of induction of cancer in humans.
IARC lists DEA in Group 2B – Possibly carcinogenic to humans.
ACGIH designates DEA as A3 – confirmed animal carcinogen with unknown relevance to humans.
Diethanolamine is not listed on the NTP Report On Carcinogens.

Reproductive toxicity:
Limited data from animal studies does not indicate that TEA is a reproductive toxin.

Developmental effects:
Limited data from animal studies does not indicate that TEA is a developmental toxin.

Target Organ effects:
In studies conducted in experimental animals, long-term ingestion and skin contact exposures to DEA caused anemia and effects on the liver and kidney. The evidence from these studies was not used to for classification since the DEA was mixed with ethanol in the skin contact studies and neutralized with hydrochloric acid in oral studies. The relevance of this evidence for humans was not established.

Aspiration hazard:
Data are not available.

11.2 Potential health effects for product, as used

Relevant routes of exposure: Inhalation, Ingestion, Skin contact, eye contact.

Immediate and delayed health effects:

Inhalation: TEA does not readily form vapors at normal ambient temperatures. Breathing mists may cause irritation to the eyes, nose, throat, and respiratory tract. Symptoms of exposure may include coughing, wheezing, shortness of breath and difficult breathing.

Ingestion: If swallowed, this material can cause irritation and possibly burns of the digestive tract with abdominal and chest pain, nausea, vomiting and diarrhea. May cause liver and kidney damage. The acute toxicity estimate for the mixture was calculated to be greater than 4000 mg/kg.

Skin: Prolonged contact with the liquid may cause irritation with local discomfort or pain, redness and swelling. May be absorbed through the skin. Chronic dermatitis and eczema may result from repeated exposures.

Eye: Contact with liquid, mist or vapor causes eye irritation.

Interactions With Other Chemicals:
The use of ethanolamines and nitrites together as additives in metalworking fluids can lead to the formation of N-nitrosodiethanolamine, a possible carcinogen.

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Section 12: Ecological Information

12.1 Toxicity Data for TEA:

Algae:

72 Hr EC_{50} *Desmodesmus subspicatus*: 216 mg/L
96 Hr EC_{50} *Desmodesmus subspicatus*: 169 mg/L

Freshwater fish:

96 Hr LC_{50} *Pimephales promelas*: 10600-13000 mg/L [flow-through]
96 Hr LC_{50} *Pimephales promelas*: >1000 mg/L [static]
96 Hr LC_{50} *Lepomis macrochirus*: 450-1000 mg/L [static]

24 Hr EC_{50} *Daphnia magna*: 1386 mg/L

12.2 Persistence and degradability Data for TEA:

Material is readily biodegradable.
Passes OECD Test(s) for ready biodegradability.
Material is ultimately biodegradable. Reaches more than 70% mineralization in OECD tests for inherent biodegradability.
Theoretical oxygen demand (ThOD) is calculated to be 2.04 p/p.
Inhibitory concentration (IC50) in OECD "Activated Sludge, Respiratory Inhibition Test" (Guideline #209) is > 1000 mg/L.

12.3 Bioaccumulative potential Data for TEA:

Bioconcentration Factor (BCF) = <3.9 method: OECD 305C
K_{ow} = -2.53

12.4 Mobility in soil Data for TEA:

Henry's Law Constant (H) is estimated to be 3.38E-19 atm m^3/mole at 25°C.
Potential for mobility in soil is very high (Koc between 0 and 50).
Log soil organic carbon partition coefficient (log Koc) is estimated to be 0.48.

Other information:

For detailed Ecological data, write to the address in Section 1 or call INEOS Oxide's Customer Information Center at (866) 865-4767.

Section 13: Disposal Considerations

13.1 Disposal methods

Do NOT discard into any sewers, on the ground or into any body of water. Store material for disposal as indicated in Section 7 Handling and Storage.
Dispose of in accordance with local/regional/national/ international regulations.
For unused, uncontaminated product, the preferred options include sending to a licensed, permitted recycler, reclaimer incinerator or other thermal destruction device.

USA: Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.

Other information:

Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. INEOS Oxide HAS NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN SDS SECTION 2.

As a service to its customers, INEOS Oxide can provide names of information resources to help identify waste management companies and other facilities which recycle, reprocess or manage chemicals or plastics, and that manage used drums. Telephone INEOS Oxide's Customer Information Center at (866) 865-4767.

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Section 14: Transport Information:

14.1 UN Number
Not regulated

14.2 UN proper shipping name
Not applicable

14.3 Transport hazard class(es)
Not applicable

14.4 Packing group
Not applicable

14.5 Environmental hazards
Not available

14.6 Special precautions for user
Not available

14.7 U.S. Hazardous Materials Regulation (DOT 49CFR):
Reportable Quantity for Bulk Shipments: 100 lbs (45.4 kg) for DEA
ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (DIETHANOLAMINE), 9, UN3082, PG III.

For regulatory information regarding transportation, if required, consult product shipping papers, or your INEOS Oxide representative.

Section 15: Regulatory Information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

USA

TSCA: T All component substances are listed in the TSCA inventory

Clean Air Act: Triethanolamine and Diethanolamine.

OSHA HazCom 2012 Hazards: Eye Damage Cat. 1
Skin Irritant Cat. 2

SARA Title III :

Sec. 313:	Diethanolamine 1% *de minims*
CERCLA RQ:	Diethanolamine RQ 100 lb (45.4 kg)

Canada

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

WHMIS Classification:

NSNR Status: All component substances are listed on Canada's Domestic Substances List (DSL).

NPRI Substances: Diethanolamine is subject to the requirements of the National Pollutant Release Inventory. Part 1, Group 1 substance.

Europe

European Inventories: Substances are listed in EINECS.

Other international inventories

Australia: All substances are present on the Inventory of Chemical Substances (AICS).

China: All substances are present on the Chinese inventory (IECSC).

Japan: All substances are present on ENCS. Triethanolamine (2)-308; Diethanolamine (2)-354; (2)-302.

Korea: All substances are present on the Inventory. Triethanolamine KE-25940; Diethanolamine KE-20959.

Mexico: All substances are present on the inventory (INSQ).

New Zealand: All substances are present on the inventory (NZIoC) HSNO Approval: HSR002785; HSR 002962.

Philippines: All substances are present on the inventory (PICCS).

Turkey: All substances are present on the inventory.

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Section 16: Other Information

Revision date May 8, 2013

Revision summary:

October 1, 2006: Section 1; updated Manufacturer address. Section 4; updated first aid information, Section 6; updated spill information, Section 11; updated acute toxicity data. Changed WHMIS classification, Section 14; revision to DOT reporting due to change in special provisions.
March 3, 2010: Update SDS template. Revised Section 8: Exposure Limits.
May 8, 2013: Revised Section 2, GHS Hazard Classifications. Revised Section 3, DEA content. Revised Section 11, Carcinogenicity information for DEA. Revised Section 14, DOT regulation.

References and sources for data

CCOHS – ChemInfo
HSDB – Hazardous Substances Data Bank
IARC Monograph Volume101
RTECS® - Registry of Toxic Effects of Chemical Substances
National Toxicology Program (NTP) – Report on Carcinogens. 12th Edition, 2011.

Legend to abbreviations

ACGIH – American Conference of Governmental Industrial Hygienists
GHS- Globally Harmonized System for Classification and Labeling
IARC – International Agency for Research on Cancer
LD_{50}- Median lethal dose; the dose causing 50 % lethality
OSHA – United States, Occupational Safety and Health Administration
TWA – Time weighted average
TLV - Threshold Limit Value
NTP – National Toxicology Program
WHMIS – Canada, Workplace Hazardous Materials Information System

Supplier note: The information provided on this SDS 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.