Material Safety Data Sheet

Triethylenetetramine

sc-251328

Hazard Alert Code Key:
- EXTREME
- HIGH
- MODERATE
- LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Triethylenetetramine

STATEMENT OF HAZARDOUS NATURE

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C6-H18-N4, (H2NCH2CH2NHCH2)2, H2(N2H2-H2-NH)3H, NH2(CH2)2NH2(CH2)2NH2, "N, N' -bis(2-aminoethyl)-1, 2-diaminoethane", "1, 8-diamino-3, 6-diazaoctane", "N, N' -bis(2-aminoethyl) ethylenediamine", "3, 6-diazaoctane-1, 8-diamine", tetratin, "1, 2-ethanediamine, N, N' -bis(2-aminoethyl)-", "ethylenediamine, N, N' -bis(2-aminoethyl)-", "1, 4, 7, 10-tetraazadecane", "Araldite Hardener HY 951", "TETA", "DEH 24", "Araldite HY 951", "TEZCA", "GE Material D5F15B1", "Hysol H2-3404", "Ludowici Wear Resist Trowelable (Part B)", Trien, Trientine

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

<table>
<thead>
<tr>
<th></th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flammability:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Toxicity:</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Body Contact:</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Reactivity:</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Chronic:</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW
RISK
Harmful in contact with skin.
Causes burns.
Risk of serious damage to eyes.
May cause SENSITISATION by skin contact.
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED
- The material can produce chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Accidental ingestion of the material may be damaging to the health of the individual.
- Ingestion of amine epoxy-curing agents (hardeners) may cause severe abdominal pain, nausea, vomiting or diarrhea.
The vomitus may contain blood and mucous.
- Ingestion of alkaline corrosives may produce burns around the mouth, ulcerations and swellings of the mucous membranes, profuse saliva production, with an inability to speak or swallow.
Both the esophagus and stomach may experience burning pain; vomiting and diarrhea may follow.

EYE
- The material can produce chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- If applied to the eyes, this material causes severe eye damage.
- Direct eye contact with corrosive bases can cause pain and burns.
There may be swelling, epithelium destruction, clouding of the cornea and inflammation of the iris.
- Vapors of volatile amines irritate the eyes, causing excessive secretion of tears, inflammation of the conjunctiva and slight swelling of the cornea, resulting in "halos" around lights.
This effect is temporary, lasting only for a few hours.

SKIN
- The material can produce chemical burns following direct contact with the skin.
- Skin contact with the material may be harmful; systemic effects may result following absorption.
- The material is not thought to be a skin irritant (as classified using animal models).
Temporary discomfort, however, may result from prolonged dermal exposures.
- Amine epoxy-curing agents (hardeners) may produce primary skin irritation and sensitization dermatitis in predisposed individuals.
Cutaneous reactions include erythema, intolerable itching and severe facial swelling.
- Skin contact with alkaline corrosives may produce severe pain and burns; brownish stains may develop.
The corroded area may be soft, gelatinous and necrotic; tissue destruction may be deep.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED
- If inhaled, this material can irritate the throat and lungs of some persons.
- The material is not thought to produce respiratory irritation (as classified using animal models).
Nevertheless inhalation of vapors, fumes or aerosols, especially for prolonged periods, may produce respiratory discomfort and occasionally, distress.
- Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Inhalation of epoxy resin amine hardeners (including polyamines and amine adducts) and may produce bronchospasm and coughing episodes lasting several days after cessation of the exposure.
Even faint traces of these vapors may trigger an intense reaction in individuals showing "amine asthma".
- Inhalation of corrosive bases may irritate the respiratory tract.
Symptoms include cough, choking, pain and damage to the mucous membrane.
- Inhalation hazard is increased at higher temperatures.

CHRONIC HEALTH EFFECTS
- Skin contact with the material is more likely to cause a sensitization reaction in some persons compared to the general population.
There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.
There is some evidence that inhaling this product is more likely to cause a sensitization reaction in some persons compared to the general population.
Secondary amines may react with nitrites to form potentially carcinogenic N-nitrosamines.
Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue.
Ample evidence exists, from results in experimentation, that developmental disorders are directly caused by human exposure to the material.
Triethylenetetramine is embryotoxic/foetotoxic and teratogenic in guinea pigs exposed dermally and in rats exposed by feeding. These effects are thought to be secondary to copper deficiency.

### Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>NAME</th>
<th>CAS RN</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>triethylenetetramine</td>
<td>112-24-3</td>
<td>96-99</td>
</tr>
<tr>
<td>industrial material may contain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N-aminoethylethanolamine</td>
<td>111-41-1</td>
<td>1-2^</td>
</tr>
<tr>
<td>N-aminoethylpiperazine</td>
<td>140-31-8</td>
<td>0.5-1.5^</td>
</tr>
</tbody>
</table>

### Section 4 - FIRST AID MEASURES

**SWALLOWED**
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

**EYE**
- If this product comes in contact with the eyes: Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

**SKIN**
- If skin contact occurs: Immediately remove all contaminated clothing, including footwear. Flush skin and hair with running water (and soap if available).

**INHALED**
- If fumes or combustion products are inhaled remove from contaminated area. Lay patient down. Keep warm and rested. Inhalation of vapors or aerosols (mists, fumes) may cause lung edema. Corrosive substances may cause lung damage (e.g.

**NOTES TO PHYSICIAN**
- Treat symptomatically.
For acute or short-term repeated exposures to highly alkaline materials:
- Respiratory stress is uncommon but present occasionally because of soft tissue edema.
- Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
If exposure has been severe and/or symptoms marked, observation in hospital for 48 hours should be considered due to possibility of delayed pulmonary edema.

### Section 5 - FIRE FIGHTING MEASURES

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vapour Pressure (mmHg):</td>
<td>&lt;0.0013 @ 20 C</td>
</tr>
<tr>
<td>Upper Explosive Limit (%):</td>
<td>6.5</td>
</tr>
<tr>
<td>Specific Gravity (water=1):</td>
<td>0.989</td>
</tr>
<tr>
<td>Lower Explosive Limit (%):</td>
<td>1</td>
</tr>
</tbody>
</table>

**EXTINGUISHING MEDIA**
- Water spray or fog.
- Foam.

**FIRE FIGHTING**
- Alert Emergency Responders and tell them location and nature of hazard.
- Wear full body protective clothing with breathing apparatus.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

**GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS**
- Combustible.
- Slight fire hazard when exposed to heat or flame.
Combustion products include: carbon dioxide (CO2), nitrogen oxides (NOx), other pyrolysis products typical of burning organic material. May emit corrosive fumes.

**FIRE INCOMPATIBILITY**
Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:
Chemical goggles.

Gloves:
1. BUTYL 2. NEOPRENE 3. NITRILE

Respirator:
Type AK-P Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
- Drains for storage or use areas should have retention basins for pH adjustments and dilution of spills before discharge or disposal of material.
- Check regularly for spills and leaks.
Small spills should be covered with inorganic absorbents and disposed of properly. Organic absorbents have been known to ignite when contaminated with amines in closed containers. Certain cellulosic materials used for spill cleanup such as wood chips or sawdust have shown reactivity with ethyleneamines and should be avoided. Ethyleneamine leaks will frequently be identified by the odor (ammoniacal) or by the formation of a white, solid, waxy substance (amine carbamates). Inorganic absorbents or water may be used to clean up the amine waste.
- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.

MAJOR SPILLS
- Clear area of personnel and move upwind.
- Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
- DO NOT USE brass or copper containers / stirrers.
- DO NOT allow clothing wet with material to stay in contact with skin.
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS
- Lined metal can, Lined metal pail/drum
- Plastic pail.
For low viscosity materials
- Drums and jerricans must be of the non-removable head type.
- Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS
- For bulk storages:
  - If slight coloration of the ethyleneamine is acceptable, storage tanks may be made of carbon steel or black iron, provided they are free of rust and mill scale. However, if the amine is stored in such tanks, color may develop due to iron contamination. If iron contamination cannot be tolerated, tanks constructed of types 304 or 316 stainless steel should be used. (Note: Because they are quickly corroded by amines, do not use copper, copper alloys, brass, or bronze in tanks or lines.)
  - This product should be stored under a dry inert gas blanket, such as nitrogen, to minimize contamination resulting from contact with air and water.
  - Store in original containers.
  - Keep containers securely sealed.
  - DO NOT store near acids, or oxidizing agents.
  - No smoking, naked lights, heat or ignition sources.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

<table>
<thead>
<tr>
<th>Source</th>
<th>Material</th>
<th>TWA ppm</th>
<th>TWA mg/m³</th>
<th>STEL ppm</th>
<th>STEL mg/m³</th>
<th>Peak ppm</th>
<th>Peak mg/m³</th>
<th>TWA F/CC</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Canada - Ontario Occupational Exposure Limits</td>
<td>triethylenetetramine (Triéthylénététramine)</td>
<td>0.5</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Skin / Peau</td>
</tr>
</tbody>
</table>
The following materials had no OELs on our records:

- N-aminoethylethanolamine: CAS:111-41-1
- N-aminoethylpiperazine: CAS:140-31-8

PERSONAL PROTECTION

RESPIRATOR

- Type AK-P Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE

- Safety glasses with side shields.
- Chemical goggles.

HANDS/FEET

- NOTE: The material may produce skin sensitization in predisposed individuals. Care must be taken, when removing gloves and other protective equipment, to avoid all possible skin contact.
- Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include:
  - frequency and duration of contact,
  - chemical resistance of glove material,
  - glove thickness and
dexterity
- Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
  - When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
  - When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

Leather wear not recommended: Contaminated leather footwear, watch bands, should be destroyed, i.e. burnt, as it cannot be adequately decontaminated.

- When handling liquid-grade epoxy resins wear chemically protective gloves (e.g. nitrile or nitrile-buta-toluene rubber), boots and aprons.
- DO NOT use cotton or leather (which absorb and concentrate the resin), polyvinyl chloride, rubber or polyethylene gloves (which absorb the resin).
- DO NOT use barrier creams containing emulsified fats and oils as these may absorb the resin; silicone-based barrier creams should be reviewed prior to use.
- Neoprene gloves.

OTHER

- Overalls.
- PVC Apron.

ENGINEERING CONTROLS

- Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

### Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

#### PHYSICAL PROPERTIES

- Liquid.
- Mixes with water.
- Corrosive.
- Alkaline.

<table>
<thead>
<tr>
<th>State</th>
<th>Liquid</th>
<th>Molecular Weight</th>
<th>146.24</th>
</tr>
</thead>
<tbody>
<tr>
<td>Melting Range (°F)</td>
<td>-31</td>
<td>Viscosity</td>
<td>Not Available</td>
</tr>
</tbody>
</table>
Boiling Range (°F) | 511- 513 decompos | Solubility in water (g/L) | Miscible
---|---|---|---
Flash Point (°F) | 275 (TCC) | pH (1% solution) | 10
Decomposition Temp (°F) | Not Available | pH (as supplied) | 14
Autoignition Temp (°F) | 572 | Vapour Pressure (mmHG) | <0.0013 @ 20 C
Upper Explosive Limit (%) | 6.5 | Specific Gravity (water=1) | 0.989
Lower Explosive Limit (%) | 1 | Relative Vapor Density (air=1) | 5.04
Volatile Component (%vol) | Not available. | Evaporation Rate | 0.01 BuAc=1Slow

**APPEARANCE**
Moderately viscous oily liquid with mild, ammonia type odor. Soluble in water, alcohol and ether. Strongly alkaline (pH 14, neat). Exist in anhydrous and hydrated forms, hygroscopic. Monohydrate melts at 47 °C, evaporation rate of monohydrate (n-butyl acetate = 1): <0.01.

All members of this cluster are miscible or soluble in water. The estimated value of log Kow-range from 3.67 to 1.8 is consistent with the available experimental water solubilities. Vapour pressures range from 1.1x 10⁻⁶ hPa to 0.31 hPa. Estimated and experimental pKbs are in a relatively narrow range of 9.68 to 10.7.

### Conditions Contributing to Instability
- Presence of incompatible materials.
- Product is considered stable.

### Storage Incompatibility
- Avoid strong acids.
- Avoid contact with copper, aluminium and their alloys.
- Avoid reaction with oxidizing agents.
- Triethylenetetramine (TETA):
  - aqueous solutions are strong organic bases
  - reacts with nitrogen containing compounds; may cause violent decomposition
  - reacts violently with strong oxidizers, nitroparaffins, nitrogen tetroxide, permanganates, peroxides, ammonium persulfate, bromine dioxide, sulfuric acid, nitric acid
  - is incompatible with organic anhydrides (eg maleic anhydride), acrylates, alcohols, aldehydes, alkylene oxides, substituted allyls, cellulose nitrate, cresols, caprolactam solutions, epichlorohydrin, ethylene dichloride, glycols, halons, halogenated hydrocarbons, isocyanates, ketones, methyl chloroacetate, nitrates, phenols, urea, vinyl acetate
  - increases the explosive sensitivity of nitromethane
  - attacks aluminium, cobalt, copper, lad, nickel, tin zinc, and their alloys, and some plastics, rubber and coatings
- reacts with halon fire extinguishers.

For incompatible materials - refer to Section 7 - Handling and Storage.

### Toxicological Information

#### Toxicity and Irritation

<table>
<thead>
<tr>
<th>TOXICITY</th>
<th>IRRITATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral (rat) LD50: 2500 mg/kg</td>
<td>Skin (rabbit): 490 mg Open SEVERE</td>
</tr>
<tr>
<td>Dermal (rabbit) LD50: 805 mg/kg</td>
<td>Skin (rabbit): 5 mg/24 SEVERE</td>
</tr>
<tr>
<td>Eye (rabbit): 49 mg</td>
<td>Eye (rabbit): 20 mg/24 h - Moderate</td>
</tr>
</tbody>
</table>

Contact allergies quickly manifest themselves as contact eczema, more rarely as urticaria or Quincke's edema. The pathogenesis of contact eczema involves a cell-mediated (T lymphocytes) immune reaction of the delayed type. Handling ethyleneamine products is complicated by their tendency to react with other chemicals, such as carbon dioxide in the air, which results in the formation of solid carbamates. Because of their ability to produce chemical burns, skin rashes, and asthma-like symptoms, ethyleneamines also require substantial care in handling. Higher molecular weight ethyleneamines are often handled at elevated temperatures further increasing the possibility of vapor exposure to these compounds. Because of the fragility of eye tissue, almost any eye contact with any ethyleneamine may cause irreparable damage, even blindness. A single, short exposure to ethyleneamines, may cause severe skin burns, while a single, prolonged exposure may result in the material being absorbed through the skin in harmful amounts. Exposures have caused allergic skin reactions in some individuals. Single dose oral toxicity of ethyleneamines is low. The oral LD50 for rats is in the range of 1000 to 4500 mg/kg for the ethyleneamines.
In general, the low-molecular weight polyamines have been positive in the Ames assay, increase sister chromatid exchange in Chinese hamster ovary (CHO) cells, and are positive for unscheduled DNA synthesis although they are negative in the mouse micronucleus assay. It is believed that the positive results are based on its ability to chelate copper.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

The material may cause severe skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin. Repeated exposures may produce severe ulceration.

For alkyl polyamines:
The alkyl polyamines cluster consists of organic compounds containing two terminal primary amine groups and at least one secondary amine group. Typically these substances are derivatives of ethylenediamine, propylenediamine or hexamethylenediamine. The molecular weight range for the entire cluster is relatively narrow, ranging from 103 to 232.

Acute toxicity of the alkyl polyamines cluster is low to moderate via oral exposure and a moderate to high via dermal exposure. Cluster members have been shown to be eye irritants, skin irritants, and skin sensitisers in experimental animals. Repeated exposure in rats via the oral route indicates a range of toxicity from low to high hazard. Most cluster members gave positive results in tests for potential genotoxicity.

Limited carcinogenicity studies on several members of the cluster showed no evidence of carcinogenicity. Unlike aromatic amines, aliphatic amines are not expected to be potential carcinogens because they are not expected to undergo metabolic activation, nor would activated intermediates be stable enough to reach target macromolecules.

Polyamines potentiate NMDA induced whole-cell currents in cultured striatal neurons.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucous production.

Triethylenetetramine (TETA) is a severe irritant to skin and eyes and induces skin sensitisation.

TETA is of moderate acute toxicity: LD50(oral, rat) > 2000 mg/kg bw, LD50(dermal, rabbit) = 550 - 805 mg/kg bw. Acute exposure to saturated vapour via inhalation was tolerated without impairment. Exposure to to aerosol leads to reversible irritations of the mucous membranes in the respiratory tract.

Following repeated oral dosing via drinking water only in mice but not in rats at concentration of 3000 ppm there were signs of impairment. The NOAEL is 600 ppm [92 mg/kg bw (oral, 90 days)]. Lifelong dermal application to mice (1.2 mg/mouse) did not result in tumour formation.

There are differing results of the genetic toxicity for TETA. The positive results of the in vitro tests may be the result of a direct genetic action as well as a result of an interference with essential metal ions. Due to this uncertainty of the in vitro tests, the genetic toxicity of TETA has to be assessed on the basis of in vivo tests.

The in vivo micronucleus tests ([i.p. and oral] and the SLRL test showed negative results.

There are no human data on reproductive toxicity (fertility assessment). The analogue diethylenetriamine had no effects on reproduction. TETA shows developmental toxicity in animal studies if the chelating property of the substance is effective. The NOEL is 830 mg/kg bw (oral).

Experience with female patients suffering from Wilson’s disease demonstrated that no miscarriages and no foetal abnormalities occur during treatment with TETA.

In rats, there are several studies concerning developmental toxicity. The oral treatment of rats with 75, 375 and 750 mg/kg resulted in no effects on dams and fetuses, except slight increased fetal body weight. After oral treatment of rats with 830 or 1670 mg/kg bw only in the highest dose group increased foetal abnormalities in 27/44 fetus (69.2 %) were recorded, when simultaneously the copper content of the feed was reduced. Copper supplementation in the feed reduced significant the fetal abnormalities of the highest dose group to 3/51 (6.5 % foetuses. These findings suggest that the developmental toxicity is produced as a secondary consequence of the chelating properties of TETA.

Exposure to the material for prolonged periods may cause physical defects in the developing embryo (teratogenesis).

CARCINOGEN

<table>
<thead>
<tr>
<th>BREMONE COMPOUNDS (ORGANIC OR INORGANIC)</th>
<th>US Environmental Defense Scorecard Suspected Carcinogens Reference(s)</th>
<th>P65-MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SKIN</td>
<td>US AIHA Workplace Environmental Exposure Levels (WEELs) - Skin</td>
<td>Notes</td>
</tr>
</tbody>
</table>

Section 12 - ECOLOGICAL INFORMATION

Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

This material and its container must be disposed of as hazardous waste.

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / EHS TRN A1a A1b A1 A2 B1 B2 C1 C2 C3 D1 D2 D3 E1 E2 E3 Cas No / RTECS No

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Triethyle 134 709 0 0 NR 3 NI 0 2 (3) 3 3 S D 3 netetrami 6 ne / CAS:112-24-3/
Section 13 - DISPOSAL CONSIDERATIONS

US EPA Waste Number & Descriptions
A. General Product Information
Corrosivity characteristic: use EPA hazardous waste number D002 (waste code C)

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.

Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.

A Hierarchy of Controls seems to be common - the user should investigate:
- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.

DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

Recycle wherever possible.
Consult manufacturer for recycling options or consult Waste Management Authority for disposal if no suitable treatment or disposal facility can be identified.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 8
Identification Numbers: UN2259 PG: II
Label Codes: 8 Special provisions: B2, IB2, T7, TP2
Packaging: Exceptions: 154 Packaging: Non-bulk: 202
Packaging: Exceptions: 154 Quantity limitations: 1 L
Passenger aircraft/rail:
Quantity Limitations: Cargo 30 L Vessel stowage: Location: B aircraft only:
Vessel stowage: Other: 40, 52

Hazardous materials descriptions and proper shipping names:
Triethylenetetramine

Air Transport IATA:
UN/ID Number: 2259 Packing Group: II
Special provisions: None
Cargo Only
Packing Instructions: 855 Maximum Qty/Pack: 30 L
Passenger and Cargo Passenger and Cargo
Packing Instructions: Y840 Maximum Qty/Pack: 1 L
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: 851 Maximum Qty/Pack: 0.5 L
Shipping Name: TRIETHYLENETETRAMINE

Maritime Transport IMDG:
IMDG Class: 8 IMDG Subrisk: None
UN Number: 2259 Packing Group: II
EMS Number: F-A, S-B Special provisions: None
Limited Quantities: 1 L
Shipping Name: TRIETHYLENETETRAMINE
**Section 15 - REGULATORY INFORMATION**

triethylenetetramine (CAS: 112-24-3) is found on the following regulatory lists:
- Canada - Ontario Occupational Exposure Limits
- Canada Domestic Substances List (DSL)
- Canada Ingredient Disclosure List (SOR/88-64)
- Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)
- GESAMP/EHS Composite List - GESAMP Hazard Profiles
- IMO IBC Code Chapter 17: Summary of minimum requirements
- IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk
- IMO Provisional Categorization of Liquid Substances - List 3: (Trade-named) mixtures containing at least 99% by weight of components already assessed by IMO, presenting safety hazards
- US - New Jersey Right to Know Hazardous Substances
- US - Pennsylvania - Hazardous Substance List
- US AIHA Workplace Environmental Exposure Levels (WEELs)
- US DOE Temporary Emergency Exposure Limits (TEELs)
- US EPA High Production Volume Program Chemical List
- US EPA Master Testing List - Index I Chemicals Listed
- US FDA Indirect Food Additives: Adhesives and Components of Coatings - Substances for Use Only as Components of Adhesives - Adhesives
- US Toxic Substances Control Act (TSCA) - Chemical Substance Inventory

**Section 16 - OTHER INFORMATION**

**LIMITED EVIDENCE**

- Inhalation and/or ingestion may produce health damage.
- Cumulative effects may result following exposure.
- Limited evidence of a carcinogenic effect.
- May be harmful to the foetus/embryo.

* (limited evidence).

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Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references. A list of reference resources used to assist the committee may be found at: www.chemwatch.net/references.

The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios.

Scale of use, frequency of use and current or available engineering controls must be considered.

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