established in 1981
megaloid laboratories

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1. IDENTIFICATION

Name: *Triethanolamine, 99%*

Synonyms: *Low freeze grade of: N,N,N-triethanolamine; TEA; N,N'N"-trihydroxytriethylamine; 2,2',2"-trihydroxytriethylamine; 2,2',2"-nitrilotriethanol & others*

Product Uses: *Removal of CO2 & H2S from natural gas, biogas, syngas, etc; corrosion inhibitor & chelating agent; additive in: surfactants, emulsifiers, defoamers etc*

Supplier Identifier: *Megaloid Laboratories Limited*
5515 North Service Road # 306
Burlington, ON L7L 6G4

EMERGENCY INFORMATION: ***Call CHEMTREC - (800) 424-9300 (CCN# 693764)***

2. HAZARD INDENTIFICATION

GHS Class *(category)*	***reproductive toxicity; oral*** *(2)*	***eye irritant*** *(2A)*	***STOT – single exposure*** *(3)*
Signal Word	***WARNING***		
Hazard Statements	*Suspected of damaging fertility of the unborn child (H361)*	*Causes serious eye irritation (H319)*	*May cause respiratory irritation (H335)*

Hazardous Pictograms

GHS Precautionary Statements for Labelling	
Prevention:	
P201	*Obtain special instructions before use.*
P202	*Do not handle until all safety precautions have been read and understood*
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash hands thoroughly after handling.
P271	Use only outdoors or in a well-ventilated area.
P280	*Wear eye protection.*
Response:	
P304 P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P305,P351,P338	*If in eyes, rinse continuously with water for several minutes. Remove contact lenses if present and easy to do. Continue rinsing.*
P312	Call a POISON CENTER/doctor if you feel unwell.
P308+P313	IF exposed or concerned: Get medical advice/ attention.
Storage:	
P403 +P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
Disposal	
P501	Dispose of contents/ container to an approved waste disposal plant.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name:	CAS No.	%	Other Identifiers
Triethanolamine	*102-71-6*	*~85%*	*203-049-8*
Water	*7732-18-5*	*~15%*	
NOTE: May contain <0.5% diethanolamine.			

4. FIRST-AID MEASURES

Inhalation
Remove from contaminated area promptly. CAUTION: Rescuer must not endanger himself! If breathing stops, administer artificial respiration and seek medical aid promptly.

Skin Contact
Wash with plenty of water. Remove contaminated clothing and do not reuse until thoroughly laundered.

Eye Contact
Wash eyes with plenty of water, holding eyelids open. Seek medical assistance if there is any irritation.

Ingestion
Give plenty of water to dilute product. Do not induce vomiting (NOTE below). Keep victim quiet. If vomiting occurs, lower victim's head below hips to prevent inhalation of vomited material. Seek medical help promptly.

Most important symptoms and effects, both acute and delayed
Inhalation symptoms - sore throat, difficult breathing. Eye contact symptoms - redness, tears. Ingestion - abdominal and chest pain, nausea, vomiting.

Inadvertent inhalation of vomited material may seriously damage the lungs. The danger of this is greater than the risk of poisoning through absorption of this relatively low-toxicity substance. The stomach should only be emptied under medical supervision, and after the installation of an airway to protect the lungs.

Notes to physician
Treat symptomatically

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media
Water fog or fine spray, alcohol-resistant foam, dry chemical

Unsuitable Extinguishing Media
Do not use direct water stream

Specific Hazards Arising from the Product
Combustion Products - carbon monoxide, nitrogen oxides, smoke, part oxidised hydrocarbon fragments including ammonia, hydrogen cyanide, nitriles, isocyanates, nitrosamines, formaldehyde
Violent steam generation may occur upon application of direct water stream to hot liquids.

Special Protective Equipment and Precautions for Fire-fighters
Firefighters must wear SCBA

Static Charge Accumulation
Cannot accumulate a static charge on agitation or pumping

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures
Isolate the area. Use appropriate safety equipment. Keep unnecessary and unprotected personnel away from the area. Do not touch or walk through spilled material. Wear appropriate gloves and eye protection per section 8.

Methods and materials for containment and cleaning up
Recover free liquid with suitable pumps; absorb residue on an inert sorbent, sweep, shovel & store in closed containers for recycling or disposal. Dyke to control spillage and prevent environmental contamination.

7. HANDLING & STORAGE

Precautions for Safe Handling
Never cut, drill, weld or grind on or near this container. Triethanolamine may react with carbon dioxide or oxygen in the air to form hazardous products (see Part 10). Avoid generating or breathing product vapour. Use with adequate ventilation if handling hot product. Avoid prolonged skin contact & wash work clothes often. An eye bath must be available near the workplace.

Conditions for Safe Storage
Store above 0oC / 32oF, away from sources of ignition, heat & substances listed in Part 10. Keep containers, empty or full, well-sealed unless in use.

8. EXPOSURE CONTROL & PERSONAL PROTECTION

Triethanolamine:

Ontario TWAEV	0.5ppm / 3.1mg/m^3	**Ontario STEV**	Not listed
ACGIH TLV	5 mg/m^3	**ACGIH STEL**	Not listed
OSHA PEL	Not listed	**OSHA STEL**	Not listed

Diethanolamine:

Ontario TWAEV	1 mg/m^3	**Ontario STEL**	Not listed
ACGIH TLV	1 mg/m^3	**ACGIH STEL**	Not listed
OSHA PEL	3 ppm/15 mg/m^3	**OSHA STEL**	Not listed

Ventilation	low vapour pressure – mechanical ventilation is not required unless product is strongly heated
Hands	no special hand protection required, butyl or “Viton” gloves are resistant – other *types may also protect; confirm suitability with supplier*
Eyes	safety glasses with side shields – *always protect the eyes*
Clothing	no special protective clothing required;

9. PHYSICAL & CHEMICAL PROPERTIES

Odour & Appearance	clear, colourless to pale yellow liquid with mild amine (fishy) odour
Odour threshold	not known – *odour detectable when dissolved in warm water*
pH	10.8 (10% solution)

Melting point/Freezing point	-9°C / 16°F – *supercools readily; freezing point hard to determine*
Initial boiling point/boiling range	121°C / 249°F – *BP rises as water is lost*
Flash point	*178°C (352°F) estimated – closed cup*
Evaporation rate (Butyl Acetate = 1)	not known – very low volatility
Flammability (solid; gas)	no data available
Lower flammable/explosive limit	Lower limit not known
Upper flammable/explosive limit	Upper limit not known
Vapour pressure	<0.01 mmHg @ 20 °C
Vapour density (air = 1)	5.1 (TEA), 0.6 *(water)*
Relative density	1.117 (20/20°C)
Water Solubility	complete
Partition coefficient – n–octanol/water	-1.00, also -2.3[1], -1.9[1]
Auto ignition temperature	350°C / 662°F – *NOTE: triethanolamine begins to decompose above 200°C*
Decomposition temperature	no test data available
Viscosity	150 centipoise (25°C / 77°F)
Conversion Factor	1ppm = 6.09mg/m^3
Molecular Weight	149 grams/mole *(TEA)*, 18grams/mole *(water)*

10. STABILITY AND REACTIVITY

Reactivity
Dangerously reactive with - strong oxidising agents; vigorous reaction with strong acids, alkali metals & alkaline earth metals reacts with nitrating agents: nitromethane, nitrophenols or mercury forming explosive substances; alkali metals or alkaline earth metals cause release of hydrogen; reacts with halogens (bromine, iodine), isocyanates, isothiocyanates, & carbon disulphide; corrodes aluminum at high temperature

Chemical Stability
Stable; will not polymerize – but may induce polymerisation of epoxides, vinyl chloride, vinyl acetate, acrylic monomers, acrolein, or acrylonitrile

Possibility of Hazardous Reactions

Reacts with cellulose nitrate causing fire and explosion hazard. Reacts with strong acids and strong oxidants increasing risk of fire or explosion.

Conditions to avoid
Exposure to elevated temperatures can cause product to decompose.

Incompatible materials
Avoid contact with: Nitrites. Strong acids. Strong oxidizers. Heating above 60°C in the presence of aluminum can result in corrosion and generation of flammable hydrogen gas.

Hazardous decomposition products
Decomposes begins at 200oC/390oF; self-sustaining above 250oC/480oF, reacts with CO2 in air ➔ thermally unstable carbamates; oxidises slowly in air, becomes rapid in fire or if a large surface area forms *(on cloth or wire mesh)*

Sensitive to Impact
No

11. TOXICOLOGICAL INFORMATION

Acute Toxicity	
Skin Contact	may be slightly irritating to skin – *4 studies: not irritating*[1]; *1 study: erythema after 20hr contact*[1]
Skin Absorption	yes; no toxic effects likely by this route
Eye Contact	may irritate eyes – *3 studies: not irritating; 2 studies: erythema or irritation*[1]
Inhalation	little to no effect
Ingestion	little to no effect – *not a route of industrial exposure*
Triethanolamine:	
Calculated LD_{50} (oral)	6505 (range: 4940-12,940)mg/kg (rat), 7530mg/kg (rat)[1], 6880 (range: 6350-9175)mg/kg (mouse), 2590 & 6120mg/kg (rabbit), 2590 & 9400mg/kg (guinea pig)
Calculated LD_{50} (skin)	26,450mg/kg (rabbit), 21,180mg/kg (rat); >2350mg/kg (rabbit – *no mortality*)[1]
LC_{50} (inhalation)	*no mortality (rat) in saturated vapour*[1]
Diethanolamine:	
Calculated LD_{50} (oral)	Rat, 1,650 mg/kg
Calculated LD_{50} (skin)	Rabbit (male) > 8,250 mg/kg
LC_{50} (inhalation) – 4 hour	Rat (male), Aersol, 3.40 mg/l

11. TOXICITY, CONTINUED

General
Prolonged skin exposure may cause dry skin – *usually in the presence of other drying substances*

Sensitising
Not a sensitiser in humans or animals[1] *(respiratory or skin sensitisation is rare despite the large number of industrial workers exposed to the substance)*

Carcinogen/Tumorigen
Not considered a tumorigen or a carcinogen in humans or animals[1]; simultaneous exposure to nitrites & diethanolamine can cause carcinogenic nitroso compounds to form *(small excess of cancer among people working with TEA (in machining fluids); TEA is **not** a carcinogen according to IARC, US NTP, or ACGIH*

Reproductive Effect
No known effect in humans; slight decrease in fertility[1]

Mutagen/Teratogen
No known effect on humans or animals[1]

Synergistic With
Nitrites may react with TEA to create nitroso compounds – some are suspect carcinogens

12. ECOLOGICAL INFORMATION

Bioaccumulation	poorly absorbed, rapidly excreted and is not a bioaccumulator
Biodegradation	biodegrades readily & rapidly in the presence of oxygen; 60-90% & 96%[1] in 20 days, 82% in 8 days & 100% in 5 days[1], poorly biodegradable in sea water; <20% in 28 days[1]
Abiotic Degradation	reacts with atmospheric hydroxyl radicals; estimated ½-life in air is 3.5[1] & 4 hours
Mobility in soil, water	water soluble; moves readily in soil & water; *if spilled product solidifies rapidly, movement in soil may be arrested; may adsorb to clay particles, slowing movement*
Aquatic Toxicity	
LC_{50} (Fish, 96hr)	450-1000 & 2000mg/litre (Lepomis macrochirus), 11,800mg/litre (Pimephelas promelas)[1]
EC_{50} (Crustacea, 24hr)	5600mg/litre (Artemia salina), 1390, 1850 & 2040mg/litre (Daphnia magna), 610mg/litre (Ceriodaphnia dubia, 48hr)[1]
EC_{50} (Algae, 72hr)	169, 216, 470, 5121 & 750mg/litre (Desmodesmus subspicatus), 204mg/litre (Phaeodactylum tricornutum)[1], >107mg/litre (Skeletonema costatum)[1]
EC_{10} (Bacteria)	525mg/litre (Photobacterium phosphoreum), 5000 & 10,0001mg/litre (Pseudomonas putida), 1000mg/litre (sewage sludge)[1]

13. DISPOSAL

Waste Disposal

Do not flush to sewer, recycle solvent if possible, local regulations may permit disposal in sanitary landfill, may be incinerated in approved facility after mixing with a suitable flammable waste

Containers

Drums should be reused. Recondition and pressure test by a licensed reconditioner prior to re-use.

Pails must be vented and thoroughly dried prior to crushing and recycling.

IBCs (intermediate bulk containers): polyethylene bottle must be pressure tested & recertified at 30 months. Replace at 60 months (5yrs).

Steel containers must be inspected, pressure tested & recertified every 5 years.

Never cut, drill, weld or grind on or near this container, even if empty

14. TRANSPORT INFORMATION

Canada TDG	**PIN**	Not regulated for transport	US only
U.S.A. 49 CFR	**PIN**	UN3082	
	Shipping Name	Environmentally Hazardous Substance, Liquid, n.o.s. (diethanolamine)	
	Class & Packing Group	9, PG III	

Marine Pollutant	Not a Marine Pollutant
ERAP Required	No
Reportable Quantity	Diethanolamine – 45.4 kg (100 lbs.)
E R G No.	No

Special Notes:
Class 9, Packing Group III when material is shipped in quantities in one package at or above the Reportable Quantity and when no other hazard class applies; otherwise, not regulated.

15. REGULATORY INFORMATION

Canada DSL	On Inventory
U.S.A. TSCA	On Inventory
Europe EINECS	On Inventory

U.S.A. Regulations:

Allowable Tolerances: Triethanolamine is exempted from the requirement of a tolerance when used as a stabilizer, inhibitor for formulations used before crop emerges from soil in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

Threshold Limit Values: 8 hr Time Weighted Avg (TWA): 5 mg/cu m. Excursion Limit Recommendation: Excursions in worker exposure levels may exceed 3 times the TLV-TWA for no more than a total of 30 minutes during a work day, and under no circumstances should they exceed 5 times the TLV-TWA, provided that the TLV-TWA is not exceeded.

TSCA Requirements: Section 8(a) of TSCA requires manufacturers of this chemical substance to report preliminary assessment information concerned with production, use, and exposure to EPA as cited in the preamble in 51 FR 41329. Pursuant to section 8(d) of TSCA, EPA promulgated a model Health and Safety Data Reporting Rule. The section 8(d) model rule requires manufacturers, importers, and processors of listed chemical substances and mixtures to submit to EPA copies and lists of unpublished health and safety studies. Triethanolamine is included on this list.

FIFRA Requirements: As the federal pesticide law FIFRA directs, EPA is conducting a comprehensive review of older pesticides to consider their health and environmental effects and make decisions about their future use. Under this pesticide reregistration program, EPA examines health and safety data for pesticide active ingredients initially registered before November 1, 1984, and determines whether they are eligible for reregistration. In addition, all pesticides must meet the new safety standard of the Food Quality Protection Act of 1996. Pesticides for which EPA had not issued Registration Standards prior to the effective date of FIFRA, as amended in 1988, were divided into three lists based upon their potential for human exposure and other factors, with List B containing pesticides of greater concern and List D pesticides of less concern. Triethanolamine is found on List C. Case No: 3145; Pesticide type: Insecticide, Antimicrobial; Case Status: No products containing the pesticide are actively registered ... The case /is characterized/ as "cancelled." Under FIFRA, pesticide producers may voluntarily cancel their registered products. EPA also may cancel pesticide registrations if registrants fail to pay required fees or make/meet certain reregistration commitments, or if EPA reaches findings of unreasonable adverse effects; Active ingredient (AI): Triethanolamine; AI Status: The active ingredient is no longer contained in any registered pesticide products ... "cancelled." Triethanolamine is exempted from the requirement of a tolerance when used as a stabilizer, inhibitor for formulations used before crop emerges from soil in accordance with good agricultural practice as inert (or occasionally active) ingredients in pesticide formulations applied to growing crops only.

16. OTHER INFORMATION

NFPA RATING	**Health**	**1**	**Flammability**	**1**	**Instability**	**0**

Prepared for *Megaloid Laboratories* **by** *Rob Cangiano*

Preparation Date: April 2005

Revision Dates: May 2008, May 2011, May 2014, May 2017, January 2020

(1) European Chemicals Agency (EChA) dossier for 2,2',2"-nitrilotriethanol:
https://echa.europa.eu/registration-dossier/-/registered-dossier/15134/1

Key to Abbreviations	**ACGIH®** = American Conference of Governmental Industrial Hygienists **AIHA®** = AIHA® Guideline Foundation HSDB® = Hazardous Substances Data Bank **IARC** = International Agency for Research on Cancer **NIOSH** = National Institute for Occupational Safety and Health **NTP** = National Toxicology Program **OSHA** = US Occupational Safety and Health Administration **RTECS®** = Registry of Toxic Effects of Chemical Substances
References	CHEMINFO database. Canadian Centre for Occupational Health and Safety (CCOHS). HSDB® database. US National Library of Medicine. Available from Canadian Centre for Occupational Health and Safety (CCOHS). NIOSH Pocket Guide database. National Institute for Occupational Safety and Health. Available from Canadian Centre for Occupational Health and Safety (CCOHS). Registry of Toxic Effects of Chemical Substances (RTECS®) database. Dassault Systèmes/BIOVIA ("BIOVIA"). Available from Canadian Centre for Occupational Health and Safety (CCOHS).
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