1 Identification

GHS Product Identifier

TRIETHANOLAMINE

Other means of identification

CAS:	Mixture
EC:	Mixture
RTECS:	Mixture
ICSC:	Mixture
Synonyms:	None
Proper Shipping Name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
Chemical Formula:	Mixture

Recommended use of the chemical and restriction on use

Laboratory chemicals, Manufacture of substances. Not for food, drug or household use.

Supplier's details

AQUATRADE WATER TREATMENT CHEMICALS (PTY) LTD

4A Spanner Road
Spartan, Kempton Park
Gauteng, South Africa
1619
www.aquatradesa.co.za
sheq@aquatradesa.co.za

PO Box 357
Isando
Gauteng, South Africa
1600
Tel: +27 11 394 0752
Tel: +27 87 654 3326 (SDS Enquiries)

Emergency phone number

E le Sar: +27 82 921 0643 (Available Mon - Fri, GMT 5:00 to 20:00)
Spilltech: +27 861 000 366 (Available 24/7)

2 Hazard(s) identification

Classification of the substance or mixture

Classification according to Regulation (EC) No 1272/2008

Acute Toxicity (Category), H302
Skin Damage/Irritation (Category 2), H315
Serious Eye Damage/Irritation (Category 1), H318
Reproductive Toxicity - Fertility unborn child - Oral/Inhalation (Category 2), H361
Specific Target Organ Toxicity - Repeat Exposure - liver, blood, kidney, nervous system - Oral/Dermal/Inhalation (Category 2), H373

For the full text of the H-Statements mentioned in this Section, see Section 16.

GHS label elements

Danger

Harmful if swallowed

Causes skin irritation

Causes serious eye damage

Suspected of damaging fertility or the unborn child

May cause damage to organs through prolonged or repeated exposure

Do not breathe dust/fume/gas/mist/vapours/spray.

Wash thoroughly after handling.

Do not eat, drink or smoke when using this product.

Wear protective gloves/protective clothing/eye protection/face protection.

IF SWALLOWED: call a POISON CENTER or doctor/physician IF you feel unwell.

IF ON SKIN: Wash with plenty of soap and water.

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

IF exposed or concerned: Get medical advice/attention.

Immediately call a POISON CENTER or doctor/physician.

Specific treatment (see P351+P352 on this label).

Rinse mouth.

If skin irritation occurs: Get medical advice/attention.

Take off contaminated clothing and wash it before reuse.

Store locked up.

Dispose of contents and container in accordance with local, regional, national, international regulations.

Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.

Other hazards which do not result in classification

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

3 Composition/information on ingredients

Description	CAS Number	EINECS Number	%	Note
2,2',2''-nitrilotriethanol	102-71-6	203-049-8	80 - 85	
2,2'-iminodiethanol	111-42-2	203-868-0	15 - 0	
Monoethanolamine	141-43-5		1 - 2	

4 First-aid measures

Description of necessary first-aid measures

Call 112 or 10177 or your local emergency help number immediately, for emergency assistance. Call the Poison Control Center at +27 21 931 6129 – Tygerberg or +27 21 658 5308 – Red Cross, Email: poisonsinformation@uct.ac.za, Website: https://www.afritox.co.za for further instructions. Provide them with information such as the compound taken, quantity and time of ingestion, age, weight and general health status of affected individual. Carefully remove the individual from the exposure area.

Remove contaminated clothing. If danger of loss of consciousness, place patient in recovery position and transport accordingly. Apply artificial respiration if necessary. First aid personnel should pay attention to their own safety.

If Inhaled

Keep patient calm, remove to fresh air. Keep patient calm, remove to fresh air, seek medical attention. Confirm that the airways are protected; also, ensure breathing and the presence of pulse. Immediately administer a corticosteroid from a controlled/metered dose inhaler.

On Skin Contact

If skin exposure or involvement of the eye has occurred, then wash thoroughly with copious amounts of water (for at least 15 minutes). Apply sterile dressings, consult a skin specialist.

On contact with eyes
Wash affected eyes for at least 15 minutes under running water with eyelids held open. Immediately wash affected eyes for at least 15 minutes under running water with eyelids held open, consult an eye specialist.

On ingestion
Unless instructed by a healthcare professional, **DO NOT** induce vomiting in the affected individual. Following an ingestion of the substance, immediately give milk to drink. In case of symptoms that indicate difficulty in swallowing including vomiting or decreased alertness, **DO NOT** give anything by way of mouth. Take individual to emergency room (ER) for further treatment. Always try to take the compound bottle/container to the ER.

Most important symptoms/effects, acute and delayed

Overexposure may cause:, vomiting, nausea, coughing, headache. Further symptoms are possible.

Indication of immediate medical attention and special treatment needed, if necessary

Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5 Fire-fighting measures

Suitable extinguishing media

Suitable extinguishing media
Water spray, dry powder, foam, carbon dioxide.

Unsuitable extinguishing media
No additional data.

Specific hazards arising from the chemical

Nitrogen oxides, carbon oxides. The substances/groups of substances mentioned can be released in case of fire. Under certain conditions in case of fire other hazardous combustion products may be generated.

Special protective actions for fire-fighters

Special protective equipment
Wear self-contained breathing apparatus and chemical-protective clothing.

Further information
Dispose of fire debris and contaminated extinguishing water in accordance with official regulations.

6 Accidental release measures

Personal precautions, protective equipment and emergency procedures

Avoid inhalation. **Avoid** contact with the skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice.

Environmental precautions

DO NOT discharge into drains/surface waters/groundwater.

Methods and materials for containment and cleaning up

For large amounts
Pump off product.

For residues
Pick up with suitable absorbent material (e.g. sand, sawdust, general-purpose binder, kieselguhr).

Clean contaminated floors and objects thoroughly with water and detergents, observing environmental regulations. Collect waste in suitable containers, which can be labeled and sealed. Incinerate or take to a special waste disposal site in accordance with local authority regulations.

Reference to other sections
Information regarding exposure controls/personal protection and disposal considerations can be found in section 8 and 13.

7 Handling and storage

Precautions for safe handling

Ensure thorough ventilation of stores and work areas. Handle in accordance with good industrial hygiene and safety practice. When using **DO NOT** eat, drink or smoke. Hands and/or face should be washed before breaks and at the end of the shift.

Protection against fire and explosion
Prevent electrostatic charge - sources of ignition should be kept well clear - fire extinguishers should be kept handy.

Temperature class: T2 (Autoignition temperature >300 °C).

Conditions for safe storage, including any incompatibilities

Store in original containers. Keep tightly closed in a dry, cool and well-ventilated place. No smoking, naked lights or ignition sources. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks. Observe manufacturer's storage and handling recommendations contained within this SDS. Use non-combustible construction materials. Store away from moisture and heat to maintain the technical properties of the product. Protect against light. Use only clean equipment. Provide impermeable floor. Provide a catch-tank and anti-corrosion protected electrical equipment in a bunded area. Store between: 15 °C to 25 °C.

Incompatible products
Acids, Acid forming substances, Ammonia, Combustible material.

Storage incompatibility
Violent reaction and fire may result when amine catalysts are exposed to, or mixed with, oxidizing agents such as perchlorates, nitrates, permanganates, chromates, nitric acid, halogens, peroxides, and some cleaning solutions containing acids. The large amount of heat generated by the reaction of the catalyst with the oxidizing agent may be sufficient to cause vigorous boiling, which can cause the hot material to splash or splatter.

Triethanolamine is an organic base. Reacts violently with strong oxidisers, permanganates, peroxides, ammonium persulfate, bromine dioxide, sulfuric acid, nitric acid and is incompatible with organic anhydrides, acrylates, alcohols, aldehydes, alkylene oxides, substituted allyls, cellulose nitrate, cresols, caprolactam, solution, epichlorohydrin, ethylene dichloride, isocyanates, ketones, glycols, mercury, nitrates, phenols, vinyl acetate. Decomposes exothermically with maleic anhydride. Increase the explosive sensitivity of nitromethane. Corrodes, aluminium, copper, its alloys, tin, zinc. **Avoid** strong acids, bases. **Avoid** contact with copper, aluminium and their alloys. **Avoid** reaction with oxidising agents

Packaging material
Suitable materials for containers
Carbon steel (iron), Stainless steel 1.4401, Stainless steel 1.4301 (V2), High density polyethylene (HDPE), glass, Low density polyethylene (LDPE).

Unsuitable materials for containers
Aluminium, Galvanized carbon steel (Zinc), Paper/Fibreboard.

Storage class according to TRGS 510 (originally VCI, Germany): (10) Combustible liquids

Storage stability
Storage temperature: 20 - 40 °C. Storage duration: 12 Months. May discolour after lengthy storage.

From the data on storage duration in this safety data sheet no agreed statement regarding the warrantee of application properties can be deduced. In the presence of nitrosating agents it is possible that this product forms nitrosamines.

SANS 10263-0 Warehousing
8.4.3.2 Where flammable or **corrosive** substances are stored, the floor shall slope away from the storage area (primary collection area) to a secondary catch basin or sump of capacity at least 10 % of the total available storage volume of the fire section concerned. The secondary catch basin shall be within the fire section, and shall be such that it can be well ventilated. Care shall be taken in the design of such areas to prevent contamination of the soil or ground water.

9.7.2 Every type of storage area inside a warehouse shall be clearly demarcated, for example separate storage areas for poisons, flammables and **corrosives** shall display the relevant hazard class diamond (see table 1). The dimensions of the hazard class diamonds shall be at least 250 mm x 250 mm.

12.8.5 Storage of flammable liquids of class 3, toxic substances of division 6.1 and **corrosives** of class 8

Nitro-methane class 3, UN No. 1261, shall be separated from substances of class 6.1, and cyanides of division 6.1 shall be separated from acids of class 8. Concentrated acids and bases shall be segregated by at least 1 m. Packaged flammable liquids of class 3, toxic substances of division 6.1 and **corrosives** of class 8 that are of category 3 can be stored in the same area, provided that

a) they are kept above floor level, and
b) liquid dangerous goods of one class are not stored above dangerous goods of another class.

12.8.8.3 Toxic and infectious substances (see class 6 in SANS 10228) can contaminate firefighting water in the event of a fire, therefore:

a) Toxic and infectious substances shall be separated from other flammable products and aerosols.
b) Toxic and infectious substances shall be segregated from oxidizing substances, organic peroxides and **corrosives**.
c) Flammable toxic and infectious substances shall be segregated from non-flammable toxic and infectious substances.

12.8.8.4 **Corrosives** (see class 8 in SANS 10228) that leak or spill from their packaging can cause serious damage to other packages, with potentially hazardous consequences.

Corrosives shall be segregated from toxic substances, infectious substances, aerosols, flammables, oxidizing substances and organic peroxides.

The provisions of above apply to the storage of the following quantities of dangerous goods.

Corrosives (acids and bases) Class 8	
Category 1	> 50 kg
Category 2	> 200 kg
Category 3	> 1 000 kg

8 Exposure controls/personal protection

Control parameters

Components with occupational exposure limits
The surveillance of the workplace by exposure measurements may be necessary, in order to proof the efficiency of safety measures, for example ventilation or the need of respiratory protection. Since this requires a specific competency, only accredited laboratories should be contracted.

2,2',2''-nitrilotriethanol (CAS: 102-71-6)	**2,2'-iminodiethanol (CAS: 111-42-2)**	**2-aminoethanol (CAS: 141-43-5)**
PNEC		
Freshwater		
0,32 mg/l	0,02 mg/l	0,085 mg/l
Marine water		
0,032 mg/l	0,002 mg/l	0,0085 mg/l
Intermittent release		
5,12 mg/l	0,095 mg/l	0,025 mg/l
STP		
10 mg/l	100 mg/l	100 mg/l
Sediment (Freshwater)		
1,7 mg/kg	0,092 mg/kg	0,425 mg/kg
Sediment (Marine water)		
0,17 mg/kg	0,0092 mg/kg	0,0425 mg/kg

Soil		
0,151 mg/kg	1,63 mg/kg	0,035 mg/kg
Oral (Secondary poisoning)		
	1,04 mg/kg	
DNEL		
Worker		
Long-term exposure- systemic effects, dermal		
6,3 mg/kg bw/day	0,13 mg/kg bw/day	1 mg/kg
Long-term exposure - systemic and local effects, Inhalation		
5 mg/m3	1 mg/m3	3,3 mg/m3
Consumer		
Long-term exposure- systemic effects, dermal		
3,1 mg/kg bw/day	0,07 mg/kg	0,24 mg/kg
Long-term exposure - systemic and local effects, Inhalation		
1,25 mg/m3	0,25 mg/m3	2 mg/m3
Long-term exposure- systemic effects, oral		
13 mg/kg bw/day	0,06 mg/kg	3,75 mg/kg

Components	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
2,2',2''-nitrilotriethanol (CAS: 102-71-6)	TWA	5 mg/m3	ACGIH
2,2'-iminodiethanol (CAS: 111-42-2)	TWA (Inhalable fraction and vapor)	1 mg/m3	ACGIH
	TWA	3 ppm 15 mg/m3	NIOSH REL
	TWA	3 ppm 15 mg/m3	OSHA P0

South African OSH

Source	Material name	TWA	STEL
South Africa Occupational Exposure Limits for Airborne Pollutants	Diethanolamine	15 mg/m3 / 3 ppm	Not Available
South Africa Hazardous Chemical Substances - Recommended Limits	Diethanolamine	15 mg/m3 / 3 ppm	Not Available
South Africa Hazardous Chemical Substances - Recommended Limits	2,2'-Iminodiethanol	15 mg/m3 / 3 ppm	Not Available
South Africa Occupational Exposure Limits for Airborne Pollutants	Ethanolamine	8 mg/m3 / 3 ppm	15 mg/m3 / 6 ppm
South Africa Hazardous Chemical Substances - Recommended Limits	2-Aminoethanol	8 mg/m3 / 3 ppm	15 mg/m3 / 6 ppm
South Africa Hazardous Chemical Substances - Recommended Limits	Ethanolamine	8 mg/m3 / 3 ppm	1500 mg/m3 / 500 ppm

EMERGENCY LIMITS

Material name	TEEL-1	TEEL-2	TEEL-3
Triethanolamine	15 mg/m3	240 mg/m3	1,500 mg/m3

Diethanolamine	3 mg/m3	28 mg/m3	130 mg/m3
Ethanolamine	6 ppm	170 ppm	1,000 ppm

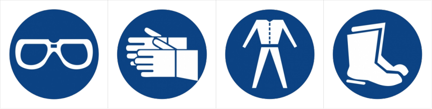
Ingredient	Original IDLH	Revised IDLH
triethanolamine	Not Available	Not Available
diethanolamine	Not Available	Not Available
ethanolamine	30 ppm	Not Available

Appropriate engineering controls

Avoid spraying the material. Supply safety shower and eyewash in immediate vicinity of exposure area. **Avoid** contact with the skin, eyes and clothing. Handle in accordance with good industrial hygiene and safety practice. Wearing of closed work clothing is required additionally to the stated personal protection equipment. Hands and/or face should be washed before breaks and at the end of the shift. Gloves must be inspected regularly and prior to each use. Replace if necessary (e.g. pinhole leaks). Take off immediately all contaminated clothing. Wash contaminated clothing before reuse. When using, **DO NOT** eat, drink or smoke.

Individual protection measures

The selection of PPE is dependent on a detailed risk assessment. The risk assessment should consider the work situation, the physical form of the chemical, the handling methods, and environmental factors. Recommendations below is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.



Eye/face protection

Tightly fitting safety goggles (splash goggles) (e.g. EN 166). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU). Contact lenses should not be worn as they may contribute to severe eye injury.

Skin protection

Chemical resistant protective gloves (EN 374)
Suitable materials also with prolonged, direct contact (Recommended: Protective index 6, corresponding > 480 minutes of permeation time according to EN 374):
e.g. nitrile rubber (0.4 mm), chloroprene rubber (0.5 mm), polyvinylchloride (0.7 mm) and other

Manufacturer's directions for use should be observed because of great diversity of types.

Supplementary note:
The specifications are based on tests, literature data and information of glove manufacturers or are derived from similar substances by analogy. Due to many conditions (e.g. temperature) it must be considered, that the practical usage of a chemical-protective glove in practice may be much shorter than the permeation time determined through testing.

Protective gloves must not be worn when working on machines with rotating workpieces or rotating tools, if there is a risk of entanglement.
It is recommended to use liquid-tight gloves no longer than necessary, ideally they should be exchanged hourly, or to use undergloves made from cotton.

To use liquid-tight gloves without exchanging them after at least 4 hours per day is considered as stressing the skin (humid work). The usage should not be continuously and should not replace technical and organizational measures.

Body Protection

Body protection must be chosen depending on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit (according to EN 14605 in case of splashes or EN ISO 13982 in case of dust).

Respiratory protection

Respiratory protection in case of vapour/aerosol release.
Combination filter for gases/vapours of organic compounds and solid and liquid particles (f.e. EN 14387 Type A-P2).

Consider the risk management measures as outlined in the exposure scenario.

9 Physical and chemical properties

Physical and chemical properties

Appearance (physical state, colour etc):	Colourless, Light yellow, Viscous, liquid
Odour:	Ammoniacal
Odour threshold:	No data available
pH:	11 - 11.7 @ 2 % 15.8 - 20 °C (60.4 - 68 °F)
Melting/Freezing Point:	-5 - 21 °C (23 - 70 °F) (1,013 hPa)
Initial boiling point and boiling range:	119.1 - 336.1 °C (246.4 - 637.0 °F) (1013 hPa)
Flash point:	138 - 194.4 °C (280 - 381.9 °F) (1,013 hPa)
Evaporation rate:	< 0.1 n-Butyl Acetate
Flammability (solid, gas):	No data available
Upper/lower flammability or explosive limits:	UEL 7.2 %(V)/ LEL 3.6 %(V)
Vapour pressure:	0.0002 - 9.7 mmHg @ 20 - 21 °C (68 - 70 °F)
Vapour density:	5.1
Relative density:	1.119 - 1.125 @ 20 °C (68 °F) Reference substance: (water = 1)
Solubility(ies):	1,000 g/l completely miscible (water)
Partition coefficient:	No data available
n-octanol/water Log POW:	-2.3
Auto-ignition temperature:	324 - 330 °C
Decomposition temperature:	> 120 °C
Viscosity Viscosity, dynamic:	934 mPa.s @ 20 °C (68 °F)
Viscosity, kinematic:	182 mm2/s @ 40 °C (104 °F)
Oxidizing properties:	The substance or mixture is not classified as oxidizing.

NOTE: The physical data presented above are typical values and should not be construed as a specification.

10 Stability and reactivity

Reactivity

No hazardous reactions if stored and handled as prescribed/indicated. Corrosive effects to metal are not anticipated. In the presence of water or moisture metal corrosion cannot be excluded.

Formation of flammable gases
Forms no flammable gases in the presence of water.

Chemical stability

The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions

Reacts with acids. Reacts with oxidizing agents. Reacts with acid chlorides. Reacts with halogenated compounds. The progress of reaction is exothermic. Incompatible with acid chlorides and acid anhydrides. In the presence of nitrosating agents this substance can form nitrosamines.

Conditions to avoid

Temperature: 60 °C. **Avoid** excessive temperatures. See MSDS section 7 - Handling and storage.

Incompatible materials

Substances to **avoid**: oxidizing agents, isocyanates, acid anhydrides, acid chlorides, acids, acid forming substances, copper alloys, mild steel.

Hazardous decomposition products

No hazardous decomposition products if stored and handled as prescribed/indicated.

Hazardous decomposition products
Carbon oxides, nitrogen oxides, nitrous gases.

11 Toxicological information

Toxicological (health) effects

Inhaled
The material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage. Rats exposed to triethanolamine for six hours showed no abnormality. Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be harmful. Limited evidence exists that this substance may cause irreversible mutations (though not lethal) even following a single exposure.

Ingestion
Limited evidence exists that this substance may cause irreversible mutations (though not lethal) even following a single exposure.
Ingestion of triethanolamine may cause gastro-intestinal irritation with bleeding, burning or painful sensations in the mouth, throat, chest and abdomen, vomiting and diarrhoea. Animal testing has also shown sluggishness, excessive tear secretion, hairs standing up, unsteady gait, and red/brown discharge on hair around the nose and genitals. Lethal dose in 70 kg man is 560gms. Accidental ingestion of the material may be harmful; animal experiments indicate that ingestion of less than 150 gram may be fatal or may produce serious damage to the health of the individual.

Skin Contact
The material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering. 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. Skin exposure to triethanolamine may cause slight irritation with itching, local redness, swelling and tissue destruction, sensitisation (in a small proportion of individuals), and reddened blisters. Exposure of animals to toxic levels of triethanolamine may cause sluggishness, unsteady gait, emaciation and discolouration of body organs. Skin contact with the material may be harmful; systemic effects may result following absorption.

Eye Contact
If applied to the eyes, this material causes severe eye damage. When 0.2 ml diethanolamine was dropped into rabbit eye and rinsed out after 15 seconds, there was a moderate to severe eye irritation and injury. A drop of ethanolamine into eye causes injury slightly less than that produced by ammonia say grade 9, on a 1 to 10 scale, but that into the rabbit eyes (0.005ml) caused severe eye injury with vascularisation, deformation, severe iris inflammation and conjunctival irritation.

Chronic
Long-term exposure to respiratory irritants may result in airways disease, involving difficulty breathing and related whole-body problems.

Skin contact with the material is more likely to cause a sensitisation reaction in some persons compared to the general population.

This material can cause serious damage if one is exposed to it for long periods. It can be assumed that it contains a substance which can produce severe defects. There has been some concern that this material can cause cancer or mutations but there is not enough data to make an assessment. Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure. Based on laboratory and animal testing, exposure to the material may result in irreversible effects and mutations in humans. Triethanolamine is reported to cause reversible kidney and liver damage but not cancer or foetal toxicity. However, its reaction with nitrites and nitrous acid may produce potent cancer causing agent - N-nitrosodiethanolamine. Prolonged or chronic exposure to alkanolamines may result in liver, kidney or nervous system injury. Repeated inhalation may aggravate asthma and lung disease involving inflammation or scarring. Results of animal testing with diethanolamine (DEA) and monoethanolamine (MEA) has shown a wide range of possible effects, including induction of tumours, developmental abnormalities and injury to the foetus and mother. Many amines greatly sensitise the skin and respiratory system, and certain individuals, especially those predisposed to asthma and other allergic responses, may show allergic reactions when chronically exposed to alkanolamines.

Information on the likely routes of exposure

There are generally four routes of possible or potential exposure: inhalation, skin contact, eye contact, and swallowing.

Symptoms related to the physical, chemical and toxicological characteristics

Asthma-like symptoms may continue for months or even years after exposure to the material ends. This may be due to a non-allergic condition known as reactive airways dysfunction syndrome (RADS) which can occur after exposure to high levels of highly irritating compound. Main criteria for diagnosing RADS include the absence of previous airways disease in a non-atopic individual, with sudden onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. Other criteria for diagnosis of RADS include a reversible airflow pattern on lung function tests, moderate to severe bronchial hyperreactivity on methacholine challenge testing, and the lack of minimal lymphocytic inflammation, without eosinophilia. 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. On the other hand, industrial bronchitis is a disorder that occurs as a result of exposure due to high concentrations of irritating substance (often particles) and is completely reversible after exposure ceases. The disorder is characterized by difficulty breathing, cough and mucus production. Overexposure to most of these materials may cause adverse health effects. Many amine-based compounds can cause release of histamines, which, in turn, can trigger allergic and other physiological effects, including constriction of the bronchi or asthma and inflammation of the cavity of the nose. Whole-body symptoms include headache, nausea, faintness, anxiety, a decrease in blood pressure, rapid heartbeat, itching, reddening of the skin, urticaria (hives) and swelling of the face, which are usually transient.

Delayed and immediate effects and also chronic effects from short and long term exposure

Inhalation

Inhaling vapours may result in moderate to severe irritation of the tissues of the nose and throat and can irritate the lungs. Higher concentrations of certain amines can produce severe respiratory irritation, characterized by discharge from the nose, coughing, difficulty in breathing and chest pain.

Chronic exposure via inhalation may cause headache, nausea, vomiting, drowsiness, sore throat, inflammation of the bronchi and lungs, and possible lung damage. Repeated and/or prolonged exposure to some amines may result in liver disorders, jaundice and liver enlargement.

Dermal

The material may cause 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. DEA has low acute toxicity if ingested orally or applied on the skin. It can cause moderate skin irritation and severe eye irritation. It may affect sperm production, cause anaemia and damage the liver and kidney.

Carcinogenicity

There is inadequate evidence in humans for the carcinogenicity of triethanolamine. There is inadequate evidence in experimental animals for the carcinogenicity of triethanolamine.

Overall evaluation

Triethanolamine is not classifiable as to its carcinogenicity to humans (Group 3).

Numerical measures of toxicity (such as acute toxicity estimates)

Triethanolamine

TOXICITY		IRRITATION	
dermal (rat)	LD_{50}: > 16 000 mg/kg	Eye (rabbit):	0.1 ml - mild
Oral (rat)	LD_{50}: 5 560 mg/kg	Eye (rabbit):	10 mg - mild
Eye (rabbit):	5.62 mg - SEVERE minor conjunctival irritation no irritation *		
Skin (human):	15 mg/3d (int)-mild		
Skin (rabbit):	4 h occluded		
Skin (rabbit):	560 mg/24 hr- mild		

Diethanolamine

TOXICITY		IRRITATION	
Dermal (rabbit)	LD_{50}: 12 200 mg/kg	Eye (rabbit):	5 500 mg - SEVERE
Oral (rat)	LD_{50}: 710 mg/kg	Eye (rabbit):	0.75 mg/24 hr SEVERE

Skin (rabbit):	50 mg (open)-mild
Skin (rabbit):	500 mg/24 hr-mild

Ethanolamine

TOXICITY		IRRITATION	
Dermal (rabbit)	LD_{50}: 1 000 mg/kg	Eye (rabbit):	0.76 mg - SEVERE
Oral (rat)	LD_{50}: 1 510 mg/kg	Skin (rabbit):	505 mg open-moderate

Interactive effects

Triethanolamine was not mutagenic to Bacillus subtilis by itself, but it became mutagenic after reacting with sodium nitrite under acidic conditions or when the mixture was heated.

Cutting fluids are widely used in the metal-machining industry to lubricate and reduce heat generation when metals are cut by a metal-cutting tool. These cutting fluids have caused occupational irritant contact dermatitis (OICD), and many of the additives used in these cutting fluid mixtures are thought to be responsible for OICD in workers. The purpose of this study was to assess single or various combinations of these additives in initiating the OICD response following an acute 8-hour exposure in porcine skin in vivo and in vitro using the isolated perfused porcine skin flap (IPPSF) and human epidermal keratinocytes (HEK).

Pigs (n = 4) were exposed to 5% mineral oil (MO) or 5% polyethylene glycol (PEG) aqueous mixtures containing various combinations of 2% triazine (TRI), 5% triethanolamine (TEA), 5% linear alkylbenzene sulfonate (LAS), or 5% sulfurized ricinoleic acid (SRA). Erythema and edema were evaluated and skin biopsies for histopathology were obtained at 4 and 8 hours. IPPSFs (n = 4) were exposed to control MO or PEG mixtures and complete MO or PEG mixtures, and perfusate samples were collected hourly to determine interleukin- (IL-) 8 release. The only significant ($p < 0.05$) mixture effects observed in IPPSFs were with SRA + MO that caused an increase in IL-8 release after 1 or 2 hours' exposure.

In vivo exposure to TRI alone appeared to increase erythema, edema, and dermal inflammation compared to the other additives, while SRA alone was least likely to initiate a dermal inflammatory response. In 2-component mixture exposures, the presence of TRI appeared to increase the dermal inflammatory response at 4 and 8 hours especially with the PEG mixtures. In the 3- and 4-component mixtures, MO mixtures are more likely to incite an inflammatory response than PEG mixtures. TRI exhibited the highest toxicity toward HEK, which correlates well to the in vivo irritation and morphology results.

In summary, these preliminary studies suggest that the biocide, TRI, is the more potent of the 4 performance additives in causing dermal irritation, and this may vary depending on whether the worker is exposed to a synthetic (PEG)- or MO-based fluid. These findings will however require further clinical studies to validate these acute dermal effects as well as human cumulative irritation following exposure to similar cutting fluid formulations in the workplace.

Where specific chemical data are not available

No additional data available.

Mixtures

No additional data available.

Mixture versus ingredient information

No additional data available.

Other information

No additional data available.

12 Ecological information

Toxicity

Triethanolamine

ENDPOINT TEST	DURATION (HR)	SPECIES	VALUE
LC_{50}	96	Fish	11 800 mg/L
EC_{50}	96	Algae or other aquatic plants	169 mg/L
EC_{10}	96	Algae or other aquatic plants	7.1 mg/L

NOEC	504	Crustacea	16 mg/L

Diethanolamine

ENDPOINT TEST	DURATION (HR)	SPECIES	VALUE
LC_{50}	96	Fish	100 mg/L
EC_{50}	48	Crustacea	28.8 mg/L
EC_{50}	96	Algae or other aquatic plants	2.1 - 2.3 mg/L
EC_{10}	72	Algae or other aquatic plants	2.5 mg/L
NOEC	504	Crustacea	0.78 mg/L

Persistence and degradability

Ingredient	Persistence: Water/Soil	Persistence: Air
Triethanolamine	LOW	LOW
Diethanolamine	LOW (Half-life = 14 days)	LOW (Half-life = 0.3 days)
Ethanolamine	LOW	LOW

Bioaccumulative potential

Ingredient	Bioaccumulation
Triethanolamine	LOW (BCF = 3.9)
Diethanolamine	LOW (BCF = 1)
Ethanolamine	LOW (LogKOW = -1.31)

Mobility in soil

Ingredient	Mobility
Triethanolamine	LOW (KOC = 10)
Dethanolamine	HIGH (KOC = 1)
Ethanolamine	HIGH (KOC = 1)

Other adverse effects

No additional data available.

13 Disposal considerations

Disposal methods

Waste disposal recommendations

At the time of review, criteria for land treatment or burial (sanitary landfill) disposal practices are subject to significant revision. Prior to implementing land disposal of waste residue (including waste sludge), consult with environmental regulatory agencies for guidance on acceptable disposal practices.

Dispose of waste and container in accordance with local and/or national regulations. Hazardous waste shall not be mixed together with other waste. Different types of hazardous waste shall not be mixed together if this may entail a risk of pollution or create problems for the further management of the waste. Hazardous waste shall be managed responsibly. All entities that store, transport or handle hazardous waste shall take the necessary measures to prevent risks of pollution or damage to people or animals. Recycle/reuse. Remove for physico-chemical/biological treatment. **DO NOT** discharge into drains or the environment.

Ecology - waste materials

DO NOT release to the environment.

Empty Container

DO NOT reuse container. Rinse/Decontaminate thoroughly before discarding in trash or return to supplier.

14 Transport information

UN Number

UN3082 Class 9 PG III Exempt 1 000 F: 1

UN Proper Shipping Name

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.

Transport hazard class(es)

Class 9

Packing group, if applicable

III **Exempt Quantity** 1 000Kg **Factor** 1

Environmental hazards

Avoid discharge into the environment. Low toxicity to the environment.

Special precautions for user

DO NOT load with Classes 1.
Can be loaded with all other classes.
Goods of different classes **must** be segregated by an air space of at least 100mm or by an approved segregation device or non-dangerous goods.

P, B, L and O provisions as per SANS 10231:2006
L13
If any substance has leaked and spilt in a vehicle or container, the vehicle or container may not be re-used until after it has been thoroughly cleaned and, if necessary, disinfected or decontaminated. Any other goods and articles carried in the same vehicle or container shall be examined for possible contamination.

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code

Not applicable.

15 Regulatory information

Safety, health and environmental regulations specific for the product in question

SA NATIONAL LEGISLATION
Hazardous Substances Act 15 of 1973 and Regulations.
Occupational Health and Safety Act 85 of 1993 and Regulations.

SA NATIONAL STANDARDS
SANS 10228 : 2006 : Identification and Classification of Dangerous Goods for Transport by Road and Rail.
SANS 10231 : 2018 : Transport of dangerous goods - Operational requirements for road vehicles.
SANS 10234 : 2008 : Globally Harmonized System of classification and labelling of chemicals (GHS).
SANS 11014 : 2010 : Safety Data Sheets for chemical Products.

REACH Regulation (EC) No 1907/2006
This product contains only components that have been either pre-registered, registered, are exempt from registration, are regarded as registered or are not subject to registration according to Regulation (EC) No. 1907/2006 (REACH)., The aforementioned indications of the REACH registration status are provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. It is the buyer´s/user´s responsibility to ensure that his/her understanding of the regulatory status of this product is correct.

Seveso III: Directive 2012/18/EU
Listed in Regulation: Not applicable

International	Inventory	Status
Australia	AICS	Y
Canada	DSL	Y
Canada	NDSL	N (diethanolamine; ethanolamine; triethanolamine)
China	IECSC	Y
Europe	EINEC / ELINCS / NLP	Y

Japan	ENCS	Y
Korea	KECI	Y
New Zealand	NZIoC	Y
Philippines	PICCS	Y
USA	TSCA	Y

Legend:
Y = All ingredients are on the inventory
N = Not determined or one or more ingredients are not on the inventory and are not exempt from listing(see specific ingredients in brackets)

Chemical safety assessment
Not assessed.

16 Other information

Other information

Full text of H & P-Statements referred to under section 2.
Hazard statements

H302	Harmful if swallowed
H315	Causes skin irritation
H318	Causes serious eye damage
H361	Suspected of damaging fertility or the unborn child
H373	May cause damage to organs through prolonged or repeated exposure

Precautionary statements

P201+P202	Obtain special instructions before use. Do not handle until all safety precautions have been read and understood.
P260	Do not breathe dust/fume/gas/mist/vapours/spray.
P264	Wash thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P280	Wear protective gloves/protective clothing/eye protection/face protection.
P301+P312	IF SWALLOWED: call a POISON CENTER or doctor/physician IF you feel unwell.
P302+P352	IF ON SKIN: Wash with plenty of soap and water.
P305+P351+P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P308+P313	IF exposed or concerned: Get medical advice/attention.
P310	Immediately call a POISON CENTER or doctor/physician.
P321	Specific treatment (see P351+P352 on this label).
P330	Rinse mouth.
P332+P313	If skin irritation occurs: Get medical advice/attention.
P362+P364	Take off contaminated clothing and wash it before reuse.
P405	Store locked up.
P501	Dispose of contents and container in accordance with local, regional, national, international regulations.

Labelling REGULATION (EC) No 1272/2008
Signal Word
Danger
Pictograms

GHS05	Corrosive hazard
GHS07	Health hazard
GHS08	Serious health hazard

Pictogram Hazard during Transport

Class 9	Environmental hazardous substance

Training advice
Provide adequate information, instruction and training for operators.

Compiled by Aquatrade Water Treatment Chemicals (Pty) Ltd, R. van Rooyen, SHEQ Co-ordinator and E. Le Sar, Director.

MANUFACTURER/SUPPLIER DISCLAIMER:

Revision History

Revision	Date	Change
1.0	2019/04/17	Preparation of the safety data sheet according to SANS 11014:2010