

TETRAETHYLENEPENTAMINE (TEPA)

Version	Revision Date:	SDS Number:	Date of last issue: 03/25/2020
3.1	06/11/2020	400001020082	Date of first issue: 03/10/2016

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SECTION 1. IDENTIFICATION

Product name : TETRAETHYLENEPENTAMINE (TEPA)

Manufacturer or supplier's details

Company name of supplier : Huntsman International LLC
Address : P.O. Box 4980
The Woodlands,
TX 77387
United States of America (USA)
Telephone : TechInfo: (281) 719-7780

E-mail address of person responsible for the SDS : Global_Product_EHS_HPP@huntsman.com

Emergency telephone number : Chemtrec: (800) 424-9300 or (703) 527-3887

Recommended use of the chemical and restrictions on use

Recommended use : Intermediate

Restrictions on use : For industrial use only.

SECTION 2. HAZARDS IDENTIFICATION**GHS classification in accordance with 29 CFR 1910.1200**

Acute toxicity (Oral) : Category 4

Acute toxicity (Dermal) : Category 4

Skin corrosion : Category 1

Serious eye damage : Category 1

Skin sensitisation : Category 1

Short-term (acute) aquatic hazard : Category 2

Chronic aquatic toxicity : Category 2

GHS label elements

Hazard pictograms :



Signal word : Danger

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Hazard statements : H302 + H312 Harmful if swallowed or in contact with skin.
H314 Causes severe skin burns and eye damage.
H317 May cause an allergic skin reaction.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264 Wash skin thoroughly after handling.
P270 Do not eat, drink or smoke when using this product.
P272 Contaminated work clothing must not be allowed out of the workplace.
P273 Avoid release to the environment.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
Response:
P301 + P312 + P330 IF SWALLOWED: Call a POISON CENTER/ doctor if you feel unwell. Rinse mouth.
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/ doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/ doctor.
P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.
Storage:
P405 Store locked up.
Disposal:
P501 Dispose of contents/container to an approved facility in accordance with local, regional, national and international regulations.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Substance

Hazardous components

Chemical name	CAS-No.	Concentration (% w/w)
3,6,9-triazaundecamethylenediamine	112-57-2	50 - 70
N-(2-aminoethyl)piperazine-1,4-diethylamine	31295-54-2	30 - 50
N,N,N'-tris(2-aminoethyl)ethylenediamine	31295-46-2	25 - 30
N-(2-aminoethyl)-N'-[2-(1-piperazinyl)ethyl]ethylenediamine	31295-49-5	10 - 20

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Triethylenetetramine	112-24-3	3 - 5
Amines, polyethylenepoly-	68131-73-7	3 - 5

The specific chemical identity and/or exact percentage (concentration) of composition may be withheld as a trade secret.

Triethylenetetramine is a multi-constituent substance that contains four TETA ethyleneamines including linear, branched, and two cyclic molecules (shown below). The linear CAS number (112-24-3) is commonly used to represent the entire mixture, but some jurisdictions may use the multi-constituent CAS number (90640-67-8).

N,N'bis (2-aminoethyl)-1,2-ethanediamine (TETA) - CAS 112-24-3
 N-[(2-aminoethyl)2-aminoethyl]piperazine (PEEDA) - CAS 24028-46-4
 N,N'-bis-(2-aminoethyl)piperazine (Bis AEP) - CAS 6531-38-0
 Tris-(2-aminoethyl)amine (Branched TETA) - CAS 4097-89-6

SECTION 4. FIRST AID MEASURES

- | | |
|---|--|
| General advice | : Move out of dangerous area.
Consult a physician.
Show this safety data sheet to the doctor in attendance.
Treat symptomatically.
Get medical attention if symptoms occur. |
| If inhaled | : If inhaled, remove to fresh air.
Get medical attention if symptoms occur. |
| In case of skin contact | : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty.
If on skin, rinse well with water.
If on clothes, remove clothes. |
| In case of eye contact | : Small amounts splashed into eyes can cause irreversible tissue damage and blindness.
In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Continue rinsing eyes during transport to hospital.
Remove contact lenses.
Keep eye wide open while rinsing.
If eye irritation persists, consult a specialist. |
| If swallowed | : Keep respiratory tract clear.
Do NOT induce vomiting.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.
Take victim immediately to hospital. |
| Most important symptoms and effects, both acute and delayed | : None known. |
| Notes to physician | : Treat symptomatically. |

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SECTION 5. FIREFIGHTING MEASURES

- Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
- Unsuitable extinguishing media : High volume water jet
- Specific hazards during firefighting : Do not allow run-off from fire fighting to enter drains or water courses.
- Hazardous combustion products : Ammonia
Carbon oxides
Nitrogen oxides (NOx)
- Specific extinguishing methods : No data is available on the product itself.
- Further information : Collect contaminated fire extinguishing water separately. This must not be discharged into drains.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.
- Special protective equipment for firefighters : Wear self-contained breathing apparatus for firefighting if necessary.

SECTION 6. ACCIDENTAL RELEASE MEASURES

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.
Refer to protective measures listed in sections 7 and 8.
- Environmental precautions : Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
If the product contaminates rivers and lakes or drains inform respective authorities.
- Methods and materials for containment and cleaning up : Neutralise with acid.
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
Keep in suitable, closed containers for disposal.

SECTION 7. HANDLING AND STORAGE

- Advice on protection against fire and explosion : Normal measures for preventive fire protection.
- Advice on safe handling : Do not breathe vapours/dust.
Avoid exposure - obtain special instructions before use.
Avoid contact with skin and eyes.

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For personal protection see section 8.

Smoking, eating and drinking should be prohibited in the application area.

To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations.

Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

- Conditions for safe storage : Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Keep in properly labelled containers.
- Materials to avoid : For incompatible materials please refer to Section 10 of this SDS.
- Further information on storage stability : Stable under normal conditions.

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION**Components with workplace control parameters**

Components	CAS-No.	Value type (Form of exposure)	Control parameters / Permissible concentration	Basis
3,6,9-triazaundecamethylenediamine	112-57-2	TWA	5 mg/m3	US WEEL
Triethylenetetramine	112-24-3	TWA	1 ppm	US WEEL

Personal protective equipment

- Respiratory protection : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Respiratory protection : General and local exhaust ventilation is recommended to maintain vapor exposures below recommended limits. Where concentrations are above recommended limits or are unknown, appropriate respiratory protection should be worn. Follow OSHA respirator regulations (29 CFR 1910.134) and use NIOSH/MSHA approved respirators. Protection provided by air purifying respirators against exposure to any hazardous chemical is limited. Use a positive pressure air supplied respirator if there is any potential for uncontrolled release, exposure levels are unknown, or any other circumstance where air purifying respirators may not provide adequate protection.

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Hand protection

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves.

Eye protection : Eye wash bottle with pure water
Tightly fitting safety goggles
Wear face-shield and protective suit for abnormal processing problems.

Skin and body protection : Impervious clothing
Choose body protection according to the amount and concentration of the dangerous substance at the work place.

Hygiene measures : When using do not eat or drink.
When using do not smoke.
Wash hands before breaks and at the end of workday.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance : liquid

Colour : off-white

Odour : odourless

Odour Threshold : No data is available on the product itself.

pH : 11.8
Concentration: 250 g/l

Freezing point : < -4 °F / < -20 °C

Boiling point : 707 °F / 375 °C
(1,013 hPa)

Flash point : 325 °F / 163 °C
Method: open cup
> 351 °F / > 177 °C
Method: ISO 1523, closed cup

Evaporation rate : No data is available on the product itself.

Flammability (solid, gas) : No data is available on the product itself.

Flammability (liquids) : No data is available on the product itself.

Upper explosion limit / Upper flammability limit : No data is available on the product itself.

Lower explosion limit / Lower flammability limit : No data is available on the product itself.

Vapour pressure : 0.000189 hPa (68 °F / 20 °C)

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Method: OECD Test Guideline 104

Relative vapour density	:	6.53
Relative density	:	0.991 - 0.9994
Density	:	ca. 0.993 g/cm ³ (68 °F / 20 °C)
Solubility(ies)	:	
Water solubility	:	> 1,000 g/l soluble in cold water (68 °F / 20 °C) Method: OECD Test Guideline 105
Solubility in other solvents	:	Solvent: Methanol Description: partly soluble
Partition coefficient: n-octanol/water	:	log Pow: -3.16
Auto-ignition temperature	:	No data is available on the product itself.
Decomposition temperature	:	> 392 °F / > 200 °C Method: estimated
Self-Accelerating decomposition temperature (SADT)	:	No data is available on the product itself.
Viscosity	:	
Viscosity, dynamic	:	23.4 mPa.s (68 °F / 20 °C)
Explosive properties	:	No data is available on the product itself.
Oxidizing properties	:	None.
Molecular weight	:	189.31 g/mol
Metal corrosion rate	:	Not corrosive to metals
Particle size	:	No data is available on the product itself.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No dangerous reaction known under conditions of normal use.
Chemical stability	:	Stable under normal conditions.
Possibility of hazardous reactions	:	No hazards to be specially mentioned.
Conditions to avoid	:	None known.
Incompatible materials	:	None known.
Hazardous decomposition products	:	ammonia, anhydrous Aldehydes

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dinitrogen oxide

carbon monoxide

carbon dioxide

Ketones

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure : No data is available on the product itself.

Acute toxicity

Acute oral toxicity - Product : Acute toxicity estimate : 564.04 mg/kg
Method: Calculation method

Components:

Triethylenetetramine:
Acute inhalation toxicity : (Rat, male and female): Exposure time: 8 h
Test atmosphere: vapour
Method: OECD Test Guideline 403

Acute dermal toxicity - Product : Acute toxicity estimate : 1,100 mg/kg
Method: Calculation method

Acute toxicity (other routes of administration) : No data available

Skin corrosion/irritation**Components:**

3,6,9-triazaundecamethylenediamine:
Species: Rabbit
Result: Causes burns.

N-(2-aminoethyl)piperazine-1,4-diethylamine:
Result: Causes burns.

N,N,N'-tris(2-aminoethyl)ethylenediamine:
Result: Causes burns.

N-(2-aminoethyl)-N'-[2-(1-piperaziny)ethyl]ethylenediamine:
Result: Causes burns.

Triethylenetetramine:
Species: reconstructed human epidermis (RhE)
Method: OECD Test Guideline 435
Result: Corrosive after 3 minutes to 1 hour of exposure

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Species: Rabbit
Method: OECD Test Guideline 404
Result: Corrosive after 3 minutes to 1 hour of exposure

Amines, polyethylenepoly-:
Species: Rabbit
Method: OECD Test Guideline 404
Result: Corrosive after 3 minutes to 1 hour of exposure

Serious eye damage/eye irritation**Components:**

3,6,9-triazaundecamethylenediamine:

Species: Rabbit

Result: Corrosive

Assessment: Corrosive

N-(2-aminoethyl)piperazine-1,4-diethylamine:

Result: Risk of serious damage to eyes.

N,N,N'-tris(2-aminoethyl)ethylenediamine:

Result: Risk of serious damage to eyes.

N-(2-aminoethyl)-N'-[2-(1-piperazinyl)ethyl]ethylenediamine:

Result: Risk of serious damage to eyes.

Triethylenetetramine:

Species: Rabbit

Result: Irreversible effects on the eye

Method: OECD Test Guideline 405

Amines, polyethylenepoly-:

Species: Rabbit

Result: Risk of serious damage to eyes.

Method: OECD Test Guideline 405

Respiratory or skin sensitisation**Components:**

3,6,9-triazaundecamethylenediamine:

Exposure routes: Skin

Species: Guinea pig

Method: OECD Test Guideline 406

Result: May cause sensitisation by skin contact.

N-(2-aminoethyl)piperazine-1,4-diethylamine:

Result: May cause sensitisation by skin contact.

N,N,N'-tris(2-aminoethyl)ethylenediamine:

Result: May cause sensitisation by skin contact.

N-(2-aminoethyl)-N'-[2-(1-piperazinyl)ethyl]ethylenediamine:

Result: May cause sensitisation by skin contact.

Triethylenetetramine:

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Exposure routes: Skin
Species: Humans
Assessment: Probability or evidence of skin sensitisation in humans
Result: Probability or evidence of skin sensitisation in humans

Amines, polyethylenepoly-:
Exposure routes: Skin
Species: Guinea pig
Method: OECD Test Guideline 406
Result: May cause sensitisation by skin contact.

Assessment: No data available

Germ cell mutagenicity**Components:**

3,6,9-triazaundecamethylenediamine:

Genotoxicity in vitro : Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 479
Result: positive

Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Metabolic activation: negative
Method: OECD Test Guideline 482
Result: negative

Triethylenetetramine:

Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: positive

Amines, polyethylenepoly-:

Genotoxicity in vitro : Concentration: 0 - 1670 ug/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Concentration: 0 - 200 µg/L
Metabolic activation: negative
Method: OECD Test Guideline 482
Result: negative

Components:

3,6,9-triazaundecamethylenediamine:

Genotoxicity in vivo : Species: Mouse
Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: negative

Triethylenetetramine:

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Genotoxicity in vivo : Test Type: In vivo micronucleus test
Species: Mouse (male and female)
Cell type: Bone marrow
Application Route: Intraperitoneal injection
Dose: 0 - 600 mg/kg
Method: OECD Test Guideline 474
Result: negative

Amines, polyethylenepoly-:
Genotoxicity in vivo : Application Route: Intraperitoneal injection
Dose: 185 - 600 mg/kg
Method: OECD Test Guideline 474
Result: negative

Germ cell mutagenicity-
Assessment : No data available

Carcinogenicity**Components:**

3,6,9-triazaundecamethylenediamine:

Species: Mouse, male

Application Route: Dermal

Exposure time: 104 weeks

Dose: 20000 ppm

Frequency of Treatment: 3 daily

Method: OECD Test Guideline 451

Result: negative

Triethylenetetramine:

Species: Mouse, male

Dose: 42 mg/kg

Frequency of Treatment: 3 daily

NOAEL: >= 50 mg/kg bw/day

Method: OECD Test Guideline 451

Result: negative

Species: Mouse, male

Application Route: Dermal

Exposure time: 104 weeks

Dose: 16.8 mg/kg

Frequency of Treatment: 3 daily

NOAEL: >= 20 mg/kg bw/day

Method: OECD Test Guideline 451

Carcinogenicity -
Assessment : No data available

IARC

No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH

No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential

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carcinogen by ACGIH.

OSHA

No component of this product present at levels greater than or equal to 0.1% is on OSHA's list of regulated carcinogens.

NTP

No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

Reproductive toxicity

Effects on fertility : No data available

Components:

3,6,9-triazaundecamethylenediamine:

Effects on foetal development : Species: Rabbit, female
Application Route: Dermal
General Toxicity Maternal: No-observed-effect level: 50 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level: 750 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Species: Rat
Application Route: Oral
Result: No data available
Remarks: see user defined free text

Triethylenetetramine:

Test Type: Pre-natal
Species: Rat
Application Route: Oral
Dose: 75/325/750 mg/kg bw/day
Duration of Single Treatment: 10 d
General Toxicity Maternal: No observed adverse effect level: >= 750 mg/kg body weight
Developmental Toxicity: No observed adverse effect level: >= 750 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Test Type: Pre-natal
Species: Rabbit
Application Route: Dermal
Dose: 5/50/125 mg/kg bw/day
Duration of Single Treatment: 13 d
General Toxicity Maternal: No observed adverse effect level: 50 mg/kg body weight
Developmental Toxicity: No observed adverse effect level: >= 125 mg/kg body weight

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Method: OECD Test Guideline 414
Result: No teratogenic effects

Reproductive toxicity - : No data available
Assessment

STOT - single exposure

No data available

STOT - repeated exposure

No data available

Repeated dose toxicity**Components:**

3,6,9-triazaundecamethylenediamine:

Species: Rat, male and female

NOAEL: 50 mg/kg/d

Application Route: Ingestion

Exposure time: 26 Weeks

Method: Subchronic toxicity

Species: Rabbit, male and female

NOAEL: 50 mg/kg/d

Application Route: Skin contact

Exposure time: 744 h

Number of exposures: 5 d

Method: Subacute toxicity

Triethylenetetramine:

Species: Rat, male and female

NOAEL: 350 mg/kg

Application Route: Oral

Exposure time: 28 d

Number of exposures: 7 d

Dose: 100/350/1000 mg/kg bw/day

Method: OECD Test Guideline 407

Target Organs: Lungs

Remarks: Information given is based on data obtained from similar substances.

Species: Dog, male and female

NOAEL: 125 mg/kg

Application Route: Oral

Remarks: Information given is based on data obtained from similar substances.

Species: Dog, male and female

NOAEL: 50 mg/kg

Application Route: Oral

Method: Subchronic toxicity

Remarks: Information given is based on data obtained from similar substances.

Species: Rat, male and female

NOAEL: 50 mg/kg

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Application Route: Oral
Exposure time: 26 weeks
Dose: 50/175/600 mg/kg bw/day
Method: OECD Test Guideline 408
Target Organs: Lungs
Remarks: Information given is based on data obtained from similar substances.

Species: Mouse, male and female
NOAEL: 92 mg/kg, 600 ppm
Application Route: Oral
Exposure time: 120/600/3000 ppm
Method: OECD Test Guideline 408
Remarks: Information given is based on data obtained from similar substances.

Amines, polyethylenepoly-:
Species: Rat, male and female
LOAEL: 52 mg/kg/d
Application Route: Ingestion
Exposure time: 26 Weeks
Number of exposures: 7 d
Method: Subchronic toxicity

Repeated dose toxicity - : No data available
Assessment

Aspiration toxicity

No data available

Experience with human exposure

General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution

No data available

Neurological effects

No data available

Further information

Ingestion: No data available

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3,6,9-triazaundecamethylenediamine:

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 473 mg/l
Exposure time: 96 h
Test substance: Fresh water
Method: OECD Test Guideline 203

LC50 (Poecilia reticulata (guppy)): 420 mg/l

Exposure time: 96 h

Test Type: semi-static test

Test substance: Fresh water

Method: Directive 67/548/EEC, Annex V, C.1.

LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l

Exposure time: 96 h

Test substance: Fresh water

Method: OECD Test Guideline 203

Triethylenetetramine:

Toxicity to fish : LC50 (Pimephales promelas (fathead minnow)): 330 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: Fish Acute Toxicity Test

Amines, polyethylenepoly-:

Toxicity to fish : LC50 (Poecilia reticulata (guppy)): 100 mg/l
Exposure time: 96 h
Test Type: semi-static test
Test substance: Fresh water
Method: Directive 67/548/EEC, Annex V, C.1.

Components:

3,6,9-triazaundecamethylenediamine:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 24.1 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: Directive 67/548/EEC, Annex V, C.2.

Triethylenetetramine:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 31.1 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: Directive 67/548/EEC, Annex V, C.2.

Amines, polyethylenepoly-:

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Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 2.2 mg/l
 Exposure time: 48 h
 Test Type: static test
 Test substance: Fresh water
 Method: Directive 67/548/EEC, Annex V, C.2.

Components:

3,6,9-triazaundecamethylenediamine:

Toxicity to algae/aquatic plants : IC50 (Selenastrum capricornutum (green algae)): 2.1 mg/l
 Exposure time: 72 h
 Method: OECD Test Guideline 201

ErC50 (Selenastrum capricornutum (green algae)): 6.8 mg/l
 Exposure time: 72 h
 Test Type: static test
 Test substance: Fresh water
 Method: OECD Test Guideline 201

EbC50 (Selenastrum capricornutum (green algae)): 2.1 mg/l
 Exposure time: 72 h
 Test Type: static test
 Test substance: Fresh water
 Method: OECD Test Guideline 201

Triethylenetetramine:

Toxicity to algae/aquatic plants : ErC50 (Selenastrum capricornutum (green algae)): 20 mg/l
 Exposure time: 72 h
 Test Type: semi-static test
 Test substance: Fresh water
 Method: OECD Test Guideline 201

EC10 (Selenastrum capricornutum (green algae)): 1.34 mg/l
 Exposure time: 72 h
 Test Type: semi-static test
 Test substance: Fresh water
 Method: OECD Test Guideline 201

Amines, polyethylenepoly-:

Toxicity to algae/aquatic plants : EbC50 (Selenastrum capricornutum (green algae)): 0.23 mg/l
 Exposure time: 72 h
 Test Type: static test
 Test substance: Fresh water
 Method: OECD Test Guideline 201

Components:

Amines, polyethylenepoly-:

M-Factor (Acute aquatic toxicity) : 1
 Toxicity to fish (Chronic toxicity) : No data available

Components:

Triethylenetetramine:

Toxicity to daphnia and other : EC10 (Daphnia magna (Water flea)): 1.9 mg/l

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aquatic invertebrates
(Chronic toxicity)

Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 202

Components:

Amines, polyethylenepoly-:
M-Factor (Chronic aquatic toxicity) : 1

Components:

3,6,9-triazaundecamethylenediamine:

Toxicity to microorganisms : EC50: 97.3 mg/l
Exposure time: 2 h
Test Type: static test
Test substance: Fresh water

Triethylenetetramine:

Toxicity to microorganisms : NOEC (Bacteria): ≥ 100 mg/l
Exposure time: 28 d
Method: OECD Test Guideline 216

: EC50 (Bacteria): > 100 mg/l
Exposure time: 28 h
Method: OECD Test Guideline 216

: EC50 (Bacteria): 15.7 mg/l
Exposure time: 2 h
Test Type: static test
Test substance: Fresh water

: NOEC (Bacteria): 1.3 mg/l
Exposure time: 2 h
Test Type: static test
Test substance: Fresh water

Amines, polyethylenepoly-:

Toxicity to microorganisms : EC50: 319.3 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water

Components:

Triethylenetetramine:

Toxicity to soil dwelling organisms : NOEC (Eisenia fetida (earthworms)): ca. 1,000 mg/kg
Exposure time: 56 d
Method: OECD Test Guideline 222

EC50 (Eisenia fetida (earthworms)): $> 1,000$ mg/kg
Exposure time: 56 d
Method: OECD Test Guideline 222

Amines, polyethylenepoly-:

Toxicity to soil dwelling organisms : NOEC (Eisenia fetida (earthworms)): 1,000 mg/kg
Exposure time: 1,344 h

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Test substance: Synthetic
Method: OECD Test Guideline 222

Plant toxicity : No data available

Sediment toxicity : No data available

Toxicity to terrestrial organisms : No data available

Ecotoxicology Assessment**Components:**

3,6,9-triazaundecamethylenediamine:

Acute aquatic toxicity : This product has no known ecotoxicological effects.

Triethylenetetramine:

Acute aquatic toxicity : This product has no known ecotoxicological effects.

Amines, polyethylenepoly-:

Acute aquatic toxicity : Very toxic to aquatic organisms.

Components:

N-(2-aminoethyl)piperazine-1,4-diethylamine:

Chronic aquatic toxicity : Toxic to aquatic life with long lasting effects.

N,N,N'-tris(2-aminoethyl)ethylenediamine:

Chronic aquatic toxicity : Toxic to aquatic life with long lasting effects.

N-(2-aminoethyl)-N'-[2-(1-piperaziny)ethyl]ethylenediamine:

Chronic aquatic toxicity : Toxic to aquatic life with long lasting effects.

Triethylenetetramine:

Chronic aquatic toxicity : Harmful to aquatic life with long lasting effects.

Amines, polyethylenepoly-:

Chronic aquatic toxicity : Very toxic to aquatic life with long lasting effects.

Toxicity Data on Soil : No data available

Other organisms relevant to the environment : No data available

Persistence and degradability**Components:**

3,6,9-triazaundecamethylenediamine:

Biodegradability : Result: Not readily biodegradable.
Biodegradation: < 60 %
Exposure time: 28 d

Inoculum: activated sludge
Result: Not biodegradable
Biodegradation: 17 %
Exposure time: 84 d

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Method: Inherent Biodegradability: Modified SCAS Test

Triethylenetetramine:
Biodegradability

: Inoculum: activated sludge
Result: Not readily biodegradable.
Biodegradation: 0 %
Exposure time: 162 d
Method: OECD Test Guideline 301D

Test Type: aerobic
Inoculum: activated sludge
Result: Not inherently biodegradable.
Biodegradation: 20 % (Dissolved organic carbon (DOC))
Exposure time: 84 d
Method: OECD Test Guideline 302A

Amines, polyethylenepoly-:
Biodegradability

: Result: Not readily biodegradable.
Biodegradation: 0 %
Method: OECD Test Guideline 301D

Biodegradation: 16 %
Exposure time: 84 d
Method: Inherent Biodegradability: Modified SCAS Test

Biochemical Oxygen
Demand (BOD)

: No data available

Components:

Triethylenetetramine:

Chemical Oxygen Demand (COD) : 1,940 mg/g
BOD/COD : No data available

ThOD : No data available

BOD/ThOD : No data available

Dissolved organic carbon (DOC) : No data available

Physico-chemical
removability : No data available

Stability in water : No data available

Photodegradation : No data available

Impact on Sewage
Treatment : No data available**Bioaccumulative potential**

Bioaccumulation : No data available

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Partition coefficient: n-octanol/water - Product : log Pow: -3.16

Mobility in soil

Mobility : No data available

Components:

3,6,9-triazaundecamethylenediamine:

Distribution among environmental compartments : Koc: 3.2 - 3.7
Method: OECD Test Guideline 106

Triethylenetetramine:

Distribution among environmental compartments : Koc: 1584.9 - 5012
Method: OECD Test Guideline 106

Amines, polyethylenepoly-:

Distribution among environmental compartments : Koc: > 3.5
Method: OECD Test Guideline 121

Stability in soil : No data available

Other adverse effects

Environmental fate and pathways : No data available

Results of PBT and vPvB assessment : No data available

Endocrine disrupting potential : No data available

Adsorbed organic bound halogens (AOX) : No data available

Hazardous to the ozone layer

Ozone-Depletion Potential : Regulation: 40 CFR Protection of Environment; Part 82
Protection of Stratospheric Ozone - CAA Section 602 Class I Substances
Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

Additional ecological information - Product : An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.
Toxic to aquatic life with long lasting effects.

Global warming potential (GWP) : No data available

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SECTION 13. DISPOSAL CONSIDERATIONS**Disposal methods**

Waste from residues	: The product should not be allowed to enter drains, water courses or the soil. Do not contaminate ponds, waterways or ditches with chemical or used container. Send to a licensed waste management company. Dispose of as hazardous waste in compliance with local and national regulations. Dispose of contents/ container to an approved waste disposal plant.
Contaminated packaging	: Empty remaining contents. Dispose of as unused product. Do not re-use empty containers.

SECTION 14. TRANSPORT INFORMATION**International Regulations****IATA**

UN/ID No.	: UN 2320
Proper shipping name	: Tetraethylenepentamine
Class	: 8
Packing group	: III
Labels	: Corrosive
Packing instruction (cargo aircraft)	: 856
Packing instruction (passenger aircraft)	: 852

IMDG

UN number	: UN 2320
Proper shipping name	: TETRAETHYLENEPENTAMINE
Class	: 8
Packing group	: III
Labels	: 8
EmS Code	: F-A, S-B
Marine pollutant	: yes

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

Not applicable for product as supplied.

National Regulations**DOT Classification**

UN/ID/NA number	: UN 2320
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Proper shipping name : TETRAETHYLENEPENTAMINE

Class : 8

Packing group : III

Labels : CORROSIVE

ERG Code : 153

Marine pollutant : yes

Special precautions for user

The transport classification(s) provided herein are for informational purposes only, and solely based upon the properties of the unpackaged material as it is described within this Safety Data Sheet. Transportation classifications may vary by mode of transportation, package sizes, and variations in regional or country regulations.

SECTION 15. REGULATORY INFORMATION**EPCRA - Emergency Planning and Community Right-to-Know Act****CERCLA Reportable Quantity**

This material does not contain any components with a CERCLA RQ.

SARA 311/312 Hazards : Acute toxicity (any route of exposure)
Serious eye damage or eye irritation
Respiratory or skin sensitisation
Skin corrosion or irritation

SARA 313 : This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

This product does not contain any hazardous air pollutants (HAP), as defined by the U.S. Clean Air Act Section 112 (40 CFR 61).

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

The components of this product are reported in the following inventories:

DSL : All components of this product are on the Canadian DSL

ENCS : On the inventory, or in compliance with the inventory

AICS : On the inventory, or in compliance with the inventory

NZIoC : On the inventory, or in compliance with the inventory

KECI : On the inventory, or in compliance with the inventory

PICCS : On the inventory, or in compliance with the inventory

IECSC : On the inventory, or in compliance with the inventory

TCSI : On the inventory, or in compliance with the inventory

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TSCA : On the inventory, or in compliance with the inventory

Inventories

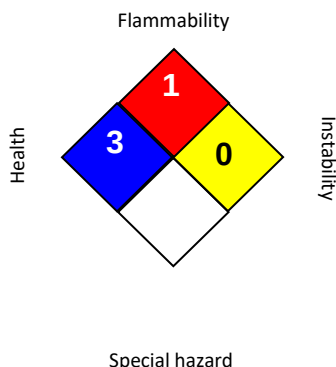
AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

TSCA - 5(a) Significant New Use Rule List of Chemicals

No substances are subject to a Significant New Use Rule.

US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)

No substances are subject to TSCA 12(b) export notification requirements.

SECTION 16. OTHER INFORMATION**Further information****NFPA 704:****HMIS® IV:**

HEALTH	3
FLAMMABILITY	1
PHYSICAL HAZARD	0

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks. The "*" represents a chronic hazard, while the "/" represents the absence of a chronic hazard

Revision Date : 06/11/2020

US WEEL : USA. Workplace Environmental Exposure Levels (WEEL)
US WEEL / TWA : 8-hr TWA

The information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

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Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.

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