SAFETY DATA SHEET

D.E.H.® 26 Epoxy Hardener

Version	Revision Date:	SDS Number:	Date of last issue: 03-29-2021
10.0	06-18-2021	101233052	Date of first issue: 06-18-2021

BLUE CUBE OPERATIONS LLC encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the pre-cautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

SECTION 1. IDENTIFICATION

Product name	:	D.E.H.® 26 Epoxy Hardener
Product code	:	000000001000000972

Manufacturer or supplier's details

Company name of supplier	:	BLUE CUBE OPERATIONS LLC
Address	:	190 CARONDELET PLAZA, SUITE 1530 CLAYTON MO 63105-3467
Telephone	:	(844) 238-3445
E-mail address	:	INFO@OLIN.COM
Emergency telephone	:	+1 800 424 9300
Local Emergency Contact	:	1-800-424-9300

Recommended use of the chemical and restrictions on use

Identified uses	:	Polyamide resins. Oil additive. Others.
Recommended use	:	For industrial use.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Acute toxicity (Dermal)	:	Category 4
Skin corrosion	:	Category 1B
Serious eye damage	:	Category 1
Skin sensitization	:	Sub-category 1B

GHS label elements

Hazard pictograms :

Signal Word : Danger

Hazard Statements : Harmful in contact with skin.
Causes severe skin burns and eye damage.
May cause an allergic skin reaction.

Precautionary Statements :

Prevention:

P261 Avoid breathing dust/ fume/ gas/ mist/ vapors/ spray.
P264 Wash skin thoroughly after handling.
P272 Contaminated work clothing must not be allowed out of the workplace.
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.

Response:

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.

Storage:

P405 Store locked up.

Disposal:

P501 Dispose of contents/ container to an approved waste disposal plant.

Other hazards

None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Components

Chemical name	CAS-No.	Concentration (% w/w)
Tetraethylenepentamine mixture	112-57-2	> 90
Triethylenetetramine mixture	112-24-3	< 5

Pentaethylenehexamine mixture	4067-16-7	< 5

Actual concentration is withheld as a trade secret
CAS# 112-24-3, 112-57-2 and 4067-16-7 are for the linear components of the mixture.

SECTION 4. FIRST AID MEASURES

If inhaled	:	Move person to fresh air; if effects occur, consult a physician.
In case of skin contact	:	Immediate continued and thorough washing in flowing water for at least 30 minutes is imperative while removing contaminated clothing. Prompt medical consultation is essential. Wash clothing before reuse. Properly dispose of leather items such as shoes, belts, and watchbands. Suitable emergency safety shower facility should be immediately available.
In case of eye contact	:	Wash immediately and continuously with flowing water for at least 30 minutes. Remove contact lenses after the first 5 minutes and continue washing. Obtain prompt medical consultation, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.
If swallowed	:	Do not induce vomiting. Give one cup (8 ounces or 240 ml) of water or milk if available and transport to a medical facility. Do not give anything by mouth unless the person is fully conscious.
Most important symptoms and effects, both acute and delayed	:	Aside from the information found under Description of first aid measures(above)any additional important symptoms and effects are described in Section 11: Toxicology Information.
Protection of first-aiders	:	First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.
Notes to physician	:	Chemical eye burns may require extended irrigation. Obtain prompt consultation, preferably from an ophthalmologist. If burn is present, treat as any thermal burn, after decontamination. Due to irritant properties, swallowing may result in burns/ulceration of mouth, stomach and lower gastrointestinal tract with subsequent stricture. Aspiration of vomitus may cause lung injury. Suggest endotracheal/esophageal control if lavage is done. No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

SECTION 5. FIRE-FIGHTING MEASURES

Suitable extinguishing media	:	Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective.
Unsuitable extinguishing media	:	Do not use direct water stream. May spread fire.
Specific hazards during fire fighting	:	Heat is generated when product mixes with water. Container may rupture from gas generation in a fire situation. Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.
Hazardous combustion products	:	During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Nitrogen oxides. Carbon monoxide. Carbon dioxide.
Further information	:	Keep people away. Isolate fire and deny unnecessary entry. Use water spray to cool fire exposed containers and fire affected zone until fire is out and danger of reignition has passed. Fight fire from protected location or safe distance. Consider the use of unmanned hose holders or monitor nozzles. Immediately withdraw all personnel from the area in case of rising sound from venting safety device or discoloration of the container. Burning liquids may be extinguished by dilution with water. Do not use direct water stream. May spread fire. Move container from fire area if this is possible without hazard. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water should be applied in large quantities as fine spray.
Special protective equipment for fire-fighters	:	Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). Avoid contact with this material during fire fighting operations. If contact is likely, change to full chemical resistant fire fighting clothing with self-contained breathing apparatus. If this is not available, wear full chemical resistant clothing with self-contained breathing apparatus and fight fire from a remote location. For protective equipment in post-fire or non-fire clean-up situations, refer to the relevant sections.

SECTION 6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures	:	Evacuate area. Only trained and properly protected personnel must be involved in clean-up operations. Keep upwind of spill. Ventilate area of leak or spill. Refer to section 7, Handling, for additional precautionary measures. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection.
Environmental precautions	:	Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.
Methods and materials for containment and cleaning up	:	Contain spilled material if possible. Small spills: Absorb with materials such as: Sand. Dirt. Milsorb®. Clay. Avoid contact with absorbent materials such as: Ground corn cobs. Moist organic absorbents. Peat moss. Sawdust. Collect in suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

SECTION 7. HANDLING AND STORAGE

Advice on safe handling	:	Do not get in eyes. Do not get on skin or clothing. Avoid prolonged or repeated contact with skin. Avoid prolonged contact with eyes, skin and clothing. Wash thoroughly after handling. Do not swallow. Avoid breathing vapor. Use with adequate ventilation. Keep container closed. Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.
Conditions for safe storage	:	Hold bulk storage under nitrogen blanket. Store in the following material(s): Stainless steel. Aluminum. Do not store in: Brass. Bronze. Copper.

Copper alloys.

Recommended storage temperature : 39 - 109 °F / 4 - 43 °C

Storage period : 24 Months

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

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

Engineering measures : Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations.
Local exhaust ventilation may be necessary for some operations.

Personal protective equipment

Respiratory protection : Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. For most conditions no respiratory protection should be needed; however, if discomfort is experienced, use an approved air-purifying respirator.

Filter type : The following should be effective types of air-purifying respirators: Organic vapor cartridge.

Hand protection

Remarks : Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Polyethylene. Ethyl vinyl alcohol laminate ('EVAL'). Examples of acceptable glove barrier materials include: Butyl rubber. Natural rubber ('latex'). Neoprene. Nitrile/butadiene rubber ('nitrile' or 'NBR'). Polyvinyl alcohol ('PVA'). Polyvinyl chloride ('PVC' or 'vinyl'). Viton. NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as

well as the instructions/specifications provided by the glove supplier.

Eye protection : Use chemical goggles.

Skin and body protection : Use protective clothing chemically resistant to this material. Selection of specific items such as face shield, boots, apron, or full body suit will depend on the task.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	:	Liquid.
Color	:	Yellow
Odor	:	Amine.
Odor Threshold	:	No test data available
pH	:	13.5 Method: Literature (50% aq. sol.)
Melting point/range	:	Not applicable to liquids
Freezing point		< -4 °F / < -20 °C Method: Literature -51 °F / -46 °C
Boiling point/boiling range	:	707 °F / 375 °C (1,013 hPa) Method: Literature
Flash point	:	340 °F / 171 °C Method: ASTM D 93, closed cup
Evaporation rate	:	No test data available
Flammability (solid, gas)	:	Not applicable to liquids
Upper explosion limit / Upper flammability limit	:	4.6 %(V) Method: Estimated.
Lower explosion limit / Lower flammability limit	:	0.8 %(V) Method: Estimated.
Vapor pressure	:	< 0.01 mmHg (68 °F / 20 °C) Method: Literature

Relative vapor density	:	No test data available
Relative density	:	0.994 (68 °F / 20 °C) Method: Literature
Solubility(ies)		
Water solubility	:	1,000 g/l (68 °F / 20 °C) Method: Literature
Partition coefficient: n-octanol/water	:	log Pow: -3.16 Method: Estimated.
Autoignition temperature	:	626 °F / 330 °C (1,013 hPa) Method: Literature
Decomposition temperature	:	No test data available
Viscosity		
Viscosity, dynamic	:	83.1 mPa,s (68 °F / 20 °C) Method: Literature
Viscosity, kinematic	:	No test data available
Explosive properties	:	No
Oxidizing properties	:	No
Molecular weight	:	No test data available

Note: These are the Reference Points for these Physical Properties listed above, unless otherwise noted in their respective Physical Property value information: Boiling Point at 760 mmHg; Evaporation Rate Butyl Acetate = 1; Relative Vapor Density Air = 1; and Relative Density Water = 1.
NOTE: The physical data presented above are typical values and should not be construed as a specification.

SECTION 10. STABILITY AND REACTIVITY

Reactivity	:	No data available
Chemical stability	:	Thermally stable at typical use temperatures.
Possibility of hazardous reactions	:	Polymerization will not occur.
Conditions to avoid	:	Exposure to elevated temperatures can cause product to decompose. Generation of gas during decomposition can cause pressure in closed systems. Reaction with carbon dioxide may form an amine carbamate. Smoke may be generated depending on vapor pressure of mixture. Product absorbs carbon dioxide from the air.
Incompatible materials	:	Heat is generated when mixed with water. Spattering and

boiling can occur.
Avoid contact with oxidizing materials.
Avoid contact with:
Acids.
Acrylates.
Alcohols.
Aldehydes.
Halogenated hydrocarbons.
Ketones.
Nitrites.
Avoid contact with metals such as:
Brass.
Bronze.
Copper.
Copper alloys.
Avoid contact with absorbent materials such as:
Ground corn cobs.
Moist organic absorbents.
Peat moss.
Sawdust.

Hazardous decomposition products : Decomposition products depend upon temperature, air supply and the presence of other materials.
Decomposition products can include and are not limited to:
Ammonia.
Ethylenediamine.
Volatile amines.

SECTION 11. TOXICOLOGICAL INFORMATION

Acute toxicity

Product:

Acute oral toxicity : Remarks: Low toxicity if swallowed.
Swallowing may result in gastrointestinal irritation or ulceration.
Swallowing may result in burns of the mouth and throat.

LD50 (Rat): > 3,250 mg/kg

Acute inhalation toxicity : Remarks: At room temperature, exposure to vapor is minimal due to low volatility.
Excessive exposure may cause irritation to upper respiratory tract (nose and throat).

(Rat): Exposure time: 8 h
Test atmosphere: vapor
Symptoms: No deaths occurred following exposure to a saturated atmosphere.
Assessment: The substance or mixture has no acute inhalation toxicity
Remarks: The LC50 has not been determined.

Acute dermal toxicity : Remarks: Prolonged or widespread skin contact may result in

absorption of potentially harmful amounts.

LD50 (Rabbit): 1,260 mg/kg

Components:

Tetraethylenepentamine mixture:

Acute oral toxicity : LD50 (Rat): > 3,250 mg/kg

Acute inhalation toxicity : Remarks: At room temperature, exposure to vapor is minimal due to low volatility.
Excessive exposure may cause irritation to upper respiratory tract (nose and throat).

(Rat): Exposure time: 8 h
Test atmosphere: vapor
Symptoms: No deaths occurred following exposure to a saturated atmosphere.
Assessment: The substance or mixture has no acute inhalation toxicity
Remarks: The LC50 has not been determined.

Acute dermal toxicity : LD50 (Rabbit): 1,260 mg/kg

Triethylenetetramine mixture:

Acute oral toxicity : LD50 (Rat, male and female): 1,716 mg/kg

Acute inhalation toxicity : Remarks: The LC50 has not been determined.

Acute dermal toxicity : LD50 (Rabbit): 1,465 mg/kg

Pentaethylenehexamine mixture:

Acute oral toxicity : LD50 (Rat): 1,600 mg/kg

LD50 (Rat, male): 1,861.9 mg/kg

LD50 (Rat, female): 1,591.4 mg/kg

LD50 (Rat, male and female): 1,716.2 mg/kg

Acute inhalation toxicity : Remarks: At room temperature, exposure to vapor is minimal due to low volatility. Vapor from heated material may cause respiratory irritation and other effects.

Remarks: As product:
The LC50 has not been determined.

Acute dermal toxicity : LD50 (Rabbit): > 1,000 - < 2,000 mg/kg
Remarks: For similar material(s):

Skin corrosion/irritation

Product:

Result : Causes burns.
Remarks : Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Remarks : Classified as corrosive to the skin according to DOT guidelines.

Components:

Tetraethylenepentamine mixture:

Result : Causes burns.
Remarks : Brief contact may cause skin burns. Symptoms may include pain, severe local redness and tissue damage.

Remarks : Classified as corrosive to the skin according to DOT guidelines.

Triethylenetetramine mixture:

Result : Causes burns.
Remarks : Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness and tissue damage.

Remarks : Classified as corrosive to the skin according to DOT guidelines.

Pentaethylenehexamine mixture:

Result : Causes burns.
Remarks : Brief contact may cause severe skin burns. Symptoms may include pain, severe local redness and tissue damage.

Serious eye damage/eye irritation

Product:

Result : Corrosive
Remarks : May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Components:

Tetraethylenepentamine mixture:

Result : Corrosive
Remarks : May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Triethylenetetramine mixture:

Result : Corrosive

Remarks : May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

Pentaethylenehexamine mixture:

Result : Corrosive
Remarks : May cause severe irritation with corneal injury which may result in permanent impairment of vision, even blindness. Chemical burns may occur.
May cause pain.

Respiratory or skin sensitization

Product:

Assessment : The product is a skin sensitizer, sub-category 1B.
Remarks : Has demonstrated the potential for contact allergy in mice.
Has caused allergic skin reactions when tested in guinea pigs.
Individuals having an allergic skin reaction to this product may have an allergic skin reaction to similar material(s).
The similar material(s) is/are:
Ethylenediamine (EDA).
Diethylenetriamine.
Piperazine.
Aminoethylpiperazine (AEP).

Remarks : For respiratory sensitization:
No relevant data found.

Components:

Tetraethylenepentamine mixture:

Assessment : The product is a skin sensitizer, sub-category 1B.
Remarks : Has demonstrated the potential for contact allergy in mice.
Has caused allergic skin reactions when tested in guinea pigs.
Individuals having an allergic skin reaction to this product may have an allergic skin reaction to similar material(s).
The similar material(s) is/are:
Ethylenediamine (EDA).
Diethylenetriamine.
Piperazine.
Aminoethylpiperazine (AEP).

Remarks : For respiratory sensitization:
No relevant data found.

Triethylenetetramine mixture:

Assessment : May cause sensitization by skin contact.
Remarks : Has caused allergic skin reactions in humans.
Has demonstrated the potential for contact allergy in mice.
Has caused allergic skin reactions when tested in guinea pigs.
Individuals having an allergic skin reaction to this product may have an allergic skin reaction to similar material(s).

The similar material(s) is/are:
Ethylenediamine (EDA).
Diethylenetriamine.
Piperazine.
Aminoethylethanolamine (AEEA).

Remarks : For respiratory sensitization:
No relevant data found.

Pentaethylenehexamine mixture:

Assessment : The product is a skin sensitizer, sub-category 1B.
Remarks : Skin contact may cause an allergic skin reaction.
Has caused allergic skin reactions when tested in guinea pigs.

Remarks : For respiratory sensitization:
No relevant data found.

Germ cell mutagenicity

Product:

Genotoxicity in vitro : Remarks: In vitro genetic toxicity studies were positive.
Animal genetic toxicity studies were negative.

Components:

Tetraethylenepentamine mixture:

Genotoxicity in vitro : Remarks: In vitro genetic toxicity studies were positive.
Animal genetic toxicity studies were negative.

Triethylenetetramine mixture:

Genotoxicity in vitro : Remarks: In vitro genetic toxicity studies were negative in some cases and positive in other cases.
Animal genetic toxicity studies were negative.

Pentaethylenehexamine mixture:

Genotoxicity in vitro : Remarks: In vitro genetic toxicity studies were negative in some cases and positive in other cases.
Animal genetic toxicity studies were negative.

Carcinogenicity

Product:

Remarks : Did not cause cancer in laboratory animals.

Components:

Tetraethylenepentamine mixture:

Remarks : Did not cause cancer in laboratory animals.

Triethylenetetramine mixture:

Remarks : Did not cause cancer in laboratory animals.

Pentaethylenehexamine mixture:

Remarks : Did not cause cancer in laboratory animals.

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

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 ingredient 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

Product:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: For the component(s) tested:
Laboratory animals that were fed exaggerated doses of Triethylenetetraamine(TETA) showed adverse fetal effects that were believed to be associated with an observed copper deficiency.
Exposures having no effect on the mother should have no effect on the fetus.

Components:

Tetraethylenepentamine mixture:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: For the component(s) tested:
Laboratory animals that were fed exaggerated doses of Triethylenetetraamine(TETA) showed adverse fetal effects that were believed to be associated with an observed copper deficiency.
Exposures having no effect on the mother should have no effect on the fetus.

Triethylenetetramine mixture:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: Laboratory animals that were fed exaggerated doses of Triethylenetetraamine(TETA) showed adverse fetal effects that were believed to be associated with an observed copper deficiency.
Exposures having no effect on the mother should have no effect on the fetus.

Pentaethylenehexamine mixture:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: Based on information for component(s):
Laboratory animals that were fed exaggerated doses of Triethylenetetraamine(TETA) showed adverse fetal effects that were believed to be associated with an observed copper deficiency.
Exposures having no effect on the mother should have no effect on the fetus.

STOT-single exposure

Product:

Assessment : Material is corrosive. Material is not classified as a respiratory irritant; however, upper respiratory tract irritation or corrosivity may be expected.

Components:

Tetraethylenepentamine mixture:

Assessment : Evaluation of available data suggests that this material is not an STOT-SE toxicant.

Triethylenetetramine mixture:

Assessment : Material is corrosive. Material is not classified as a respiratory irritant; however, upper respiratory tract irritation or corrosivity may be expected.

Pentaethylenehexamine mixture:

Assessment : Evaluation of available data suggests that this material is not an STOT-SE toxicant.

STOT-repeated exposure

Components:

Pentaethylenehexamine mixture:

Assessment : The substance or mixture is not classified as specific target organ toxicant, repeated exposure.

Repeated dose toxicity

Product:

Remarks : Repeated skin application to laboratory animals did not produce systemic toxicity.

Components:

Tetraethylenepentamine mixture:

Remarks : Repeated skin application to laboratory animals did not produce systemic toxicity.

Triethylenetetramine mixture:

Remarks : In animals, effects have been reported on the following organs:
Lung.

Pentaethylenehexamine mixture:

Remarks : For the component(s) tested:
Repeated skin application to laboratory animals did not produce systemic toxicity.

Aspiration toxicity

Product:

Based on physical properties, not likely to be an aspiration hazard.

Components:

Tetraethylenepentamine mixture:

Aspiration into the lungs may occur during ingestion or vomiting, causing tissue damage or lung injury.

Triethylenetetramine mixture:

Based on physical properties, not likely to be an aspiration hazard.

Pentaethylenehexamine mixture:

Based on physical properties, not likely to be an aspiration hazard.

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Product:

Toxicity to fish :

Remarks: Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).
May increase pH of aquatic systems to > pH 10 which may be toxic to aquatic organisms.

LC50 (Poecilia reticulata (guppy)): 420 mg/l
Exposure time: 96 h
Test Type: semi-static test
Method: OECD Test Guideline 203 or Equivalent

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 24.1 mg/l
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202 or Equivalent

Toxicity to algae/aquatic : ErC50 (Pseudokirchneriella subcapitata (green algae)): 6.8

plants		mg/l End point: Growth rate inhibition Exposure time: 72 h Test Type: static test Method: OECD Test Guideline 201 or Equivalent
Toxicity to microorganisms	:	EC50 (activated sludge): 1,600 mg/l Exposure time: 1 h Test Type: static test

Components:

Tetraethylenepentamine mixture:

Toxicity to fish	:	Remarks: Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested). May increase pH of aquatic systems to > pH 10 which may be toxic to aquatic organisms. LC50 (Poecilia reticulata (guppy)): 420 mg/l Exposure time: 96 h Test Type: semi-static test Method: OECD Test Guideline 203 or Equivalent
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 24.1 mg/l Exposure time: 48 h Test Type: static test Method: OECD Test Guideline 202 or Equivalent
Toxicity to algae/aquatic plants	:	ErC50 (Pseudokirchneriella subcapitata (green algae)): 6.8 mg/l End point: Growth rate inhibition Exposure time: 72 h Test Type: static test Method: OECD Test Guideline 201 or Equivalent
Toxicity to microorganisms	:	EC50 (activated sludge): 1,600 mg/l Exposure time: 1 h Test Type: static test

Triethylenetetramine mixture:

Toxicity to fish	:	Remarks: Material is slightly toxic to aquatic organisms on an acute basis (LC50/EC50 between 10 and 100 mg/L in the most sensitive species tested). May increase pH of aquatic systems to > pH 10 which may be toxic to aquatic organisms. LC50 (Pimephales promelas (fathead minnow)): 330 mg/l Exposure time: 96 h Test Type: static test Method: OECD Test Guideline 203 or Equivalent
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 31.1 mg/l Exposure time: 48 h

Test Type: static test
Method: OECD Test Guideline 202 or Equivalent

Toxicity to algae/aquatic plants : EC50 (Pseudokirchneriella subcapitata (green algae)): 20 mg/l
End point: Growth rate inhibition
Exposure time: 72 h
Test Type: semi-static test
Method: OECD Test Guideline 201 or Equivalent

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 1.9 mg/l
End point: number of offspring
Exposure time: 21 d
Test Type: semi-static test
Method: OECD Test Guideline 211 or Equivalent

Toxicity to microorganisms : EC50 (Bacteria): 680 mg/l
Exposure time: 16 h

Pentaethylenehexamine mixture:

Toxicity to fish : Remarks: Material is moderately toxic to aquatic organisms on an acute basis (LC50/EC50 between 1 and 10 mg/L in the most sensitive species tested).

LC50 (Pimephales promelas (fathead minnow)): 133 mg/l
Exposure time: 96 h
Test Type: static test

LC50 (Poecilia reticulata (guppy)): 180 mg/l
Exposure time: 96 h
Test Type: semi-static test

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 17.5 mg/l
Exposure time: 48 h
Test Type: Static

Toxicity to algae/aquatic plants : EbC50 (Pseudokirchneriella subcapitata (green algae)): 0.7 mg/l
End point: Biomass

ErC50 (Pseudokirchneriella subcapitata (green algae)): 1.7 mg/l
End point: Growth rate inhibition
Exposure time: 72 h
Test Type: Static
Method: OECD Test Guideline 201

Persistence and degradability

Product:

Biodegradability : Result: Not biodegradable.
Remarks: Material is not readily biodegradable according to OECD/EEC guidelines.

Result: Not biodegradable.

Remarks: Material is not readily biodegradable according to OECD/EEC guidelines.

Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301A or Equivalent
Remarks: 10-day Window: Fail

Biodegradation: 0 %
Exposure time: 28 d
Method: OECD Test Guideline 301A or Equivalent
Remarks: 10-day Window: Fail

Biodegradation: 17 %
Exposure time: 84 d
Method: OECD Test Guideline 302A or Equivalent
Remarks: 10-day Window: Not applicable

Biodegradation: 17 %
Exposure time: 84 d
Method: OECD Test Guideline 302A or Equivalent
Remarks: 10-day Window: Not applicable

Biochemical Oxygen Demand (BOD) : 0 - 4 %
Incubation time: 5 d

: 0 - 4 %
Incubation time: 5 d

: 0 - 7 %
Incubation time: 10 d

: 0 - 7 %
Incubation time: 10 d

: 0 - 12 %
Incubation time: 20 d

: 0 - 12 %
Incubation time: 20 d

Chemical Oxygen Demand (COD) : 1.54 - 1.88 mg/mg

1.54 - 1.88 mg/mg

ThOD : 3.39 mg/mg

3.39 mg/mg

Photodegradation : Rate constant: 3.16E-10 cm3/s
Method: Estimated.

Rate constant: 3.16E-10 cm3/s
Method: Estimated.

Components:

Tetraethylenepentamine mixture:

Biodegradability	:	Result: Not biodegradable. Remarks: Material is not readily biodegradable according to OECD/EEC guidelines. Biodegradation: 0 % Exposure time: 28 d Method: OECD Test Guideline 301A or Equivalent Remarks: 10-day Window: Fail Biodegradation: 17 % Exposure time: 84 d Method: OECD Test Guideline 302A or Equivalent Remarks: 10-day Window: Not applicable
Biochemical Oxygen Demand (BOD)	:	0 - 12 % Incubation time: 20 d
Chemical Oxygen Demand (COD)	:	1.54 - 1.88 mg/mg
ThOD	:	3.39 mg/mg
Photodegradation	:	Rate constant: 3.16E-10 cm3/s Method: Estimated.

Triethylenetetramine mixture:

Biodegradability	:	Remarks: Biodegradation under aerobic static laboratory conditions is moderate (BOD20 or BOD28/ThOD between 10 and 40%). Result: Not biodegradable. Biodegradation: 0 % Exposure time: 20 d Method: OECD Test Guideline 301D or Equivalent Remarks: 10-day Window: Fail
Biochemical Oxygen Demand (BOD)	:	5.000 % Incubation time: 5 d 2.5 - 11 % Incubation time: 20 d
Chemical Oxygen Demand (COD)	:	1.94 mg/mg
ThOD	:	3.40 mg/mg

Pentaethylenehexamine mixture:

Biodegradability	:	Result: Not biodegradable.

Remarks: Material is not readily biodegradable according to OECD/EEC guidelines.

Biodegradation: 0 %
Exposure time: 162 d
Method: OECD Test Guideline 301D
Remarks: 10-day Window: Fail

Biochemical Oxygen Demand (BOD) : 2.000 %
Incubation time: 5 d

4.000 %
Incubation time: 10 d

8.000 %
Incubation time: 20 d

Bioaccumulative potential

Components:

Tetraethylenepentamine mixture:

Partition coefficient: n-octanol/water : log Pow: -3.16
Method: Estimated.
Remarks: No bioconcentration is expected because of the relatively high water solubility.

Triethylenetetramine mixture:

Partition coefficient: n-octanol/water : log Pow: -2.65
Method: Estimated.
Remarks: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Pentaethylenehexamine mixture:

Partition coefficient: n-octanol/water : log Pow: -3.67
Method: Estimated.

Mobility in soil

Product:

Distribution among environmental compartments : Koc: 3.6 - 1098
Method: Estimated.
Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).
Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Koc: 3.6 - 1098
Method: Estimated.
Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).
Given its very low Henry's constant, volatilization from natural

bodies of water or moist soil is not expected to be an important fate process.

Components:

Tetraethylenepentamine mixture:

Distribution among environmental compartments : Koc: 3.6 - 1098
Method: Estimated.
Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).
Given its very low Henry's constant, volatilization from natural bodies of water or moist soil is not expected to be an important fate process.

Triethylenetetramine mixture:

Distribution among environmental compartments : Koc: 4.1 - 310
Method: Estimated.
Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).

Pentaethylenehexamine mixture:

Distribution among environmental compartments : Remarks: Potential for mobility in soil is slight (Koc between 2000 and 5000).

Koc: 3887
Method: Estimated.

Other adverse effects

Components:

Tetraethylenepentamine mixture:

Results of PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Triethylenetetramine mixture:

Results of PBT and vPvB assessment : This substance is not considered to be persistent, bioaccumulating and toxic (PBT). This substance is not considered to be very persistent and very bioaccumulating (vPvB).

Pentaethylenehexamine mixture:

Results of PBT and vPvB assessment : This mixture has not been assessed for persistence, bioaccumulation and toxicity (PBT).

SECTION 13. DISPOSAL CONSIDERATIONS

Disposal methods

Waste from residues : AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE

MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL.
THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information.
All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations.
Regulations may vary in different locations.
Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator.
DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER.
FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

SECTION 14. TRANSPORT INFORMATION

International Regulations

UNRTDG

UN number	:	UN 2320
Proper shipping name	:	TETRAETHYLENEPENTAMINE
Class	:	8
Packing group	:	III
Labels	:	8

IATA-DGR

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-Code

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

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

Not applicable for product as supplied.

Domestic regulation

49 CFR

UN/ID/NA number	:	UN 2320
Proper shipping name	:	Tetraethylenepentamine
Class	:	8
Packing group	:	III
Labels	:	CORROSIVE
ERG Code	:	153
Marine pollutant	:	no

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

SARA 302 Extremely Hazardous Substances Threshold Planning Quantity

This material does not contain any components with a section 302 EHS TPQ.

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

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.

US State Regulations

Pennsylvania Right To Know

Tetraethylenepentamine mixture	112-57-2
Triethylenetetramine mixture	112-24-3

California Prop. 65

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

International Regulations

Montreal Protocol	:	Not applicable
Rotterdam Convention (Prior Informed Consent)	:	Not applicable
Stockholm Convention (Persistent Organic Pollutants)	:	Not applicable

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

CH INV	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
DSL	:	All substances contained in this product are listed on the

Canadian Domestic Substances List (DSL) or are not required to be listed.

AICS	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
NZIoC	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
ENCS	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
ISHL	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
KECI	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
PICCS	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
IECSC	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
TCSI	:	All intentional components are listed on the inventory, are exempt, or are supplier certified.
TSCA	:	All substances listed as active on the TSCA Inventory or are not required to be listed.

TSCA list

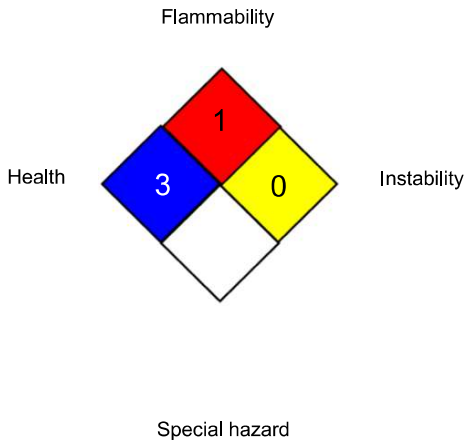
No substances are subject to a Significant New Use Rule.

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

SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



Full text of other abbreviations

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

AICS - Australian Inventory of Chemical Substances; ASTM - American Society for the Testing of Materials; bw - Body weight; CERCLA - Comprehensive Environmental Response, Compensation, and Liability Act; CMR - Carcinogen, Mutagen or Reproductive Toxicant; DIN - Standard of the German Institute for Standardisation; DOT - Department of Transportation; DSL - Domestic Substances List (Canada); ECx - Concentration associated with x% response; EHS - Extremely Hazardous Substance; ELx - Loading rate associated with x% response; EmS - Emergency Schedule; ENCS - Existing and New Chemical Substances (Japan); ErCx - Concentration associated with x% growth rate response; ERG - Emergency Response Guide; GHS - Globally Harmonized System; GLP - Good Laboratory Practice; HMIS - Hazardous Materials Identification System; IARC - International Agency for Research on Cancer; IATA - International Air Transport Association; IBC - International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk; IC50 - Half maximal inhibitory concentration; ICAO - International Civil Aviation Organization; IECSC - Inventory of Existing Chemical Substances in China; IMDG - International Maritime Dangerous Goods; IMO - International Maritime Organization; ISHL - Industrial Safety and Health Law (Japan); ISO - International Organisation for Standardization; KECI - Korea Existing Chemicals Inventory; LC50 - Lethal Concentration to 50 % of a test population; LD50 - Lethal Dose to 50% of a test population (Median Lethal Dose); MARPOL - International Convention for the Prevention of Pollution from Ships; MSHA - Mine Safety and Health Administration; n.o.s. - Not Otherwise Specified; NFPA - National Fire Protection Association; NO(A)EC - No Observed (Adverse) Effect Concentration; NO(A)EL - No Observed (Adverse) Effect Level; NOELR - No Observable Effect Loading Rate; NTP - National Toxicology Program; NZIoC - New Zealand Inventory of Chemicals; OECD - Organization for Economic Co-operation and Development; OPPTS - Office of Chemical Safety and Pollution Prevention; PBT - Persistent, Bioaccumulative and Toxic substance; PICCS - Philippines Inventory of Chemicals and Chemical Substances; (Q)SAR - (Quantitative) Structure Activity Relationship; RCRA - Resource Conservation and Recovery Act; REACH - Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals; RQ - Reportable Quantity; SADT - Self-Accelerating Decomposition Temperature; SARA - Superfund Amendments and Reauthorization Act; SDS - Safety Data Sheet; TCSI - Taiwan Chemical Substance Inventory; TSCA - Toxic Substances Control Act (United States); UN - United Nations; UNRTDG -

United Nations Recommendations on the Transport of Dangerous Goods; vPvB - Very Persistent and Very Bioaccumulative

Revision Date : 06-18-2021

BLUE CUBE OPERATIONS LLC urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given.Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

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