SAFETY DATA SHEET

D.E.R.™ 3401 Liquid Epoxy Resin

Version	Revision Date:	SDS Number:	Date of last issue: 03-10-2021
4.0	10-29-2021	101265892	Date of first issue: 10-29-2021

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.R.™ 3401 Liquid Epoxy Resin
Product code	:	000000001000000209

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
Identified uses	:	Resin for epoxy systems.

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Skin corrosion	:	Category 1
Serious eye damage	:	Category 1
Skin sensitization	:	Sub-category 1A

GHS label elements

Hazard pictograms :

Signal Word	:	Danger
Hazard Statements	:	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)
Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers	25085-99-8	60 - 70
Reaction product of phenol-formaldehyde Novolac with epichlorohydrin	28064-14-4	10 - 20
1,4-Bis(2,3-epoxypropyloxy)butane	2425-79-8	5 - 15
Methyl p-toluenesulfonate	80-48-8	5 - 15

Actual concentration is withheld as a trade secret, Liquid Epoxy Resins (LERs) are made by reacting bisphenol A and epichlorohydrin. Olin uses both CAS No. 25085-99-8 and 1675-54-3 for its LERs. Other manufacturers use CAS No. 25068-38-6 for their LERs. Accordingly, LER manufacturers consider that derivatives of LERs may be described using either CAS number as a starting material.

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. 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. If burn is present, treat as any thermal burn, after decontamination. 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. Water fog, applied gently may be used as a blanket for fire

extinguishment.

Unsuitable extinguishing media	:	Do not use direct water stream. May spread fire.
Specific hazards during fire fighting	:	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. Dense smoke is emitted when burned without sufficient oxygen.
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: Phenolics. 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. 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 fog, applied gently may be used as a blanket for fire extinguishment. Contain fire water run-off if possible. Fire water run-off, if not contained, may cause environmental damage. Review the 'Accidental Release Measures' and the 'Ecological Information' sections of this (M)SDS.
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.
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. Absorb with materials such as: Sand. 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, on skin, on clothing. Avoid prolonged or repeated contact with skin. Avoid breathing vapor. Do not swallow. Keep container closed. Use with adequate ventilation. Wash thoroughly after handling. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.
Conditions for safe storage	:	Store in a cool, dry place.
Recommended storage temperature	:	< 95 °F / < 35 °C
Storage period	:	12 Months

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Ingredients with workplace control parameters

Contains no substances with occupational exposure limit values.

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 poten-

tial 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 material is heated or sprayed, use an approved air-purifying respirator.

Filter type : The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Hand protection

Remarks : Use gloves chemically resistant to this material. Examples of preferred glove barrier materials include: Butyl rubber. Ethyl vinyl alcohol laminate ('EVAL'). Nitrile/butadiene rubber ('nitrile' or 'NBR'). Neoprene. Polyvinyl chloride ('PVC' or 'vinyl'). 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	:	Clear
Odor	:	Mild Phenolic
Odor Threshold	:	No test data available
pH	:	Not applicable
Melting point/range	:	Not applicable
Freezing point		No test data available
Boiling point/boiling range	:	> 212 °F / > 100 °C Method: Literature

Flash point	:	486 °F / 252 °C Method: Literature, closed cup
Evaporation rate	:	No data available
Flammability (solid, gas)	:	Not applicable to liquids
Upper explosion limit / Upper flammability limit	:	No test data available
Lower explosion limit / Lower flammability limit	:	No test data available
Vapor pressure	:	Method: Literature 0.000000046 Pa @ 25°C (based on major component)
Relative vapor density	:	No test data available
Relative density	:	1.15 - 1.18 (77 °F / 25 °C) Method: ASTM D891
Solubility(ies)		
Water solubility	:	Insoluble
Partition coefficient: n-octanol/water	:	No data available
Autoignition temperature	:	No test data available
Decomposition temperature	:	> 608 °F / > 320 °C
Viscosity		
Viscosity, dynamic	:	1,500 - 3,500 cP (77 °F / 25 °C) Method: ASTM D 445
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	:	Stable under recommended storage conditions. See Storage, Section 7.
Possibility of hazardous reactions	:	Will not occur by itself. Masses of more than one pound (0.5 kg) of product plus an aliphatic amine will cause irreversible polymerization with considerable heat build-up.
Conditions to avoid	:	Avoid short term exposures to temperatures above 300 °C Avoid prolonged exposure to temperatures above 250 °C Potentially violent decomposition can occur above 350 °C Generation of gas during decomposition can cause pressure in closed systems. Pressure build-up can be rapid.
Incompatible materials	:	Avoid contact with oxidizing materials. Avoid contact with: Acids. Bases. Avoid unintended contact with amines.
Hazardous decomposition products	:	Decomposition products depend upon temperature, air supply and the presence of other materials. Gases are released during decomposition. Uncontrolled exothermic reaction of epoxy resins release phenolics, carbon monoxide, and water.

SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Eye contact
Skin contact
Ingestion
Inhalation

Acute toxicity

May be harmful if swallowed or in contact with skin.
Swallowing may result in burns of the mouth, throat, and gastrointestinal tract.

Product:

Acute oral toxicity	:	Remarks: Low toxicity if swallowed. Swallowing may result in gastrointestinal irritation or ulceration. LD50 (Rat): > 2,000 mg/kg Method: Estimated. Remarks: As product: Single dose oral LD50 has not been determined. Based on information for component(s):

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

Remarks: The LC50 has not been determined.

Acute dermal toxicity : Remarks: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

LD50 (Rabbit): > 2,000 mg/kg
Method: Estimated.
Remarks: As product:
The dermal LD50 has not been determined.
Based on information for component(s):

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Acute oral toxicity : LD50 (Rat): > 15,000 mg/kg

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

Acute dermal toxicity : LD50 (Rabbit): 23,000 mg/kg

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Acute oral toxicity : LD50 (Rat): > 2,000 mg/kg
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute oral toxicity

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

Remarks: The LC50 has not been determined.

Acute dermal toxicity : LD50 (Rat): > 2,000 mg/kg
Symptoms: No deaths occurred at this concentration.
Assessment: The substance or mixture has no acute dermal toxicity

1,4-Bis(2,3-epoxypropyloxy)butane:

Acute oral toxicity : LD50 (Rat): 1,163 mg/kg

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

Remarks: The LC50 has not been determined.

Acute dermal toxicity : LD50 (Rat): > 2,150 mg/kg
Symptoms: No deaths occurred at this concentration.

Assessment: The substance or mixture has no acute dermal toxicity

Methyl p-toluenesulfonate:

Acute oral toxicity : LD50 (Rat): 341 mg/kg

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

Acute dermal toxicity : Remarks: The dermal LD50 has not been determined.

Skin corrosion/irritation

Causes skin irritation.

Product:

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

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Result : Skin irritation
Remarks : Prolonged contact may cause skin irritation with local redness.
Repeated contact may cause skin irritation with local redness.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Result : No skin irritation
Remarks : Brief contact may cause slight skin irritation with local redness.

1,4-Bis(2,3-epoxypropyloxy)butane:

Result : No skin irritation
Remarks : Brief contact is essentially nonirritating to skin.
Prolonged contact may cause severe skin irritation with local redness and discomfort.
Repeated contact may cause skin burns. Symptoms may include pain, severe local redness, swelling, and tissue damage.

Methyl p-toluenesulfonate:

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

Serious eye damage/eye irritation

Causes serious eye damage.

Product:

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

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Result : Mild eye irritation
Remarks : May cause eye irritation.
Corneal injury is unlikely.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Result : No eye irritation
Remarks : May cause slight temporary eye irritation.
Corneal injury is unlikely.

1,4-Bis(2,3-epoxypropyloxy)butane:

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

Methyl p-toluenesulfonate:

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

Respiratory or skin sensitization

Skin sensitization

May cause an allergic skin reaction.

Respiratory sensitization

Not classified based on available information.

Product:

Assessment : The product is a skin sensitizer, sub-category 1A.
Remarks : A component in this mixture has caused allergic skin reactions in humans.
Contains component(s) which have caused allergic skin sensitization in guinea pigs.
Contains component(s) which have demonstrated the potential for contact allergy in mice.

Remarks : For respiratory sensitization:
No relevant information found.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Assessment	:	The product is a skin sensitizer, sub-category 1B.
Remarks	:	Has caused allergic skin reactions in humans. Has demonstrated the potential for contact allergy in mice.
Remarks	:	For respiratory sensitization: No relevant data found.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Assessment	:	The product is a skin sensitizer, sub-category 1B.
Remarks	:	Has caused allergic skin reactions when tested in guinea pigs.
Remarks	:	For respiratory sensitization: No relevant data found.

1,4-Bis(2,3-epoxypropyloxy)butane:

Assessment	:	The product is a skin sensitizer, sub-category 1A.
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.

Methyl p-toluenesulfonate:

Assessment	:	Skin sensitizer
Remarks	:	Skin contact may cause an allergic skin reaction.
Remarks	:	For respiratory sensitization: No relevant data found.

Germ cell mutagenicity

Not classified based on available information.

Product:

Genotoxicity in vitro	:	Remarks: Contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others. Contains a component(s) which were negative in in vitro genetic toxicity studies.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

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.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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

1,4-Bis(2,3-epoxypropyloxy)butane:

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.

Methyl p-toluenesulfonate:

Genotoxicity in vitro : Remarks: No relevant data found.

Carcinogenicity

Not classified based on available information.

Product:

Remarks : Many studies have been conducted to assess the potential carcinogenicity of diglycidyl ether of bisphenol A (DGEBPA). Indeed, the most recent review of the available data by the International Agency for Research on Cancer (IARC) has concluded that DGEBPA is not classified as a carcinogen. Although some weak evidence of carcinogenicity has been reported in animals, when all of the data are considered, the weight of evidence does not show that DGEBPA is carcinogenic.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Remarks : Many studies have been conducted to assess the potential carcinogenicity of diglycidyl ether of bisphenol A (DGEBPA). Indeed, the most recent review of the available data by the International Agency for Research on Cancer (IARC) has concluded that DGEBPA is not classified as a carcinogen. Although some weak evidence of carcinogenicity has been reported in animals, when all of the data are considered, the weight of evidence does not show that DGEBPA is carcinogenic.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Remarks : No relevant data found.

1,4-Bis(2,3-epoxypropyloxy)butane:

Remarks : Did not cause cancer in animal skin painting studies.

Methyl p-toluenesulfonate:

Remarks : Did not cause cancer in long-term animal studies which used routes of exposure considered relevant to industrial handling. Positive results have been reported in other studies using routes of exposure not relevant to industrial handling.

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

Not classified based on available information.

Product:

Effects on fertility : Remarks: In animal studies, resins based on the diglycidyl ether of bisphenol A (DGEBPA) have been shown not to interfere with reproduction.

Effects on fetal development : Remarks: Resins based on the diglycidyl ether of bisphenol A (DGEBPA) did not cause birth defects or other adverse effects on the fetus when pregnant rabbits were exposed by skin contact, the most likely route of exposure, or when pregnant rats or rabbits were exposed orally.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Effects on fertility : Remarks: In animal studies, did not interfere with reproduction.

Effects on fetal development : Remarks: Resins based on the diglycidyl ether of bisphenol A (DGEBPA) did not cause birth defects or other adverse effects on the fetus when pregnant rabbits were exposed by skin contact, the most likely route of exposure, or when pregnant rats or rabbits were exposed orally.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: No relevant data found.

1,4-Bis(2,3-epoxypropyloxy)butane:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: No relevant data found.

Methyl p-toluenesulfonate:

Effects on fertility : Remarks: No relevant data found.

Effects on fetal development : Remarks: No relevant data found.

STOT-single exposure

Not classified based on available information.

Product:

Assessment : Evaluation of available data suggests that this material is not

an STOT-SE toxicant.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

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

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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

1,4-Bis(2,3-epoxypropyloxy)butane:

Assessment : Available data are inadequate to determine single exposure specific target organ toxicity.

Methyl p-toluenesulfonate:

Assessment : Available data are inadequate to determine single exposure specific target organ toxicity.

STOT-repeated exposure

Not classified based on available information.

Repeated dose toxicity

Product:

Remarks : No relevant information found.

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Remarks : Except for skin sensitization, repeated exposures to low molecular weight epoxy resins of this type are not anticipated to cause any significant adverse effects.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Remarks : No relevant data found.

1,4-Bis(2,3-epoxypropyloxy)butane:

Remarks : No relevant data found.

Methyl p-toluenesulfonate:

Remarks : No relevant data found.

Aspiration toxicity

Not classified based on available information.

Product:

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

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

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

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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

1,4-Bis(2,3-epoxypropyloxy)butane:

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

Methyl p-toluenesulfonate:

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

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

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 (Oncorhynchus mykiss (rainbow trout)): 2 mg/l Exposure time: 96 h Test Type: semi-static test
Toxicity to daphnia and other aquatic invertebrates	:	EC50 (Daphnia magna (Water flea)): 1.8 mg/l Exposure time: 48 h Test Type: static test
Toxicity to algae/aquatic plants	:	ErC50 (Scenedesmus capricornutum (fresh water algae)): 11 mg/l End point: Growth rate inhibition Exposure time: 72 h Test Type: static test
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC (Daphnia magna (Water flea)): 0.3 mg/l End point: number of offspring Exposure time: 21 d Test Type: semi-static test MATC (Maximum Acceptable Toxicant Level) (Daphnia magna (Water flea)): 0.55 mg/l End point: number of offspring

Exposure time: 21 d
Test Type: semi-static test

Toxicity to microorganisms : IC50 (Bacteria): > 42.6 mg/l
End point: Respiration rates.
Exposure time: 18 h

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

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 (Leuciscus idus (Golden orfe)): 5.7 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203 or Equivalent

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 3.5 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202 or Equivalent

1,4-Bis(2,3-epoxypropyloxy)butane:

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).

LC50 (Danio rerio (zebra fish)): 19.8 mg/l
Exposure time: 96 h
Test Type: static test
Method: OECD Test Guideline 203

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 75 mg/l
Exposure time: 24 h
Test Type: static test
Method: OECD Test Guideline 202

Toxicity to algae/aquatic plants : EL50 (Pseudokirchneriella subcapitata (green algae)): > 160 mg/l
End point: Growth rate inhibition
Exposure time: 72 h
Test Type: static test
Method: OECD Test Guideline 201

Methyl p-toluenesulfonate:

Toxicity to fish : Remarks: No relevant data found.

Persistence and degradability

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Biodegradability : Result: Not biodegradable.
Remarks: Based on stringent OECD test guidelines, this ma-

terial cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

aerobic
Biodegradation: 12 %
Exposure time: 28 d
Method: OECD Test Guideline 302B or Equivalent
Remarks: 10-day Window: Not applicable

ThOD : 2.35 mg/mg
Method: Estimated.

Photodegradation : Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Rate constant: 6.69E-11 cm3/s
Method: Estimated.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Biodegradability : Result: Not biodegradable.
Remarks: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Biodegradation: 10 - 16 %
Exposure time: 28 d
Method: OECD Test Guideline 301B or Equivalent
Remarks: 10-day Window: Fail

1,4-Bis(2,3-epoxypropyloxy)butane:

Biodegradability : Result: Not biodegradable.
Remarks: Based on stringent OECD test guidelines, this material cannot be considered as readily biodegradable; however, these results do not necessarily mean that the material is not biodegradable under environmental conditions.

Inoculum: Activated sludge, non-adapted
Concentration: 20 mg/l
Biodegradation: 43 %
Exposure time: 28 d
Method: OECD Test Guideline 301F or Equivalent
Remarks: 10-day Window: Fail

Photodegradation : Test Type: Half-life (indirect photolysis)
Sensitizer: OH radicals
Rate constant: 3.71E-11 cm3/s
Method: Estimated.

Bioaccumulative potential

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Bioaccumulation	:	Remarks: Bioconcentration potential is moderate (BCF between 100 and 3000 or Log Pow between 3 and 5).
Partition coefficient: n-octanol/water	:	log Pow: 3.242 (77 °F / 25 °C) pH: 7.1 Method: Estimated. GLP: yes

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Partition coefficient: n-octanol/water	:	Remarks: No relevant data found.

Methyl p-toluenesulfonate:

Partition coefficient: n-octanol/water	:	Remarks: No relevant data found.

Mobility in soil

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

Distribution among environmental compartments	:	Koc: 1800 - 4400 Method: Estimated. Remarks: Potential for mobility in soil is low (Koc between 500 and 2000). 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.

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Distribution among environmental compartments	:	Remarks: No data available.

1,4-Bis(2,3-epoxypropyloxy)butane:

Distribution among environmental compartments	:	Koc: 10 Method: Estimated. Remarks: Potential for mobility in soil is very high (Koc between 0 and 50).

Other adverse effects

Components:

Propane, 2,2-bis[p-(2,3-epoxypropoxy)phenyl]-, polymers:

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).

Reaction product of phenol-formaldehyde Novolac with epichlorohydrin:

Results of PBT and vPvB assessment	:	Remarks: No data available

Additional ecological information	:	No data available

1,4-Bis(2,3-epoxypropyloxy)butane:

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).
Ozone-Depletion Potential	:	Remarks: This substance is not on the Montreal Protocol list of substances that deplete the ozone layer.

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 1760
Proper shipping name	:	CORROSIVE LIQUID, N.O.S. (Methyl p-toluenesulfonate)
Class	:	8
Packing group	:	III
Labels	:	8

IATA-DGR

UN/ID No.	:	UN 1760
Proper shipping name	:	Corrosive liquid, n.o.s. (Methyl p-toluenesulfonate)
Class	:	8
Packing group	:	III

Labels	:	Corrosive
Packing instruction (cargo aircraft)	:	856
Packing instruction (passenger aircraft)	:	852

IMDG-Code

UN number	:	UN 1760
Proper shipping name	:	CORROSIVE LIQUID, N.O.S. (Methyl p-toluenesulfonate, Epoxy resin)
Class	:	8
Packing group	:	III
Labels	:	8
EmS Code	:	F-A, S-B
Marine pollutant	:	yes
Remarks	:	Stowage 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 1760
Proper shipping name	:	Corrosive liquids, n.o.s. (Methyl p-toluenesulfonate)
Class	:	8
Packing group	:	III
Labels	:	CORROSIVE
ERG Code	:	154
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	:	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

Methyl p-toluenesulfonate	80-48-8

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

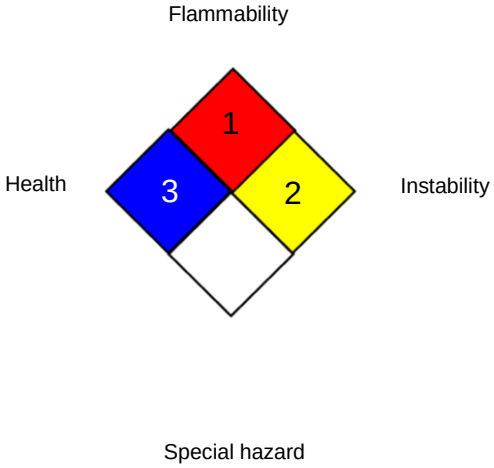
No substances are subject to a Significant New Use Rule.

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

SECTION 16. OTHER INFORMATION

Further information

NFPA 704:



Full text of other abbreviations

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 Amend-

ments 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 : 10-29-2021

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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