

**ARALDITE® 2011 RESIN US**

Version 2.1      Revision Date: 02/01/2019      SDS Number: 400001010251      Date of last issue: 09/18/2018  
Date of first issue: 05/02/2017

**SECTION 1. IDENTIFICATION**

Product name : ARALDITE® 2011 RESIN US

**Manufacturer or supplier's details**

Company name of supplier : Huntsman Advanced Materials Americas LLC  
Address : P.O. Box 4980  
The Woodlands,  
TX 77387  
United States of America (USA)  
Telephone : Non-Emergency: (800) 257-5547  
E-mail address of person responsible for the SDS : SDS@huntsman.com  
Emergency telephone number : Chemtrec: (800) 424-9300 or (703) 527-3887

**Recommended use of the chemical and restrictions on use**

Recommended use : Epoxy constituents

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

Skin irritation : Category 2  
Eye irritation : Category 2A  
Skin sensitisation : Category 1  
Short-term (acute) aquatic hazard : Category 2  
Long-term (chronic) aquatic hazard : Category 2

**GHS label elements**

Hazard pictograms :



Signal word : Warning

Hazard statements : H315 Causes skin irritation.  
H317 May cause an allergic skin reaction.  
H319 Causes serious eye irritation.  
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements : **Prevention:**

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P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
 P264 Wash skin thoroughly after handling.  
 P272 Contaminated work clothing must not be allowed out of the workplace.  
 P273 Avoid release to the environment.  
 P280 Wear protective gloves/ eye protection/ face protection.

**Response:**

P302 + P352 IF ON SKIN: Wash with plenty of soap and water.  
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

P333 + P313 If skin irritation or rash occurs: Get medical advice/ attention.

P337 + P313 If eye irritation persists: Get medical advice/ attention.

P362 Take off contaminated clothing and wash before reuse.

P391 Collect spillage.

**Storage:**

Not available

**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 : Mixture

**Hazardous components**

Chemical name	CAS-No.	Concentration (% w/w)
2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane	1675-54-3	70 - 90
Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol	9003-36-5	5 - 10
bisphenol A - epoxy resins, number average MW >700 - <1100	25068-38-6	1 - 5
Silicon, amorphous	7631-86-9	1 - 5

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

Both 25068-38-6 and 1675-54-3 can be used to describe the epoxy resin which is produced through the reaction of bisphenol A and epichlorohydrin

**SECTION 4. FIRST AID MEASURES**

General advice : Move out of dangerous area.  
 Show this safety data sheet to the doctor in attendance.  
 Treat symptomatically.  
 Get medical attention if symptoms occur.

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- If inhaled : If inhaled, remove to fresh air.  
Get medical attention if symptoms occur.
- In case of skin contact : If skin irritation persists, call a physician.  
If on skin, rinse well with water.  
If on clothes, remove clothes.
- In case of eye contact : Immediately flush eye(s) with plenty of water.  
Remove contact lenses.  
Keep eye wide open while rinsing.  
If eye irritation persists, consult a specialist.
- If swallowed : Keep respiratory tract clear.  
Never give anything by mouth to an unconscious person.  
If symptoms persist, call a physician.
- Most important symptoms and effects, both acute and delayed : None known.
- Notes to physician : Treat symptomatically.

**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.
- 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.

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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 : 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.  
 For personal protection see section 8.  
 Smoking, eating and drinking should be prohibited in the application area.  
 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.  
 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
Silicon, amorphous	7631-86-9	TWA (Dust)	20 Million particles per cubic foot (Silica)	OSHA Z-3
		TWA (Dust)	80 mg/m <sup>3</sup> / %SiO <sub>2</sub> (Silica)	OSHA Z-3
		TWA (Dust)	20 Million particles per cubic	OSHA Z-3



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			foot (Silica)	
		TWA (Dust)	80 mg/m <sup>3</sup> / %SiO <sub>2</sub> (Silica)	OSHA Z-3
		TWA	6 mg/m <sup>3</sup> (Silica)	NIOSH REL

**Personal protective equipment**

**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.

**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** : paste

**Colour** : No data is available on the product itself.

**Odour** : slight

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

**pH** : ca. 6 (68 °F / 20 °C)  
Concentration: 500 g/l

**Freezing point** : No data is available on the product itself.

# SAFETY DATA SHEET

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Melting point : No data is available on the product itself.

Boiling point : > 392 °F / > 200 °C

Flash point : 410 °F / 210 °C  
Method: Pensky-Martens closed cup, 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 : < 0.001 hPa (68 °F / 20 °C)

Relative vapour density : No data is available on the product itself.

Relative density : 1.14 - 1.19

Density : 1.15 g/cm<sup>3</sup> (77 °F / 25 °C)

Solubility(ies)

Water solubility : practically insoluble (68 °F / 20 °C)

Solubility in other solvents : No data is available on the product itself.

Partition coefficient: n-octanol/water : No data is available on the product itself.

Auto-ignition temperature : No data is available on the product itself.

Decomposition temperature : > 392 °F / > 200 °C

Self-Accelerating decomposition temperature (SADT) : No data is available on the product itself.

Viscosity

Viscosity, dynamic : 30,000 - 50,000 mPa.s (77 °F / 25 °C)

Explosive properties : No data is available on the product itself.

Oxidizing properties : No data is available on the product itself.

Particle size : No data is available on the product itself.

### SECTION 10. STABILITY AND REACTIVITY

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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 : No hazardous decomposition products are known.

**SECTION 11. TOXICOLOGICAL INFORMATION**

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

**Acute toxicity****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Acute oral toxicityComponents : LD50 (Rat, female): > 2,000 mg/kg  
 Method: OECD Test Guideline 420  
 Assessment: The substance or mixture has no acute oral toxicity

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Acute oral toxicityComponents : LD50 (Rat, male and female): > 5,000 mg/kg  
 Method: OECD Test Guideline 401

bisphenol A - epoxy resins, number average MW >700 - <1100:

Acute oral toxicityComponents : LD50 (Rat, female): > 2,000 mg/kg  
 Method: OECD Test Guideline 420  
 Assessment: The substance or mixture has no acute oral toxicity

Silicon, amorphous:

Acute oral toxicityComponents : LD50 (Rat): > 5,000 mg/kg  
 Method: OECD Test Guideline 401

**Components:**

Silicon, amorphous:

Acute inhalation toxicity : LC50 (Rat, male and female): > 58.8 mg/l  
 Exposure time: 4 h  
 Test atmosphere: dust/mist  
 Method: OECD Test Guideline 403

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg

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Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Acute dermal toxicity : LD50 (Rat, male and female): > 2,000 mg/kg  
Method: OECD Test Guideline 402  
Assessment: The substance or mixture has no acute dermal toxicity

Silicon, amorphous:  
Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg

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

**Skin corrosion/irritation****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Species: Rabbit  
Assessment: Mild skin irritant  
Method: OECD Test Guideline 404  
Result: Irritating to skin.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rabbit  
Method: OECD Test Guideline 404  
Result: Irritating to skin.

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Method: OECD Test Guideline 404  
Result: Skin irritation

Silicon, amorphous:  
Species: Rabbit  
Assessment: No skin irritation  
Method: OECD Test Guideline 404  
Result: No skin irritation

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

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Species: Rabbit  
Result: Irritating to eyes.



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Assessment: Mild eye irritant  
Method: OECD Test Guideline 405

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rabbit  
Result: No eye irritation  
Method: OECD Test Guideline 405

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Species: Rabbit  
Result: Eye irritation  
Method: OECD Test Guideline 405

Silicon, amorphous:  
Species: Rabbit  
Result: No eye irritation  
Assessment: No eye irritation  
Method: OECD Test Guideline 405

**Respiratory or skin sensitisation****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Exposure routes: Skin  
Species: Mouse  
Assessment: May cause sensitisation by skin contact.  
Method: OECD Test Guideline 429  
Result: Causes sensitisation.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Exposure routes: Skin  
Species: Mouse  
Method: OECD Test Guideline 429  
Result: May cause sensitisation by skin contact.

bisphenol A - epoxy resins, number average MW >700 - <1100:  
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:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Genotoxicity in vitro : Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 476  
Result: positive

Concentration: 0 - 5000 ug/plate  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 471  
Result: positive

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Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Genotoxicity in vitro : Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 471  
 Result: positive

Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 473  
 Result: positive

Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 476  
 Result: positive

bisphenol A - epoxy resins, number average MW >700 - <1100:  
 Genotoxicity in vitro : Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 476  
 Result: Positive results were obtained in some in vitro tests.

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

Silicon, amorphous:  
 Genotoxicity in vitro : Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 473  
 Result: negative

Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 476  
 Result: negative

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

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
 Genotoxicity in vivo : Cell type: Germ  
 Application Route: Oral  
 Method: OECD Test Guideline 478  
 Result: negative

Cell type: Somatic  
 Application Route: Oral  
 Dose: 0 - 5000 mg/kg  
 Method: OPPTS 870.5395  
 Result: negative

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Genotoxicity in vivo : Cell type: Somatic  
 Application Route: Oral  
 Exposure time: 48 h  
 Dose: 2000 mg/kg  
 Method: OECD Test Guideline 474  
 Result: negative

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Cell type: Somatic  
Application Route: Oral  
Dose: 2000 mg/kg  
Method: OECD Test Guideline 486  
Result: negative

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Genotoxicity in vivo : Cell type: Germ  
Application Route: Oral  
Method: OECD Test Guideline 478  
Result: negative

Cell type: Somatic  
Application Route: Oral  
Dose: 0 - 5000 mg/kg  
Method: OPPTS 870.5395  
Result: negative

Silicon, amorphous:  
Genotoxicity in vivo : Application Route: Inhalation  
Dose: 50 mg/m<sup>3</sup>  
Result: negative

**Carcinogenicity****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
Species: Rat, male and female  
Application Route: Oral  
Exposure time: 24 month(s)  
Dose: 15 mg/kg  
Frequency of Treatment: 7 days/week  
Method: OECD Test Guideline 453  
Result: negative

Species: Mouse, male  
Application Route: Dermal  
Exposure time: 24 month(s)  
Dose: 0.1 mg/kg  
Frequency of Treatment: 3 days/week  
Method: OECD Test Guideline 453  
Result: negative

Species: Rat, female  
Application Route: Dermal  
Exposure time: 24 month(s)  
Dose: 1 mg/kg  
Frequency of Treatment: 5 days/week  
Method: OECD Test Guideline 453  
Result: negative

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Species: Rat, male and female  
Application Route: Oral  
Exposure time: 24 month(s)

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Dose: 15 mg/kg  
Frequency of Treatment: 7 daily  
Method: OECD Test Guideline 453  
Result: negative

Silicon, amorphous:  
Species: Rat, male and female  
Application Route: Oral  
Exposure time: 103 weeks  
Dose: 1800 - 3200 mg/kg  
Frequency of Treatment: 7 daily  
Method: OECD Test Guideline 453  
Result: negative

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 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****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Effects on fertility : Test Type: Two-generation study  
Species: Rat, male and female  
Application Route: Oral  
Dose: >750 milligram per kilogram  
General Toxicity - Parent: No-observed-effect level: 540 mg/kg body weight  
General Toxicity F1: No-observed-effect level: 540 mg/kg body weight  
Symptoms: No adverse effects  
Method: OECD Test Guideline 416  
Result: No effects on fertility and early embryonic development were detected.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rat, male and female  
Application Route: Oral  
Method: OECD Test Guideline 416  
Result: No effects on fertility and early embryonic development were detected.

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bisphenol A - epoxy resins, number average MW >700 - <1100:

Species: Rat, male and female

Application Route: Oral

General Toxicity - Parent: No-observed-effect level: 750 mg/kg body weight

General Toxicity F1: No-observed-effect level: 750 mg/kg body weight

Method: OECD Test Guideline 416

Result: No effects on fertility and early embryonic development were detected.

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Effects on foetal development

: Species: Rabbit, female

Application Route: Dermal

General Toxicity Maternal: No observed adverse effect level: 30 mg/kg body weight

Method: Other guidelines

Result: No teratogenic effects

Species: Rabbit, female

Application Route: Oral

General Toxicity Maternal: No observed adverse effect level: 60 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: 180 mg/kg body weight

Method: OECD Test Guideline 414

Result: No teratogenic effects

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Species: Rabbit, female

Application Route: Dermal

General Toxicity Maternal: No observed adverse effect level: 30 mg/kg body weight

Result: No teratogenic effects

bisphenol A - epoxy resins, number average MW >700 - <1100:

Species: Rabbit, female

Application Route: Dermal

General Toxicity Maternal: No observed adverse effect level: 30 mg/kg body weight

Method: Other guidelines

Result: No teratogenic effects

Species: Rabbit, female

Application Route: Oral

General Toxicity Maternal: No observed adverse effect level: 60 mg/kg body weight

Method: OECD Test Guideline 414

Result: No teratogenic effects

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

Silicon, amorphous:

Species: Mouse  
Application Route: Oral  
General Toxicity Maternal: No observed adverse effect level:  
1,340 mg/kg body weight  
Method: OECD Test Guideline 414  
Result: No teratogenic effects

Species: Rabbit  
Application Route: Oral  
General Toxicity Maternal: No observed adverse effect level:  
1,600 mg/kg body weight  
Method: OECD Test Guideline 414  
Result: No teratogenic effects

Species: Rat  
Application Route: Oral  
General Toxicity Maternal: No observed adverse effect level:  
1,350 mg/kg body weight  
Method: OECD Test Guideline 414  
Result: No teratogenic effects

Reproductive toxicity - Assessment : No data available

**STOT - single exposure**

No data available

**STOT - repeated exposure**

No data available

**Repeated dose toxicity****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Species: Rat, male and female

NOAEL: 50 mg/kg

Application Route: Ingestion

Exposure time: 14 Weeks

Number of exposures: 7 d

Method: Subchronic toxicity

Species: Rat, male and female

NOEL: 10 mg/kg

Application Route: Skin contact

Exposure time: 13 Weeks

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Number of exposures: 5 d  
Method: Subchronic toxicity

Species: Mouse, male  
NOAEL: 100 mg/kg  
Application Route: Skin contact  
Exposure time: 13 Weeks  
Number of exposures: 3 d  
Method: Subchronic toxicity

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
Species: Rat, male and female  
NOAEL: 250 mg/kg  
Application Route: Ingestion  
Exposure time: 13 Weeks  
Number of exposures: 7 d  
Method: Subchronic toxicity

bisphenol A - epoxy resins, number average MW >700 - <1100:  
Species: Rat, male and female  
NOAEL: 50 mg/kg  
Application Route: Ingestion  
Exposure time: 14 Weeks  
Number of exposures: 7 d  
Method: Subchronic toxicity

Species: Rat, male and female  
NOEL: 10 mg/kg  
Application Route: Skin contact  
Exposure time: 13 Weeks  
Number of exposures: 5 d  
Method: Subchronic toxicity

Silicon, amorphous:  
Species: Rat, male and female  
NOAEL: 7950 - 8980 mg/kg  
Application Route: Ingestion  
Exposure time: 4,320 h  
Number of exposures: 7 d  
Method: Subchronic toxicity

Species: Rat, male and female  
: 4000 - 4500 mg/m<sup>3</sup>  
Application Route: Ingestion  
Test atmosphere: dust/mist  
Exposure time: 13 Weeks  
Number of exposures: 7 d  
Method: OECD Test Guideline 413

Repeated dose toxicity - : No data available  
Assessment

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**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

**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): 1.5 mg/l  
Exposure time: 96 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 203

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Toxicity to fish : LC50 (Fish): 2.54 mg/l  
Exposure time: 96 h  
Method: Calculation method

bisphenol A - epoxy resins, number average MW &gt;700 - &lt;1100:

Toxicity to fish : LC50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l  
Exposure time: 96 h  
Test Type: static test  
Test substance: Fresh water



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Method: OECD Test Guideline 203

Silicon, amorphous:  
 Toxicity to fish

: LL50 (Brachydanio rerio (zebrafish)): > 10,000 mg/l  
 Exposure time: 96 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 202

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 2.7 mg/l  
 Exposure time: 48 h  
 Test Type: static test  
 Test substance: Fresh water

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 2.55 mg/l  
 Exposure time: 48 h  
 Method: Calculation method

bisphenol A - epoxy resins, number average MW >700 - <1100:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): > 100 mg/l  
 Exposure time: 48 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 202

Silicon, amorphous:

Toxicity to daphnia and other aquatic invertebrates : EL50 (Daphnia magna (Water flea)): >= 1,000 mg/l  
 Exposure time: 24 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 202

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): 9.4 mg/l  
 Exposure time: 72 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: EPA-660/3-75-009

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Toxicity to algae/aquatic plants : EC50 (Selenastrum capricornutum (green algae)): 1.8 mg/l  
 Exposure time: 72 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 201

bisphenol A - epoxy resins, number average MW >700 - <1100:

Toxicity to algae/aquatic plants : EgC50 (Selenastrum capricornutum (green algae)): > 100 mg/l  
 Exposure time: 72 h  
 Method: OECD Test Guideline 201

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Silicon, amorphous:  
 Toxicity to algae/aquatic plants : EL50 (Desmodesmus subspicatus (green algae)): > 10,000 mg/l  
 Exposure time: 72 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 201

M-Factor (Acute aquatic toxicity) : No data available

Toxicity to fish (Chronic toxicity) : No data available

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
 Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.3 mg/l  
 Exposure time: 21 d  
 Test Type: semi-static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 211

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.3 mg/l  
 Exposure time: 21 d  
 Test Type: semi-static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 211  
 Remarks: Information given is based on data obtained from similar substances.

M-Factor (Chronic aquatic toxicity) : No data available

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
 Toxicity to microorganisms : IC50 (activated sludge): > 100 mg/l  
 Exposure time: 3 h  
 Test Type: static test  
 Test substance: Fresh water

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Toxicity to microorganisms : IC50 (activated sludge): > 100 mg/l  
 Exposure time: 3 h  
 Test Type: static test  
 Test substance: Fresh water

Toxicity to soil dwelling organisms : No data available

Plant toxicity : No data available

Sediment toxicity : No data available

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Toxicity to terrestrial organisms : No data available

Ecotoxicology Assessment  
 Acute aquatic toxicity : No data available

Chronic aquatic toxicity : No data available

Toxicity Data on Soil : No data available

Other organisms relevant to the environment : No data available

**Persistence and degradability****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Biodegradability : Inoculum: Sewage (STP effluent)  
 Concentration: 20 mg/l  
 Result: Not readily biodegradable.  
 Biodegradation: 5 %  
 Exposure time: 28 d  
 Method: OECD Test Guideline 301F

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Biodegradability : Inoculum: activated sludge  
 Concentration: 3 mg/l  
 Result: Not biodegradable  
 Biodegradation: ca. 0 %  
 Exposure time: 28 d  
 Method: Directive 67/548/EEC Annex V, C.4.E.

bisphenol A - epoxy resins, number average MW >700 - <1100:

Biodegradability : Test Type: aerobic  
 Inoculum: Sewage (STP effluent)  
 Concentration: 20 mg/l  
 Result: Not biodegradable  
 Biodegradation: 5 %  
 Exposure time: 28 d  
 Method: OECD Test Guideline 301F

Biochemical Oxygen Demand (BOD) : No data available

Chemical Oxygen Demand (COD) : No data available

BOD/COD : No data available

ThOD : No data available

BOD/ThOD : No data available

Dissolved organic carbon (DOC) : No data available

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Physico-chemical removability : No data available

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Stability in water : Degradation half life(DT50): 4.83 d (77 °F / 25 °C) pH: 4  
Method: OECD Test Guideline 111  
Remarks: Fresh water

Degradation half life(DT50): 7.1 d (77 °F / 25 °C) pH: 9  
Method: OECD Test Guideline 111  
Remarks: Fresh water

Degradation half life(DT50): 3.58 d (77 °F / 25 °C) pH: 7  
Method: OECD Test Guideline 111  
Remarks: Fresh water

bisphenol A - epoxy resins, number average MW >700 - <1100:

Stability in water : Degradation half life(DT50): 4.83 d (77 °F / 25 °C) pH: 4  
Method: OECD Test Guideline 111  
Remarks: Fresh water

Degradation half life(DT50): 7.1 d (77 °F / 25 °C) pH: 9  
Method: OECD Test Guideline 111  
Remarks: Fresh water

Degradation half life(DT50): 3.58 d (77 °F / 25 °C) pH: 7  
Method: OECD Test Guideline 111  
Remarks: Fresh water

Photodegradation : No data available

Impact on Sewage Treatment : No data available

**Bioaccumulative potential****Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:

Bioaccumulation : Bioconcentration factor (BCF): 31  
Remarks: Does not bioaccumulate.

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:

Bioaccumulation : Species: Fish  
Bioconcentration factor (BCF): 150  
Remarks: Does not bioaccumulate.

bisphenol A - epoxy resins, number average MW >700 - <1100:

Bioaccumulation : Species: Fish  
Bioconcentration factor (BCF): 31  
Remarks: Does not bioaccumulate.

**Components:**

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2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
 Partition coefficient: n- : log Pow: 3.242 (77 °F / 25 °C)  
 octanol/water pH: 7.1  
 Method: OECD Test Guideline 117

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Partition coefficient: n- : log Pow: 2.7 - 3.6  
 octanol/water Method: OECD Test Guideline 117

**Mobility in soil**

Mobility : No data available

**Components:**

2,2'-[(1-methylethylidene)bis(4,1-phenyleneoxymethylene)]bisoxirane:  
 Distribution among : Koc: 445  
 environmental compartments

Formaldehyde, oligomeric reaction products with 1-chloro-2,3-epoxypropane and phenol:  
 Distribution among : Koc: 4460  
 environmental compartments Method: OECD Test Guideline 121

bisphenol A - epoxy resins, number average MW >700 - <1100:

Distribution among : Koc: 445  
 environmental compartments  
 Stability in soil : No data available

**Other adverse effects**

Environmental fate and : No data available  
 pathways

Results of PBT and vPvB : No data available  
 assessment

Endocrine disrupting : No data available  
 potential

Adsorbed organic bound : No data available  
 halogens (AOX)

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

Global warming potential : No data available  
 (GWP)

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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 3082  
 Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.  
 (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)  
 Class : 9  
 Packing group : III  
 Labels : Miscellaneous  
 Packing instruction (cargo aircraft) : 964  
 Packing instruction (passenger aircraft) : 964  
 Environmentally hazardous : yes

**IMDG**

- UN number : UN 3082  
 Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.  
 (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)  
 Class : 9  
 Packing group : III  
 Labels : 9  
 EmS Code : F-A, S-F  
 Marine pollutant : yes

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

Not applicable for product as supplied.

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**National Regulations****DOT Classification**

UN/ID/NA number : UN 3082  
 Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.  
 (BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)  
 Class : 9  
 Packing group : III  
 Labels : CLASS 9  
 ERG Code : 171  
 Marine pollutant : yes(BISPHENOL A EPOXY RESIN, BISPHENOL F EPOXY RESIN)  
 Remarks : Shipment by ground under DOT is non-regulated; however it may be shipped per the applicable hazard classification to facilitate multi-modal transport involving ICAO (IATA) or IMO.

**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** : Skin corrosion or irritation  
 Serious eye damage or eye irritation  
 Respiratory or skin sensitisation

**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:**

CH INV : The formulation contains substances listed on the Swiss Inventory  
 DSL : All components of this product are on the Canadian DSL

# SAFETY DATA SHEET

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AICS : On the inventory, or in compliance with the inventory  
NZIoC : On the inventory, or in compliance with the inventory  
ENCS : 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  
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.

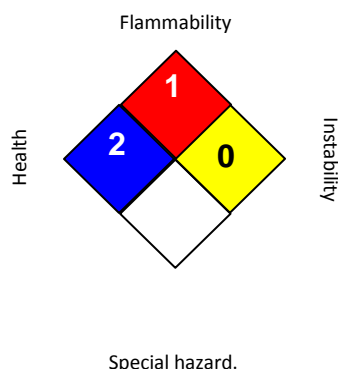
### US. Toxic Substances Control Act (TSCA) Section 12(b) Export Notification (40 CFR 707, Subpt D)

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

## SECTION 16. OTHER INFORMATION

### Further information

#### NFPA 704:



#### HMIS® IV:

<b>HEALTH</b>		<b>2</b>
<b>FLAMMABILITY</b>		<b>1</b>
<b>PHYSICAL HAZARD</b>		<b>0</b>

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 : 02/01/2019  
NIOSH REL : USA. NIOSH Recommended Exposure Limits  
OSHA Z-3 : USA. Occupational Exposure Limits (OSHA) - Table Z-3



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Mineral Dusts

NIOSH REL / TWA : Time-weighted average concentration for up to a 10-hour workday during a 40-hour workweek

OSHA Z-3 / TWA : 8-hour time weighted average

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.

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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NO PERSON OR ORGANIZATION EXCEPT A DULY AUTHORIZED HUNTSMAN EMPLOYEE IS AUTHORIZED TO PROVIDE OR MAKE AVAILABLE DATA SHEETS FOR HUNTSMAN PRODUCTS. DATA SHEETS FROM UNAUTHORIZED SOURCES MAY CONTAIN INFORMATION THAT IS NO LONGER CURRENT OR ACCURATE.

**ARALDITE® 2011 HARDENER US**

Version 1.3      Revision Date: 04/06/2017      SDS Number: 400001010612      Date of last issue: 02/16/2017  
Date of first issue: 08/16/2016

**SECTION 1. IDENTIFICATION**

Product name : ARALDITE® 2011 HARDENER US

**Manufacturer or supplier's details**

Company name of supplier : Huntsman Advanced Materials Americas LLC  
Address : 2795 Slough Avenue  
Mississauga, ON L4T 1G2,  
Canada  
Telephone : +1 905 678 9150  
E-mail address of person responsible for the SDS : MSDS@huntsman.com

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

**Recommended use of the chemical and restrictions on use**

Recommended use : Hardener

**SECTION 2. HAZARDS IDENTIFICATION****GHS classification in accordance with the Hazardous Products Regulations**

Skin corrosion : Category 1C

Serious eye damage : Category 1

Skin sensitisation : Category 1

**GHS label elements**

Hazard pictograms :



Signal word : Danger

Hazard statements : H314 Causes severe skin burns and eye damage.  
H317 May cause an allergic skin reaction.

Precautionary statements : **Prevention:**  
P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
P264 Wash skin thoroughly after handling.  
P272 Contaminated work clothing should 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): Remove/ Take off

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immediately all contaminated clothing. Rinse skin with water/ shower.

P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.

P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

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.

**Additional Labelling**

The following percentage of the mixture consists of ingredient(s) with unknown acute toxicity: 88.801 %

The following percentage of the mixture consists of ingredient(s) with unknown hazards to the aquatic environment: 88.801 %

**Other hazards**

None known.

**SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS**

Substance / Mixture : Mixture

**Hazardous components**

Chemical name	CAS-No.	Concentration (% w/w)
N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine	10563-29-8	7 - 9
trientine	112-24-3	1 - 3
N-[2-(1-piperazinyl)ethyl]ethylenediamine	24028-46-4	0.1 - 1

**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.  
Do not leave the victim unattended.

If inhaled : If unconscious, place in recovery position and seek medical advice.  
If symptoms persist, call a physician.

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.

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- 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.  
Protect unharmed eye.  
Keep eye wide open while rinsing.  
If eye irritation persists, consult a specialist.
- If swallowed : Keep respiratory tract clear.  
Do NOT induce vomiting.  
Do not give milk or alcoholic beverages.  
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 : Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours.

**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 : No hazardous combustion products are known
- 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.

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**SECTION 6. ACCIDENTAL RELEASE MEASURES**

- Personal precautions, protective equipment and emergency procedures : Use personal protective equipment.  
Evacuate personnel to safe areas.  
Ensure adequate ventilation.  
In case of inadequate ventilation wear respiratory protection.
- 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 : 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.  
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.  
Observe label precautions.  
Electrical installations / working materials must comply with the technological safety standards.
- Materials to avoid : Strong acids  
Strong bases  
Strong oxidizing agents
- Recommended storage temperature : 2 - 40 °C

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

Contains no substances with occupational exposure limit values.

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**Engineering measures** : Effective exhaust ventilation system

**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.

**Hand protection**

**Material** : butyl-rubber  
**Break through time** : > 8 h

**Material** : Solvent-resistant gloves (butyl-rubber)  
**Material** : Nitrile rubber  
**Break through time** : 10 - 480 min

**Material** : Neoprene gloves

**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.  
Ensure that eyewash stations and safety showers are close to the workstation location.

**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** : light yellow

**Odour** : slight

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

**pH** : No data is available on the product itself.

**Freezing point** : No data is available on the product itself.

**Melting point** : No data is available on the product itself.

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Boiling point	:	> 200 °C
Flash point	:	110 °C Method: Pensky-Martens 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	:	No data is available on the product itself.
Lower explosion limit	:	No data is available on the product itself.
Vapour pressure	:	0.04 hPa (20 °C)
Relative vapour density	:	No data is available on the product itself.
Relative density	:	No data is available on the product itself.
Density	:	0.95 g/cm <sup>3</sup> (25 °C)
Solubility(ies)	:	
Water solubility	:	practically insoluble (20 °C)
Solubility in other solvents	:	No data is available on the product itself.
Partition coefficient: n-octanol/water	:	No data is available on the product itself.
Auto-ignition temperature	:	No data is available on the product itself.
Decomposition temperature	:	> 200 °C
Self-Accelerating decomposition temperature (SADT)	:	No data is available on the product itself.
Viscosity	:	
Viscosity, dynamic	:	20,000 - 35,000 mPa.s (25 °C)
Explosive properties	:	No data is available on the product itself.
Oxidizing properties	:	No data is available on the product itself.
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 decomposition if stored and applied as directed.
Conditions to avoid	:	No data available

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Hazardous decomposition products : Nitrogen oxides (NOx)  
Carbon dioxide (CO2)  
Carbon monoxide  
Burning produces noxious and toxic fumes.

**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 : 1,492 mg/kg  
Method: Calculation method

Acute inhalation toxicity : No data available

Acute dermal toxicity - Product : Acute toxicity estimate : 1,066 mg/kg  
Method: Calculation method

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

**Skin corrosion/irritation****Product:**

Remarks: Extremely corrosive and destructive to tissue.

**Serious eye damage/eye irritation****Product:**

Species: Rabbit

Result: Corrosive

Assessment: Corrosive

Remarks: May cause irreversible eye damage.

**Respiratory or skin sensitisation****Product:**

Remarks: Causes sensitisation.

Assessment: No data available

**Germ cell mutagenicity****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Genotoxicity in vitro : Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 487  
Result: negative



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

Metabolic activation: with and without metabolic activation  
 Method: OECD Test Guideline 476  
 Result: negative

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

**Components:**

trientine:  
 Genotoxicity in vivo : Application Route: Intraperitoneal injection  
 Dose: 0 - 600 mg/kg  
 Method: OECD Test Guideline 474  
 Result: negative

**Carcinogenicity****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:  
 Species: Mouse, (male)  
 Application Route: Dermal  
 Exposure time: 20 month(s)  
 Frequency of Treatment: 3 daily  
 Result: negative

trientine:  
 Species: Mouse, (male)  
 Application Route: Dermal  
 Dose: 42 mg/kg  
 Frequency of Treatment: 3 days/week  
 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 days/week  
 Method: OECD Test Guideline 451

Carcinogenicity - Assessment : No data available

**ACGIH**

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

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**Reproductive toxicity****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Effects on fertility : Species: Rat, male and female  
Application Route: Oral  
Method: OECD Test Guideline 422  
Result: Animal testing did not show any effects on fertility.

**Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Effects on foetal development : Species: Rat, male and female  
Application Route: Oral  
General Toxicity Maternal: No observed adverse effect level:  
15 mg/kg body weight  
Developmental Toxicity: No observed adverse effect level: 15  
mg/kg body weight  
Embryo-foetal toxicity: No observed adverse effect level: 15  
mg/kg body weight  
Method: OECD Test Guideline 422  
Result: No effects on fertility and early embryonic  
development were detected.

trientine:

Species: Rat  
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: Rabbit  
Application Route: Dermal  
General Toxicity Maternal: No observed adverse effect level:  
125 mg/kg body weight  
Method: OECD Test Guideline 414  
Result: No teratogenic effects

**Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Reproductive toxicity - Assessment : No evidence of adverse effects on sexual function and fertility,  
or on development, based on animal experiments.

**STOT - single exposure**

No data available

**STOT - repeated exposure**

No data available

**Repeated dose toxicity****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

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Species: Rat, male and female  
: 550 ppm  
Application Route: Ingestion  
Test atmosphere: vapour  
Exposure time: 3 Weeks  
Number of exposures: 7 d  
Method: Subchronic toxicity

Species: Mouse, male  
NOAEL:  $\geq 56.3$  mg/kg/d  
Application Route: Skin contact  
Exposure time: 20 h  
Number of exposures: 3 d  
Method: Chronic toxicity

trientine:  
Species: Rat, male and female  
NOAEL: 50 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

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**Further information****Product:**

Remarks: No data available

**Other health hazards**

No data available

**SECTION 12. ECOLOGICAL INFORMATION****Ecotoxicity****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Toxicity to fish : LC50 (Brachydanio rerio (zebrafish)): > 100 mg/l  
Exposure time: 96 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 203

trientine:

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

**Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Toxicity to daphnia and other aquatic invertebrates : EC50 (Daphnia magna (Water flea)): 9.2 mg/l  
Exposure time: 48 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 202

trientine:

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.

**Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Toxicity to algae : ErC50 (Selenastrum capricornutum (green algae)): 21 mg/l  
Exposure time: 72 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 201

trientine:

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Toxicity to algae : 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

M-Factor (Acute aquatic toxicity) : No data available

Toxicity to fish (Chronic toxicity) : No data available

**Components:**

trientine:

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : EC10 (Daphnia magna (Water flea)): 1.9 mg/l  
 Exposure time: 21 d  
 Test Type: semi-static test  
 Test substance: Fresh water  
 Method: OECD Test Guideline 202

M-Factor (Chronic aquatic toxicity) : No data available

**Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Toxicity to microorganisms : EC50 (Pseudomonas putida): 181 mg/l  
 Exposure time: 16 h  
 Test Type: static test  
 Test substance: Fresh water  
 Method: DIN 38 412 Part 8

trientine:

Toxicity to microorganisms : EC50 (activated sludge): 800 mg/l  
 Exposure time: 0.5 h  
 Test Type: static test  
 Test substance: Fresh water

Toxicity to soil dwelling organisms : No data available

Plant toxicity : No data available

Sediment toxicity : No data available

Toxicity to terrestrial organisms : No data available

Ecotoxicology Assessment Acute aquatic toxicity : No data available

Chronic aquatic toxicity : No data available

Toxicity Data on Soil : No data available

Other organisms relevant to : No data available

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the environment

**Persistence and degradability****Components:**

N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Biodegradability : Result: Readily biodegradable.  
Biodegradation: 100 %  
Exposure time: 28 d  
Method: ISO Method, other

trientine:

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

Inoculum: activated sludge  
Result: Not readily biodegradable.  
Biodegradation: 20 %  
Exposure time: 84 d  
Method: Inherent Biodegradability: Modified SCAS Test

Biochemical Oxygen Demand (BOD) : No data available

Chemical Oxygen Demand (COD) : No data available

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

**Components:**

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N'-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:

Partition coefficient: n-octanol/water : log Pow: 0.5

log Pow: -0.56 (25 °C)

pH: 11.6

Method: OECD Test Guideline 107

trientine:

Partition coefficient: n-octanol/water : log Pow: -2.65 (20 °C)  
Method: OECD Test Guideline 117

**Mobility in soil**

Mobility : No data available

**Components:**

trientine:

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

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 : Not applicable

Additional ecological information - Product : No data available

Global warming potential (GWP) : No data available

**SECTION 13. DISPOSAL CONSIDERATIONS****Disposal methods**

Waste from residues : Do not dispose of waste into sewer.  
Do not contaminate ponds, waterways or ditches with chemical or used container.  
Send to a licensed waste management company.

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Contaminated packaging : Empty remaining contents.  
Dispose of as unused product.  
Do not re-use empty containers.

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

UN number : UN 2735  
Proper shipping name : POLYAMINES, LIQUID, CORROSIVE, N.O.S.  
(N-(3-DIMETHYLAMINOPROPYL)-1,3-  
PROPYLENEDIAMINE)  
Class : 8  
Packing group : III  
Labels : 8

**IATA**

UN/ID No. : UN 2735  
Proper shipping name : Polyamines, liquid, corrosive, n.o.s.  
(N-(3-DIMETHYLAMINOPROPYL)-1,3-  
PROPYLENEDIAMINE)  
Class : 8  
Packing group : III  
Labels : Corrosive  
Packing instruction (cargo  
aircraft) : 856  
Packing instruction : 852  
(passenger aircraft)

**IMDG**

UN number : UN 2735  
Proper shipping name : POLYAMINES, LIQUID, CORROSIVE, N.O.S.  
(N-(3-DIMETHYLAMINOPROPYL)-1,3-  
PROPYLENEDIAMINE)  
Class : 8  
Packing group : III  
Labels : 8  
EmS Code : F-A, S-B  
Marine pollutant : no

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

Not applicable for product as supplied.

**National Regulations****TDG**

UN number : UN 2735  
Proper shipping name : POLYAMINES, LIQUID, CORROSIVE, N.O.S.



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(N-(3-DIMETHYLAMINOPROPYL)-1,3-PROPYLENEDIAMINE)

Class	:	8
Packing group	:	III
Labels	:	8
ERG Code	:	153
Marine pollutant	:	no

**SECTION 15. REGULATORY INFORMATION****The components of this product are reported in the following inventories:**

CH INV	:	The formulation contains substances listed on the Swiss Inventory, On the inventory, or in compliance with the inventory
DSL	:	This product contains one or several components listed in the Canadian NDSL.
AICS	:	On the inventory, or in compliance with the inventory
NZIoC	:	On the inventory, or in compliance with the inventory
ENCS	:	Low volume exemption, On the inventory, or in compliance with the inventory
KECI	:	Not 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
TSCA	:	On the inventory, or in compliance with the inventory

**Inventories**

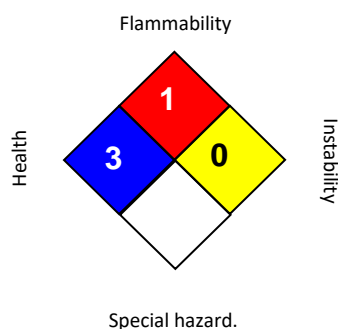
AICS (Australia), DSL (Canada), IECSC (China), REACH (European Union), ENCS (Japan), ISHL (Japan), KECI (Korea), NZIoC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (USA)

**Canada. CEPA 1999 Significant New Activity (SNAc) List**

No substances are subject to a Significant New Activity Notification.

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

<b>HEALTH</b>		<b>3</b>
<b>FLAMMABILITY</b>		<b>1</b>
<b>PHYSICAL HAZARD</b>		<b>0</b>

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.

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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.

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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.

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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