SECTION 1. IDENTIFICATION

Product name : ARALDITE® 2015 RESIN(E)/HARZ

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 : 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 : Adhesives

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200

Skin irritation : Category 2
Serious eye damage : Category 1
Skin sensitisation : Category 1
Acute aquatic toxicity : Category 2
Chronic aquatic toxicity : Category 2

GHS label elements
Hazard pictograms :

Signal word : Warning
               Danger

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.
H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H318 Causes serious eye damage.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements:

Prevention:
P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
P273 Avoid release to the environment.
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.
P273 Avoid release to the environment.
P280 Wear protective gloves/ eye protection/ face protection.

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

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bisphenol A epoxy resin</td>
<td>25068-38-8</td>
<td>30 - 50</td>
</tr>
<tr>
<td>limestone</td>
<td>1317-65-3</td>
<td>20 - 30</td>
</tr>
<tr>
<td>bisphenol F-epoxy resin</td>
<td>9003-36-5</td>
<td>10 - 20</td>
</tr>
<tr>
<td>mica</td>
<td>12001-26-2</td>
<td>5 - 10</td>
</tr>
<tr>
<td>1,4-bis(2,3-epoxypropoxy)butane</td>
<td>2425-79-8</td>
<td>5 - 10</td>
</tr>
<tr>
<td>bisphenol A - epoxy resins, number average MW &gt;700 - &lt;1100</td>
<td>25068-38-8</td>
<td>1 - 5</td>
</tr>
</tbody>
</table>
SAFETY DATA SHEET

ARALDITE® 2015 RESIN(E)/HARZ

Version 1.0  Revision Date: 03/23/2017  SDS Number: 400001000041  Date of last issue: -

<table>
<thead>
<tr>
<th>Chemical</th>
<th>UN#</th>
<th>PEC (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>dipentaerythritol pentaacrylate</td>
<td>00500-81-2</td>
<td>1 - 5</td>
</tr>
<tr>
<td>hydroquinone</td>
<td>123-31-9</td>
<td>0.025 - 0.1</td>
</tr>
</tbody>
</table>

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

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: If skin irritation persists, call a physician. If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact: Small amounts splashed into eyes can cause irreversible tissue damage and blindness. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Continue rinsing eyes during transport to hospital. Remove contact lenses. 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.

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.
Araldite® 2015 Resin(E)/Harz

Hazardous combustion products: No data is available on the product itself.

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.

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. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Electrical installations / working materials must comply with the technological safety standards.
ARALDITE® 2015 RESIN(E)/HARZ

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

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>limestone</td>
<td>1317-65-3</td>
<td>TWA (total dust)</td>
<td>15 mg/m3</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (respirable fraction)</td>
<td>5 mg/m3</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td>mica</td>
<td>12001-26-2</td>
<td>TWA (Respirable fraction)</td>
<td>3 mg/m3</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (Dust)</td>
<td>20 Million particles per cubic foot</td>
<td>OSHA Z-3</td>
</tr>
<tr>
<td>hydroquinone</td>
<td>123-31-9</td>
<td>TWA</td>
<td>1 mg/m3</td>
<td>ACGIH</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA</td>
<td>2 mg/m3</td>
<td>OSHA Z-1</td>
</tr>
</tbody>
</table>

Personal protective equipment

Respiratory protection: Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Recommended Filter type: Combined particulates and organic vapor type.

Filter type: Filter type A-P

Hand protection Material: butyl-rubber
Ethyl Vinyl Alcohol Laminate (EVAL)

Break through time: > 8 h
Nitrile rubber
10 - 480 min

Remarks: The suitability for a specific workplace should be discussed with the producers of the protective gloves. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).

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 : beige
Odour : slight

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

pH : ca. 6 - 7 (25 °C)
Concentration: 500 g/l

Freezing point : No data is available on the product itself.
Melting point : No data is available on the product itself.
Boiling point : > 200 °C
Flash point : > 150 °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 : No data is available on the product itself.
Lower explosion limit : No data is available on the product itself.
Vapour pressure : < 0.002 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 : 1.4 g/cm3 (25 °C)
Solubility (ies)
Water solubility : practically insoluble (20 °C)
SAFETY DATA SHEET

ARALDITE® 2015 RESIN(E)/HARZ

Version 1.0  Revision Date: 03/23/2017  SDS Number: 400001000041  Date of last issue: -

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: thixotropic

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 hazards to be specially mentioned.
Conditions to avoid: None known.
Incompatible materials: None known.
Hazardous decomposition products: Carbon oxides
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: > 5,000 mg/kg
Method: Calculation method

Acute inhalation toxicity - Product: Acute toxicity estimate: 171.87 mg/l
Exposure time: 4 h
Test atmosphere: vapour
Method: Calculation method

Acute dermal toxicity - Product: Acute toxicity estimate: > 5,000 mg/kg
Method: Calculation method
Acute toxicity (other routes of administration): No data available

Skin corrosion/irritation

Product: Irritating to skin.

Serious eye damage/eye irritation

Product: May cause irreversible eye damage.

Respiratory or skin sensitisation

Product: Causes sensitisation.

Assessment: No data available

Germ cell mutagenicity

Components:

Bisphenol A epoxy resin:
Genotoxicity in vitro: Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: positive
Concentration: 0 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Bisphenol F-epoxy resin:
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

1,4-bis(2,3-epoxypropoxy)butane:
Genotoxicity in vitro: Concentration: 1 - 100 µg/L
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Concentration: 10 - 5000 µg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive
SAFETY DATA SHEET

ARALDITE® 2015 RESIN(E)/HARZ

Method: OECD Test Guideline 473
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
Concentration: 0 - 5000 ug/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

hydroquinone:
Genotoxicity in vitro: Metabolic activation: with and without metabolic activation
Result: positive

Test Type: Ames test
Species: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
GLP: yes

Test Type: Chromosome aberration test in vitro
Species: Human lymphocytes
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative
GLP: yes

Test Type: Chromosome aberration test in vitro
Species: Chinese hamster ovary cells
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: positive

Components:

Bisphenol A epoxy resin:
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

bisphenol F-epoxy resin:
Genotoxicity in vivo: Cell type: Somatic
Application Route: Oral
Exposure time: 48 h
Dose: 2000 mg/kg
Method: OECD Test Guideline 474
Result: negative

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

1,4-bis(2,3-epoxypropoxy)butane:
Genotoxicity in vivo: Test Type: In vivo micronucleus test
Species: Mouse
Cell type: Somatic
Application Route: Oral
Exposure time: 4 d
Dose: 187.5 - 750 mg/kg
Method: OECD Test Guideline 474
Result: negative

Test Type: unscheduled DNA synthesis assay
Species: Rat
Cell type: Liver cells
Application Route: Oral
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

hydroquinone:
Genotoxicity in vivo: Application Route: Intraperitoneal injection
Method: OECD Test Guideline 463
Result: positive

Application Route: Intraperitoneal injection
Method: OECD Test Guideline 474
Result: positive

Application Route: Oral
Exposure time: 10 Weeks
Method: OECD Test Guideline 478
Result: negative

Components:
Bisphenol A epoxy resin:
Germ cell mutagenicity:
Weight of evidence does not support classification as a germ
Assessment: cell mutagen.

1,4-bis(2,3-epoxypropoxy)butane:
Gem cell mutagenicity: Weight of evidence does not support classification as a germ cell mutagen.
Assessment

bisphenol A - epoxy resins, number average MW >700 - <1100:
Gem cell mutagenicity: Animal testing did not show any mutagenic effects.
Assessment

hydroquinone:
Gem cell mutagenicity: In vitro tests showed mutagenic effects.
Assessment

Gem cell mutagenicity: No data available
Assessment

Carcinogenicity

Components:
Bisphenol A epoxy resin:
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)
Dose: 15 mg/kg
Frequency of Treatment: 7 daily
Method: OECD Test Guideline 453
Result: negative
Species: Mouse, (male)
Application Route: Dermal
Exposure time: 24 month(s)
Dose: .1 mg/kg
Frequency of Treatment: 3 daily
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 daily
Method: OECD Test Guideline 453
Result: negative

Hydroquinone:
Species: Rat
Application Route: Oral
Exposure time: 103 weeks
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive

Species: Mouse
Application Route: Oral
Exposure time: 103 weeks
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 453
Result: positive

Components:
bisphenol A - epoxy resins, number average MW >700 - <1100:
Carcinogenicity - : Animal testing did not show any carcinogenic effects.
Assessment
hydroquinone:
: Limited evidence of carcinogenicity in animal studies

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 identified as a carcinogen or potential carcinogen by OSHA.

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:
Bisphenol A epoxy resin:
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.

bisphenol F-epoxy resin:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

bisphenol A - epoxy resins, number average MW >700 - <1100:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

hydroquinone:
Species: Rat
Application Route: Oral
Method: Skin Sensitization

Components:
Bisphenol A epoxy resin:
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

Bisphenol F-epoxy resin:
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

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

Hydroquinone:
Species: Rat
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
100 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:
25 mg/kg body weight
Method: Prenatal Developmental Toxicity Study
Result: No teratogenic effects

Components:
Bisphenol A - epoxy resins, number average MW >700 - <1100:
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:
Bisphenol A epoxy resin:
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

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

Bisphenol F-epoxy resin:
Species: Rat, male and female
NOAEL: 250 mg/kg
Application Route: Ingestion
Exposure time: 13 Weeks
Number of exposures: 7 d
Method: Subchronic toxicity

1,4-bis(2,3-epoxypropoxy)butane:
Species: Rat, male and female
NOAEL: 200 mg/kg
Application Route: Ingestion
Exposure time: 28 d
Number of exposures: 7 d
Method: Subacute 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

hydroquinone:
Species: Mouse
LOAEL: 100 mg/kg/d
Application Route: Ingestion
Exposure time: 13 Weeks
Number of exposures: 5 d
Method: Subchronic toxicity

Species: Rat
LOAEL: 100 mg/kg/d
Application Route: Ingestion
Exposure time: 13 Weeks
Number of exposures: 5 d
Method: Subchronic toxicity

Species: Rat
NOAEL: 109.6 mg/kg/d
Application Route: Skin contact
Exposure time: 13 Weeks
Number of exposures: 5 d
Method: Subchronic toxicity

Repeated dose toxicity - : No data available
Assessment

Aspiration toxicity
No data available

Experience with human exposure
General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution
No data available
Neurological effects
No data available

Further information
Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:
Bisphenol A epoxy resin:
Toxicity to fish:
- LC50 (Onchorhynchus mykiss (rainbow trout)): 1.5 mg/l
  - Exposure time: 96 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 203

Limestone:
Toxicity to fish:
- LC50: > 56,000 mg/l
  - Exposure time: 96 h

Bisphenol F-epoxy resin:
Toxicity to fish:
- LC50 (Onchorhynchus mykiss (rainbow trout)): 0.55 mg/l
  - Exposure time: 96 h
  - Test Type: semi-static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 203

1,4-bis(2,3-epoxypropoxy)butane:
Toxicity to fish:
- LC50 (Brachydanio rerio (zebrafish)): 24 mg/l
  - Exposure time: 96 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 203

Hydroquinone:
Toxicity to fish:
- LC50 (Onchorhynchus mykiss (rainbow trout)): 0.638 mg/l
  - Exposure time: 96 h
  - Test Type: flow-through test
  - Method: OECD Test Guideline 203

Components:
Bisphenol A epoxy resin:
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
**SAFETY DATA SHEET**

**ARALDITE® 2015 RESIN(E)/HARZ**

<table>
<thead>
<tr>
<th>Version</th>
<th>Revision Date</th>
<th>SDS Number</th>
<th>Date of last issue</th>
<th>Date of first issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>03/23/2017</td>
<td>400001000041</td>
<td>-</td>
<td>03/23/2017</td>
</tr>
</tbody>
</table>

- **bisphenol F-epoxy resin:**
  - **Toxicity to daphnia and other aquatic invertebrates:**  
    - EC50 (Daphnia magna (Water flea)): 1.6 mg/l  
    - Exposure time: 48 h  
    - Test Type: static test  
    - Test substance: Fresh water  
    - Method: OECD Test Guideline 202

- **1,4-bis(2,3-epoxypropoxy)butane:**
  - **Toxicity to daphnia and other aquatic invertebrates:**  
    - EC50 (Daphnia magna (Water flea)): 75 mg/l  
    - Exposure time: 24 h  
    - Test Type: static test  
    - Test substance: Fresh water  
    - Method: OECD Test Guideline 202

- **hydroquinone:**
  - **Toxicity to daphnia and other aquatic invertebrates:**  
    - EC50 (Daphnia magna (Water flea)): 0.134 mg/l  
    - Exposure time: 48 h  
    - Test Type: semi-static test  
    - Test substance: Fresh water  
    - Method: OECD Test Guideline 202  
    - GLP: yes

**Components:**

- **Bisphenol A epoxy resin:**
  - **Toxicity to algae:**  
    - 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

- **bisphenol F-epoxy resin:**
  - **Toxicity to algae:**  
    - 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

- **1,4-bis(2,3-epoxypropoxy)butane:**
  - **Toxicity to algae:**  
    - EL50: > 160 mg/l  
    - Exposure time: 72 h  
    - Test Type: static test  
    - Test substance: Fresh water  
    - Method: OECD Test Guideline 201

- **hydroquinone:**
  - **Toxicity to algae:**  
    - ErC50 (Selenastrum capricornutum (green algae)): 0.33 mg/l  
    - Exposure time: 72 h  
    - Test Type: static test  
    - Test substance: Fresh water  
    - Method: OECD Test Guideline 201  
    - GLP: yes

**Components:**

- **bisphenol F-epoxy resin:**  
  - M-Factor (Acute aquatic toxicity): 1
hydroquinone:
M-Factor (Acute aquatic toxicity) : 10
Toxicity to fish (Chronic toxicity) : No data available

Components:
Bisphenol A epoxy resin:
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

limestone:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : EC50 (Daphnia magna (Water flea)): > 350 mg/l
Exposure time: 125 d
Test Type: semi-static test
Test substance: Fresh water

bisphenol F-epoxy resin:
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

hydroquinone:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 0.0057 mg/l
Exposure time: 21 d
Test Type: semi-static test
Method: OECD Test Guideline 211
GLP: yes

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

Components:
Bisphenol A epoxy resin:
Toxicity to microorganisms : IC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water

bisphenol F-epoxy resin:
Toxicity to microorganisms : IC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water

1,4-bis(2,3-epoxypropoxy)butane:
Toxicity to microorganisms : IC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

hydroquinone:
Toxicity to microorganisms : IC50 (activated sludge): 71 mg/l
Exposure time: 2 h
GLP:

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

Components:
bisphenol F-epoxy resin:
Acute aquatic toxicity : This product has no known ecotoxicological effects.

Components:
bisphenol F-epoxy resin:
Chronic aquatic toxicity : Toxic to aquatic life with long lasting effects.

Toxicity Data on Soil : No data available

Other organisms relevant to the environment : No data available

Persistence and degradability

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

bisphenol F-epoxy resin:
Biodegradability : Inoculum: activated sludge
Concentration: 3 mg/l
Result: Not readily biodegradable.
Biodegradation: ca. 0 %
Exposure time: 28 d

1,4-bis(2,3-epoxypropoxy)butane:
Biodegradability : Inoculum: activated sludge
Concentration: 20 mg/l
Result: Not readily biodegradable.
## SAFETY DATA SHEET

### ARALDITE® 2015 RESIN(E)/HARZ

<table>
<thead>
<tr>
<th>Version</th>
<th>SDS Number</th>
<th>Date of last issue:</th>
<th>Date of first issue:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>40000100041</td>
<td>-</td>
<td>03/23/2017</td>
</tr>
</tbody>
</table>

- **Biodegradation:** 43 %
- **Exposure time:** 28 d
- **Method:** OECD Test Guideline 301F

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

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

#### Hydroquinone:

#### Biodegradability
- **Test Type:** aerobic
- **Inoculum:** activated sludge
- **Concentration:** 100 mg/l
- **Result:** Readily biodegradable.
- **Biodegradation:** 70 %
- **Exposure time:** 14 d
- **Method:** OECD Test Guideline 301C

### Biochemical Oxygen Demand (BOD)

- **Data:** No data available

### Chemical Oxygen Demand (COD)

- **Data:** No data available

### BOD/COD

- **Data:** No data available

### ThOD

- **Data:** No data available

### BOD/ThOD

- **Data:** No data available

### Dissolved organic carbon (DOC)

- **Data:** No data available

### Physico-chemical removability

- **Data:** No data available

### Components:

**Bisphenol A epoxy resin:**

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

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

  **Degradation half life (DT50):** 3.58 d (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 (25 °C) pH: 4
Method: OECD Test Guideline 111
Remarks: Fresh water
Degradation half life (DT50): 7.1 d (25 °C) pH: 9
Method: OECD Test Guideline 111
Remarks: Fresh water
Degradation half life (DT50): 3.58 d (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:
Bisphenol A epoxy resin:
Bioaccumulation: Bioconcentration factor (BCF): 31
Remarks: Does not bioaccumulate.
bisphenol F-epoxy resin:
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.
hydroquinone:
Bioaccumulation: Bioconcentration factor (BCF): 3.16

Components:
Bisphenol A epoxy resin:
Partition coefficient: n-octanol/water: log Pow: 3.242 (25 °C)
pH: 7.1
Method: OECD Test Guideline 117
limestone:
Partition coefficient: n-octanol/water: log Pow: < 1
Method: No information available.
bisphenol F-epoxy resin:
Partition coefficient: n-octanol/water: log Pow: 2.7 - 3.6
Method: OECD Test Guideline 117
1,4-bis(2,3-epoxypropoxy)butane:
Partition coefficient: n-octanol/water: log Pow: -0.269 (25 °C)
pH: 6.7
Method: OECD Test Guideline 117
hydroquinone:  
Partition coefficient: n-octanol/water  
: log Pow: 0.59

Mobility in soil  
Mobility  
: No data available

Components:  
Bisphenol A epoxy resin:  
Distribution among environmental compartments  
: Koc: 445
biphenol F-epoxy resin:  
Distribution among environmental compartments  
: Koc: 4460Method: OECD Test Guideline 121
1,4-bis(2,3-epoxypropoxy)butane:  
Distribution among environmental compartments  
: Koc: 12.59Method: OECD Test Guideline 121
biphenol A - epoxy resins, number average MW >700 - <1100:  
Distribution among environmental compartments  
: Koc: 445
Stability in soil  
: No data available

Other adverse effects  
Environmental fate and pathways  
: No data available
Results of PBT and vPvB assessment:  
: No data available
Endocrine disrupting potential  
: No data available
Adsorbed organic bound halogens (AOX)  
: No data available

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

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

Global warming potential (GWP)  
: No data available
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.

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

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.

National Regulations

DOT Classification
UN/ID/NA number : UN 3082
ARALDITE® 2015 RESIN(E)/HARZ

Proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (BISPHENOL A 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: Above applies only to containers over 119 gallons or 450 liters. Not regulated if shipped in packages less than or equal to 119 gallons (450 liters).

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

CERCLA Reportable Quantity

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Component RQ (lbs)</th>
<th>Calculated product RQ (lbs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>hydroquinone</td>
<td>123-31-9</td>
<td>100</td>
<td>*</td>
</tr>
<tr>
<td>toluene</td>
<td>108-88-3</td>
<td>1000</td>
<td>*</td>
</tr>
</tbody>
</table>

*: Calculated RQ exceeds reasonably attainable upper limit.

SARA 311/312 Hazards: Acute Health Hazard

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

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

toluene: 108-88-3

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

CH INV: The formulation contains substances listed on the Swiss Inventory, Not 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: Not 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), KECl (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:

Flammability

1

Health

3

Special hazard

HMIS® IV:

HEALTH

3

FLAMMABILITY

1

PHYSICAL HAZARD

0

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

Revision Date : 03/23/2017

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.

The trademarks above are the property of Huntsman Corporation or an affiliate thereof.

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.
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

SECTION 1. IDENTIFICATION

Product name : ARALDITE® 2015 HARDENER

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 : 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 : Adhesives

SECTION 2. HAZARDS IDENTIFICATION

GHS classification in accordance with 29 CFR 1910.1200
Acute toxicity (Inhalation) : Category 4
Skin corrosion : Category 1B
Serious eye damage : Category 1
Skin sensitisation : Category 1
Reproductive toxicity : Category 1B
Specific target organ toxicity
- repeated exposure (Inhalation) : Category 1 (Respiratory Tract)
Acute aquatic toxicity : Category 2
Chronic aquatic toxicity : Category 2

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.
- H332 Harmful if inhaled.
- H402 Harmful to aquatic life.
- H314 Causes severe skin burns and eye damage.
- H317 May cause an allergic skin reaction.
- H332 Harmful if inhaled.
- H360 May damage fertility or the unborn child.
- H372 Causes damage to organs (Respiratory Tract) through prolonged or repeated exposure if inhaled.
- H411 Toxic to aquatic life with long lasting effects.

Precautionary statements:

Prevention:
- P280 Wear protective gloves/protective clothing/eye protection/face protection.
- P273 Avoid release to the environment.
- P201 Obtain special instructions before use.
- P202 Do not handle until all safety precautions have been read and understood.
- P260 Do not breathe dust/fume/gas/mist/vapours/spray.
- P264 Wash skin thoroughly after handling.
- P270 Do not eat, drink or smoke when using this product.
- P271 Use only outdoors or in a well-ventilated area.
- P272 Contaminated work clothing should not be allowed out of the workplace.
- P273 Avoid release to the environment.
- P280 Wear protective gloves/protective clothing/eye protection/face protection.

Response:
- P309 + P311 IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.
- P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
- P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
- P303 + P361 + P353 IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/shower.
- P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
- 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.
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version 1.0  Revision Date: 03/22/2017  SDS Number: 400001007753  Date of last issue: -

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.
P306 + P313 IF exposed or concerned: Get medical advice/attention.
P333 + P313 If skin irritation or rash occurs: Get medical advice/attention.
P363 Wash contaminated clothing before reuse.
P391 Collect spillage.

Storage:
P405 Store locked up.
P405 Store locked up.

Disposal:
P501 Dispose of contents/container to an approved facility in accordance with local, regional, national and international regulations.

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture : Mixture

Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>barium sulfate</td>
<td>7727-43-7</td>
<td>30 - 50</td>
</tr>
<tr>
<td>2-Propenenitrile, polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[(2-(1-piperaziny1)ethyl]amino]butyl-terminated</td>
<td>68883-29-4</td>
<td>30 - 50</td>
</tr>
<tr>
<td>naphthalene, bis(1-methylethyl)</td>
<td>38640-62-9</td>
<td>5 - 10</td>
</tr>
<tr>
<td>Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine</td>
<td>68002-29-1</td>
<td>5 - 10</td>
</tr>
<tr>
<td>2,2'-iminobis(ethylenimine)</td>
<td>111-40-0</td>
<td>5 - 10</td>
</tr>
<tr>
<td>Aminoethylpiperazine</td>
<td>140-31-8</td>
<td>1 - 2.5</td>
</tr>
<tr>
<td>2,4,8-tris(dimethylaminomethyl)phenol</td>
<td>90-72-2</td>
<td>1 - 2.5</td>
</tr>
<tr>
<td>4,4’-isopropylidenediphenol</td>
<td>80-05-7</td>
<td>0.25 - 1</td>
</tr>
<tr>
<td>trientine</td>
<td>112-24-3</td>
<td>0.25 - 1</td>
</tr>
</tbody>
</table>

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

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 : Consult a physician after significant exposure. If unconscious, place in recovery position and seek medical advice.

In case of skin contact : Immediate medical treatment is necessary as untreated wounds from corrosion of the skin heal slowly and with difficulty. If on skin, rinse well with water. If on clothes, remove clothes.

In case of eye contact : Small amounts splashed into eyes can cause irreversible tissue damage and blindness. In the case of contact with eyes, rinse immediately with plenty of water and seek medical advice. Continue rinsing eyes during transport to hospital. Remove contact lenses. 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 : No information available.

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 data is available on the product itself.

Specific extinguishing : No data is available on the product itself.
methods

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. Ensure adequate ventilation.

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 : Avoid formation of aerosol. 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.
Provide sufficient air exchange and/or exhaust in work rooms. To avoid spills during handling keep bottle on a metal tray. Dispose of rinse water in accordance with local and national regulations.
Persons susceptible to skin sensitisation problems or asthma, allergies, chronic or recurrent respiratory disease should not be employed in any process in which this mixture is being used.

Conditions for safe storage : Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

Materials to avoid : Strong acids
Strong bases

Strong oxidizing agents

SECTION 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Components with workplace control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters / Permissible concentration</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>barium sulfate</td>
<td>7727-43-7</td>
<td>TWA (total dust)</td>
<td>15 mg/m3</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (respirable fraction)</td>
<td>5 mg/m3</td>
<td>OSHA Z-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TWA (Inhalable fraction)</td>
<td>5 mg/m3</td>
<td>ACGIH</td>
</tr>
<tr>
<td>2,2'-iminodi(ethylamine)</td>
<td>111-40-0</td>
<td>TWA</td>
<td>1 ppm</td>
<td>ACGIH</td>
</tr>
</tbody>
</table>

Personal protective equipment

Respiratory protection : Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines. Recommended Filter type: Combined particulates and organic vapour type

Filter type : Filter type A-P

Hand protection
Material : butyl-rubber
Ethyl Vinyl Alcohol Laminate (EVAL)

Break through time : > 8 h
Nitrile rubber
10 - 480 min

Remarks : The suitability for a specific workplace should be discussed with the producers of the protective gloves. Take note of the information given by the producer concerning permeability and break through times, and of special workplace conditions (mechanical strain, duration of contact).

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

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Appearance</strong></td>
<td>paste</td>
</tr>
<tr>
<td><strong>Colour</strong></td>
<td>light cream</td>
</tr>
<tr>
<td><strong>Odour</strong></td>
<td>amine-like</td>
</tr>
<tr>
<td><strong>Odour Threshold</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>pH</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Freezing point</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Melting point</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Boiling point</strong></td>
<td>&gt; 200 °C</td>
</tr>
<tr>
<td><strong>Flash point</strong></td>
<td>&gt; 100 °C (Method: Pensky-Martens closed cup, closed cup)</td>
</tr>
<tr>
<td><strong>Evaporation rate</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Flammability (solid, gas)</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Flammability (liquids)</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Upper explosion limit</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Lower explosion limit</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Vapour pressure</strong></td>
<td>&lt; 0.49 hPa (20 °C)</td>
</tr>
<tr>
<td><strong>Relative vapour density</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Relative density</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Density</strong></td>
<td>1.4 g/cm³ (25 °C)</td>
</tr>
<tr>
<td><strong>Solubility (in water)</strong></td>
<td>practically insoluble (20 °C)</td>
</tr>
<tr>
<td><strong>Solubility in other solvents</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Partition coefficient: n-octanol/water</strong></td>
<td>No data is available on the product itself.</td>
</tr>
<tr>
<td><strong>Auto-ignition temperature</strong></td>
<td>No data is available on the product itself.</td>
</tr>
</tbody>
</table>
Decomposition temperature : > 200 °C

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

Viscosity
  Viscosity, dynamic : thixotropic

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 decomposition if stored and applied as directed.
Chemical stability : No decomposition if stored and applied as directed.
Possibility of hazardous reactions : No decomposition if stored and applied as directed.
Conditions to avoid : No data available
Incompatible materials : No data available
Hazardous decomposition products : Burning produces noxious and toxic fumes.
  Carbon oxides
  Nitrogen oxides (NOₓ)

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: > 5,000 mg/kg
    Method: Calculation method

  Acute inhalation toxicity - Product : Acute toxicity estimate: 2.95 mg/l
    Exposure time: 4 h
    Test atmosphere: dust/mist
    Method: Calculation method

  Acute dermal toxicity - Product : Acute toxicity estimate: > 5,000 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:**
Remarks: May cause irreversible eye damage.

Respiratory or skin sensitisation

**Product:**
Remarks: Causes sensitisation.

**Components:**
naphthalene, bis(1-methylethyl)-:
Assessment: May be harmful if swallowed or if inhaled.
Does not cause skin sensitisation.

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Assessment: May cause an allergic skin reaction.

Germ cell mutagenicity

**Components:**
barium sulfate:
Genotoxicity in vitro: 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

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

naphthalene, bis(1-methylethyl)-:
Genotoxicity in vitro: Test Type: Chromosome aberration test in vitro
Species: Chinese hamster ovary cells
Concentration: 9.5 - 60 µg/L
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Test Type: Ames test
Species: Salmonella typhimurium
Concentration: 92 mg/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative
Test Type: In vitro mammalian cell gene mutation test  
Species: mouse lymphoma cells  
Concentration: 40 - 60 mg/ml  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 476  
Result: negative

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Genotoxicity in vitro

Test Type: In vitro mammalian cell gene mutation test  
Species: mouse lymphoma cells  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 476  
Result: negative

Test Type: Micronucleus test  
Species: Human lymphocytes  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 487  
Result: negative

Test Type: Ames test  
Species: Salmonella typhimurium  
Metabolic activation: with and without metabolic activation  
Method: OECD Test Guideline 471  
Result: negative

Aminoethylpiperazine:
Genotoxicity in vitro

Concentration: 5000 ug/plate  
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

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

2,4,5-tris(dimethylaminomethyl)phenol:
Genotoxicity in vitro

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

Concentration: 2500 ug/plate  
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
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version 1.0 Revision Date: 03/22/2017 SDS Number: 400001007753 Date of last issue: - Date of first issue: 03/22/2017

4,4'-isopropylidenediphenol:
Genotoxicity in vitro: Metabolic activation: with and without metabolic activation
Result: negative

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

Components:
naphthalene, bis(1-methylethyl)-:
Genotoxicity in vivo: Test Type: Micronucleus test
Species: Mouse (male and female)
Application Route: Intraperitoneal injection
Dose: 1.92 g/kg
Method: OECD Test Guideline 474
Result: negative

2,2'-iminod(ethylamine):
Genotoxicity in vivo: Cell type: Somatic
Application Route: Oral
Dose: 85 - 850 mg/kg
Method: OECD Test Guideline 474
Result: negative

Aminoethylpiperazine:
Genotoxicity in vivo: Application Route: Intraperitoneal injection
Dose: 175 - 560 mg/kg
Method: OECD Test Guideline 474
Result: negative

4,4'-isopropylidenediphenol:
Genotoxicity in vivo: Method: OECD Test Guideline 474
Result: negative

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

Components:
naphthalene, bis(1-methylethyl)-:
Germ cell mutagenicity-Assessment: Tests on bacterial or mammalian cell cultures did not show mutagenic effects.

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tail-oil fatty acids and triethylenetetramine:
Germ cell mutagenicity-Assessment: In vitro tests did not show mutagenic effects.
Germ cell mutagenicity: No data available

Carcinogenicity

Components:

- barium sulfate:
  - Species: Rat, (male and female)
  - Application Route: Oral
  - Exposure time: 104 weeks
  - Dose: 60 - 75 mg/kg
  - Method: OPPTS 870.4200
  - Result: negative

- Species: Mouse, (male and female)
  - Application Route: Oral
  - Dose: 160 - 200 mg/kg
  - Method: OPPTS 870.4200
  - Result: negative

- 2,2'-iminodipropionitrile:
  - Species: Mouse, (male)
  - Application Route: Dermal
  - Dose: 56.3 mg/kg
  - Frequency of Treatment: 3 daily
  - Result: negative

- 4,4'-isopropylidenediphenol:
  - Species: Rat, (male and female)
  - Application Route: Oral
  - Exposure time: 103 weeks
  - Frequency of Treatment: 7 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

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 identified as a carcinogen or potential carcinogen by OSHA.

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:

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylene tetramine:

Effects on fertility:

Species: Rat, male and female
Application Route: Oral
Dose: 0, 100, 300, 1000 mg/kg bw/d
Frequency of Treatment: 7 days/week
General Toxicity - Parent: No observed adverse effect level: 1,000 mg/kg body weight
Method: OECD Test Guideline 422
Result: Animal testing did not show any effects on fertility.

2,2'-iminodi(ethylamine):

Species: Rat, male and female
Application Route: Oral
General Toxicity - Parent: No observed adverse effect level: 30 mg/kg wet weight
Method: OECD Test Guideline 421
Result: positive

2,4,6-tris(dimethylaminomethyl)phenol:

Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 422
Remarks: No significant adverse effects were reported

4,4'-isopropylidenediphenol:

Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: Embryotoxic effects and adverse effects on the offspring were detected.

Components:

naphthalene, bis(1-methyl)
ARALDITE® 2015 HARDENER

General Toxicity Maternal: Lowest observed adverse effect level: 250 mg/kg body weight
Teratogenicity: No observed adverse effect level: 625 mg/kg body weight
Embryo-foetal toxicity: No observed adverse effect level: 625 mg/kg body weight
Result: No teratogenic effects

2,2'-iminodi(ethylamine):
Species: Rat
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level: 100 mg/kg body weight
Method: OECD Test Guideline 421
Result: No adverse effects

4,4'-isopropylidenediphenol:
Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level: < 160 mg/kg body weight
Method: OECD Test Guideline 416
Result: No teratogenic effects

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:
naphthalene, bis(1-methylethyl) :
Reproductive toxicity - Assessment : No evidence of adverse effects on sexual function and fertility, or on development, based on animal experiments.

Aminoethylpiperazine:
Reproductive toxicity - Assessment : Some evidence of adverse effects on sexual function and fertility, and/or on development, based on animal experiments.

4,4'-isopropylidenediphenol:
Reproductive toxicity - Assessment : Clear evidence of adverse effects on sexual function and fertility, based on animal experiments.
STOT - single exposure

**Components:**
2,2’-iminodi(ethyiamine):
Target Organs: Respiratory Tract
Assessment: May cause respiratory irritation.

4,4’-isopropylidenediphenol:
Assessment: The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.

STOT - repeated exposure

**Components:**
Aminoethylpiperazine:
Exposure routes: Inhalation
Target Organs: Respiratory Tract
Assessment: Causes damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

**Components:**
barium sulfate:
Species: Rat
LOEC: >= 104 mg/kg, 40 mg/m3
Application Route: Ingestion
Test atmosphere: dust/mist
Exposure time: 5 h
Number of exposures: 5 d
Method: Subchronic toxicity

naphthalene, bis(1-methylethyl):
Species: Rat, male and female
NOAEL: 170 mg/kg
Application Route: oral (feed)
Exposure time: 4,320 h
Number of exposures: 7 d
Dose: 170, 340, and 670 mg/kg
Method: Subchronic toxicity
Remarks: No significant adverse effects were reported

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Species: Rat, male and female
NOAEL: 1000 mg/kg
NOAEL: 1,000 mg/kg
Application Route: Oral
Exposure time: 14 days
Number of exposures: Once daily
Dose: 0, 100, 300, 1000 mg/kg bw/d
Group: yes
Method: OECD Test Guideline 422
Target Organs: Liver

2,2'-iminodi(ethyamine):
Species: Rat, male and female
: 70 - 80 mg/m3
Application Route: Ingestion
Test atmosphere: vapour
Exposure time: 360 h
Number of exposures: 7 d
Method: Subchronic toxicity

Species: Rat, male and female
NOAEL: 114 mg/kg/d
Application Route: Skin contact
Exposure time: 9,600 h
Number of exposures: 6 d
Method: Chronic toxicity

Aminoethylpiperazine:
Species: Rat, male and female
NOAEL: 152 mg/kg/d
Application Route: Oral
Exposure time: 28 d
Method: OECD Test Guideline 422

Species: Rat, male and female
NOAEL: > 1000 mg/kg/d
Application Route: Skin contact
Exposure time: 29 d
Number of exposures: 6h/application, 5d/week
Method: OECD Test Guideline 410

Species: Rat, male and female
: 0.2 mg/m3
Application Route: Inhalation
Exposure time: 90 d
Number of exposures: 6h/d, 5d/week
Method: OECD Test Guideline 413
Target Organs: Respiratory Tract
Assessment: The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 1.

Species: Rat, male and female
: 53.3 mg/m3
Application Route: Inhalation
Exposure time: 90 d
Number of exposures: 6h/d, 5d/week
Method: OECD Test Guideline 413

2,4,6-tris(dimethylaminomethyl)phenol:
Species: Rat, male and female
NOEL: 15 mg/kg
Application Route: Ingestion
Exposure time: 1,032 h
Number of exposures: 7 d
Method: Subacute toxicity

4,4’-isopropylidenediphenol:
Species: Dog, male and female
: 75 mg/kg, 10 mg/m³
Application Route: Ingestion
Test atmosphere: dust/mist
Exposure time: 2,160 h
Number of exposures: 7 d
Method: Subchronic toxicity

Species: Rat, male and female
LOAEL: 600 mg/kg
Application Route: Ingestion
Exposure time: 672 h
Number of exposures: 7 d
Method: Subchronic 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

Components:
naphthalene, bis(1-methylethyl)-:
Repeated dose toxicity - : May be harmful if swallowed or if inhaled.
Assessment : No adverse effect has been observed in chronic toxicity tests.

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Repeated dose toxicity - : No adverse effect has been observed in chronic toxicity tests.
Assessment

Aspiration toxicity

Components:
naphthalene, bis(1-methylethyl)-:
May be fatal if swallowed and enters airways.

Experience with human exposure
General Information: No data available

Inhalation: No data available
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version: 1.0  Revision Date: 03/22/2017  SDS Number: 400001007753  Date of last issue: -  Date of first issue: 03/22/2017

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
Product:
Remarks: No data available

SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity
Components:
barium sulfate:
Toxicity to fish: LC50: 174 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 203

naphthalene, bis(1-methylethyl) :
Toxicity to fish: LC50: > 0.5 mg/l
Exposure time: 96 h
Test Type: semi-static test
Remarks: Aquatic toxicity is unlikely due to low solubility.

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Toxicity to fish: LC50 (Brachydanio rerio (zebrafish)): 7.07 mg/l
Exposure time: 96 h
Method: OECD Test Guideline 203

2,2'-iminodi(ethylamine):
Toxicity to fish: LC50: 430 mg/l
Exposure time: 96 h
Test Type: semi-static test
Test substance: Fresh water
Aminoethylpiperazine:
Toxicity to fish: LC50: 2,190 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water

2,4,6-tris(dimethylaminomethyl)phenol:
Toxicity to fish: LC50 (Cyprinus carpio (Carp)): 175 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Fresh water

4,4'-isopropylidenediphenol:
Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): 7.5 mg/l
Exposure time: 96 h

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:
barium sulfate:
Toxicity to daphnia and other aquatic invertebrates: LC50 (Daphnia magna (Water flea)): 14.5 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 202

2-Propenenitrile, polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[2-(1-piperazinyl)ethyl]amino]butyl-terminated:
Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 1.000 mg/l
Exposure time: 48 h
Method: OECD Test Guideline 202

Naphthalene, bis(1-methylethyl):
Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): > 0.16 mg/l
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202
Remarks: Aquatic toxicity is unlikely due to low solubility.

EL50 (Daphnia magna (Water flea)): 1.7 mg/l
Exposure time: 48 h
Test Type: semi-static test
Method: OECD Test Guideline 202

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 7.07 mg/l
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202

2,2\textquotesingle-iminodi(ethylamine);
Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 32 mg/l
Exposure time: 48 h
Test Type: static test
Test substance: Fresh water

Aminoethylpiperazine:
Toxicity to daphnia and other aquatic invertebrates: EC50 (Daphnia magna (Water flea)): 58 mg/l
Exposure time: 48 h
Test Type: static test
Method: OECD Test Guideline 202
Remarks: Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

2,4,8-tris(dimethylaminomethyl)phenol:
Toxicity to daphnia and other aquatic invertebrates: LC50: 718 mg/l
Exposure time: 96 h
Test Type: static test
Test substance: Marine water

4,4\textquotesingle-isopropylidenediphenol:
Toxicity to daphnia and other aquatic invertebrates: EC50: 3.9 - 10.2 mg/l
Exposure time: 48 h
(Ceriodaphnia dubia (Water flea));

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

Components:
barium sulfate:
Toxicity to algae: EC50: > 100 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201
NOEC: > 1.15 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 201

2-Propenenitrile, polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[2-(1-piperazinyl)ethyl]amino]butyl-terminated:
Toxicity to algae: EC50 (No information available.): > 1,000 mg/l
Exposure time: 72 h
Method: OECD Test Guideline 201
## naphthalene, bis(1-methylethyl)-:
**Toxicity to algae**
- NOEC (Desmodesmus subspicatus (Gloeocapsa subspicatus)): ca. 0.15 mg/l
- Exposure time: 72 h
- Test Type: static test
- Method: DIN 38412
- GLP: no
- Remarks: Aquatic toxicity is unlikely due to low solubility.

## Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylene tetramine:
**Toxicity to algae**
- EC50 (Selenastrum capricornutum (green algae)): 4.34 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

- EC10 (Selenastrum capricornutum (green algae)): 1.78 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Method: OECD Test Guideline 201

## 2,2'-iminodi(ethylamine):
**Toxicity to algae**
- EbC50 (Selenastrum capricornutum (green algae)): 1,164 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

## Aminoethylpiperazine:
**Toxicity to algae**
- EC50 (Selenastrum capricornutum (green algae)): > 1,000 mg/l
  - Exposure time: 72 h
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

## 2,4,5-tris(dimethylaminomethyl)phenol:
**Toxicity to algae**
- ErC50 (Desmodesmus subspicatus (Scenedesmus subspicatus)): 84 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

- NOEC (Desmodesmus subspicatus (Scenedesmus subspicatus)): 6.25 mg/l
  - Exposure time: 72 h
  - Test Type: static test
  - Test substance: Fresh water
  - Method: OECD Test Guideline 201

## 4,4'-isopropylidenediphenol:
**Toxicity to algae**
- EC50 (Selenastrum capricornutum (green algae)): 2.5 - 3.1 mg/l
  - Exposure time: 96 h
trientine:
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

Components:
naphthalene, bis(1-methylethyl)-:
M-Factor (Acute aquatic toxicity): 1

Components:
2,2'-iminodi(ethylamine):
Toxicity to fish (Chronic toxicity): NOEC: 10 mg/l
Exposure time: 28 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 210

4,4'-isopropylidenediphenol:
Toxicity to fish (Chronic toxicity): NOEC (Pimephales promelas (fathead minnow)): 0.016 mg/l
Exposure time: 444 d
Test Type: flow-through test
Test substance: Fresh water
Method: Fish Life Cycle Toxicity
Remarks: Toxic to aquatic organisms.

Components:
barium sulfate:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 5.8 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

naphthalene, bis(1-methylethyl)-:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 0.013 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 202

2,2'-iminodi(ethylamine):
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity): NOEC (Daphnia magna (Water flea)): 5.6 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water

trientine:
Toxicity to daphnia and other aquatic invertebrates: EC10 (Daphnia magna (Water flea)): 1.9 mg/l
Exposure time: 21 d
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version: 1.0  Revision Date: 03/22/2017  SDS Number: 400001007753  Date of last issue: -  Date of first issue: 03/22/2017

(Chronic toxicity)  
Test Type: semi-static test  
Test substance: Fresh water  
Method: OECD Test Guideline 202

Components:
naphthalene, bis(1-methylhexyl):  
M-Factor (Chronic aquatic toxicity) : 1
4,4'-isopropylidenediphenol:  
M-Factor (Chronic aquatic toxicity) : 1

Components:  
Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tail-oil fatty acids and triethyleneetetramine:  
Toxicity to microorganisms : EC50 (activated sludge): 384 mg/l  
Exposure time: 3 h  
Test Type: static test  
Method: OECD Test Guideline 209

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

Components:  
2,2'-iminodi(ethylamine):  
Toxicity to soil dwelling organisms : EC50 (Eisenia fetida (earthworms)): > 1,000 mg/kg  
Exposure time: 56 d  
Method: OECD Test Guideline 222

Aminomethylpiperazine:  
Toxicity to soil dwelling organisms : LC50 (Eisenia fetida (earthworms)): 712 mg/kg  
Exposure time: 56 d  
Method: OECD Test Guideline 222

NOEC (Eisenia fetida (earthworms)): 500 mg/kg  
Exposure time: 56 d  
Method: OECD Test Guideline 222

Plant toxicity : No data available
Sediment toxicity : No data available
Toxicity to terrestrial organisms : No data available
Ecotoxicology Assessment

Components:  
2,2'-iminodi(ethylamine):  
Acute aquatic toxicity : This product has no known ecotoxicological effects.
Components:
2,4,8-tris(dimethylaminomethyl)phenol:
  Chronic aquatic toxicity: This product has no known ecotoxicological effects.

4,4'-isopropylidenediphenol:
  Chronic aquatic toxicity: Toxic to aquatic life with long lasting effects.

Toxicity Data on Soil:
  No data available

Other organisms relevant to the environment:
  No data available

Persistence and degradability
Components:
2-Propenentitrile, polymer with 1,3-butadiene, 1-cyano-1-methyl-4-oxo-4-[[2-(1-piperazinyl)ethyl]amino]butyl-terminated:
  Biodegradability: Result: Not readily biodegradable.

napthalene, bis(1-methylethyl):
  Biodegradability: Inoculum: activated sludge
                       Concentration: 0.2 mg/l
                       Result: Not readily biodegradable.
                       Biodegradation: 30 - 35 %
                       Exposure time: 56 d
                       Method: OECD Test Guideline 310

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tall-oil fatty acids and triethylenetetramine:
  Biodegradability: Test Type: aerobic
                      Inoculum: activated sludge
                      Result: Not readily biodegradable.
                      Biodegradation: 0 - 70 %
                      Exposure time: 74 d
                      Method: OECD Test Guideline 301B

2,2'-iminodi(ethylamine):
  Biodegradability: Inoculum: activated sludge
                      Result: Readily biodegradable.
                      Biodegradation: 87 %
                      Exposure time: 21 d
                      Method: OECD Test Guideline 301D

Aminoethylpiperazine:
  Biodegradability: Inoculum: activated sludge
                      Result: Not readily biodegradable.
                      Biodegradation: 0 %
                      Exposure time: 28 d
                      Method: OECD Test Guideline 301F

2,4,6-tris(dimethylaminomethyl)phenol:
  Biodegradability: Inoculum: activated sludge
                      Concentration: 2 mg/l
                      Result: Not readily biodegradable.
                      Biodegradation: 4 %
                      Exposure time: 28 d
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version: 1.0  Revision Date: 03/22/2017  SDS Number: 400001007753  Date of last issue: -  Date of first issue: 03/22/2017

Method: OECD Test Guideline 301D

4,4'-isopropylidenediphenol:
Biodegradability: Result: Not readily biodegradable.
Biodegradation: 1 - 2 %
Exposure time: 28 d

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

Components:
Aminoethylpiperazine:
Biochemical Oxygen Demand (BOD) 5 mg/l
Demand (BOD) Incubation time: 5 d

Components:
Aminoethylpiperazine:
Chemical Oxygen Demand (COD) 560 mg/l
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

Components:
2,2'-iminodi(ethylamine): Photodegradation Test Type: Air
Rate constant: 500000
Degradation (direct photolysis): 50 %

Aminoethylpiperazine: Photodegradation Test Type: Air
Degradation (direct photolysis): 50 %
Test Type: Water
Impact on Sewage Treatment: No data available

Bioaccumulative potential

Components:
naphthalene, bis(1-methylethyl)-:
Bioaccumulation: Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 770 - 6,400
Exposure time: 60 d
Test substance: Fresh water
Method: flow-through test

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tail-oil fatty acids and triethylenetetramine:
Bioaccumulation: Bioconcentration factor (BCF): 77.4
Remarks: Does not bioaccumulate.

2,2'-iminodi(ethyamine):
Bioaccumulation: Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): 0.3 - 6.3
Exposure time: 42 d
Test substance: Fresh water
Method: flow-through test
Remarks: Bioaccumulation is unlikely.

Aminoethylpiperazine:
Bioaccumulation: Species: Fish
Remarks: Does not bioaccumulate.

Components:
naphthalene, bis(1-methylethyl)-:
Partition coefficient: n-octanol/water: log Pow: 6.081
Method: QSAR

Fatty acids, C18-unsatd., dimers, oligomeric reaction products with tail-oil fatty acids and triethylenetetramine:
Partition coefficient: n-octanol/water: log Pow: 10.34
Method: OECD Test Guideline 117

2,2'-iminodi(ethyamine):
Partition coefficient: n-octanol/water: log Pow: -1.58 (20 °C)
pH: 7

Aminoethylpiperazine:
Partition coefficient: n-octanol/water: log Pow: -1.48 (20 °C)

2,4,6-tris(dimethylaminomethyl)phenol:
Partition coefficient: n-octanol/water: log Pow: 0.219 (21.5 °C)
Method: OPPTS 830.7550

trienteine:
Partition coefficient: n-octanol/water: log Pow: -2.65 (20 °C)
ARALDITE® 2015 HARDENER

Mobility in soil
Mobility : No data available

Components:
naphthalene, bis(1-methylethyl)-:
Distribution among environmental compartments 2,2‘-iminodi(ethylamine):
Distribution among environmental compartments Aminoethylpiperazine:
Distribution among environmental compartments trientline:
Distribution among environmental compartments Stabilly in soil:
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-Deppletion Potential : Regulation: 40 CFR Protection of Environment: Part 82 Protection of Stratospheric Ozone - CAA Section 602 Class I Substances Remarks: This product neither contains, nor was manufactured with a Class I or Class II ODS as defined by the U.S. Clean Air Act Section 602 (40 CFR 82, Subpt. A, App.A + B).

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

Global warming potential (GWP) : No data available

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.

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 2735
Proper shipping name: Amines, liquid, corrosive, n.o.s.
(DIETHYLENE TRIAMINE, DIISOPROPYLNAPHTHALENE ISOMERS)
Class: 8
Packing group: II
Labels: Corrosive
Packing instruction (cargo aircraft): 855
Packing instruction (passenger aircraft): 851

IMDG
UN number: UN 2735
Proper shipping name: AMINES, LIQUID, CORROSIVE, N.O.S.
(DIETHYLENE TRIAMINE, DIISOPROPYLNAPHTHALENE ISOMERS)
Class: 8
Packing group: II
Labels: 8
EmS Code: F-A, S-B
Marine pollutant: yes

Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code
Not applicable for product as supplied.

National Regulations

DOT Classification
UN/ID/NA number: UN 2735
Proper shipping name: AMINES, LIQUID, CORROSIVE, N.O.S.
(DIETHYLENE TRIAMINE, DIISOPROPYLNAPHTHALENE ISOMERS)
Class: 8
SAFETY DATA SHEET

ARALDITE® 2015 HARDENER

Version 1.0 Revision Date: 03/22/2017 SDS Number: 400001007753 Date of last issue: -
Date of first issue: 03/22/2017

Packing group: II
Labels: CORROSIVE
ERG Code: 153
Marine pollutant: yes(DIISOPROPYLNAPHTHALENE ISOMERS)

SECTION 15. REGULATORY INFORMATION

EPCRA - Emergency Planning and Community Right-to-Know Act

SARA 311/312 Hazards: Acute Health Hazard
Chronic Health Hazard

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
WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.
4,4'-isopropylidenediphenol 80-05-7

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: All components of this product are on the Canadian DSL

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), KECl (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:

HMIS® IV:

HEALTH 

FLAMMABILITY

PHYSICAL HAZARD

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 : 03/22/2017

The information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREBIN 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.

The trademarks above are the property of Huntsman Corporation or an affiliate thereof.

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.