SECTION 1. IDENTIFICATION

Product name : ARALDITE® LY 8604 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
Restrictions on use : For industrial use only.

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:**
- 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

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
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<tr>
<td>2,2'-[1-methylethylidene]bis(4,1-phenyleneoxymethylene)]bisoxirane</td>
<td>1675-54-3</td>
<td>70 - 90</td>
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<td>68609-97-2</td>
<td>10 - 20</td>
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<tr>
<td>p-tert-butylphenyl 1-(2,3-epoxy)propyl ether</td>
<td>3101-60-8</td>
<td>5 - 10</td>
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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.

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.

Hazardous combustion products
: Carbon oxides
: Halogenated compounds

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
: Use personal protective equipment.
protective equipment and emergency procedures

Refer to protective measures listed in sections 7 and 8.

Environmental precautions:
- Prevent product from entering drains.
- Prevent further leakage or spillage if safe to do so.
- If the product contaminates rivers and lakes or drains inform respective authorities.

Methods and materials for containment and cleaning up:
- 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
- Contains no substances with occupational exposure limit values.

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 : liquid

Colour : Clear

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.

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

Flash point : > 199.99 °F / > 93.33 °C
Method: estimated, closed cup

Evaporation rate : < 1

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.
flamability limit

Vapour pressure : < 1.333 hPa (60 °F / 20 °C)

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

Relative density : 1.15

Density : 1.1 g/cm³

Solubility(ies)
  Water solubility : negligibly

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.

Thermal decomposition : No data is available on the product itself.

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

Viscosity
  Viscosity, dynamic : 750 mPa.s (66 °F / 20 °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 hazards to be specially mentioned.

Conditions to avoid : None known.

Incompatible materials : None known.

Hazardous decomposition products : carbon dioxide
  carbon monoxide
  Halogenated compounds
SECTION 11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure:

No data is available on the product itself.

**Acute toxicity**

**Components:**

2,2'-(1-methylene)bis(4,1-phenyleneoxy)methylene)biscyclohexane:

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

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:

- **Acute oral toxicity Components**
  - LD50 (Rat, male): ca. 26.8 g/kg
  - Method: Other guidelines

p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:

- **Acute oral toxicity Components**
  - LD50 (Rat, female): > 2,000 mg/kg
  - Method: OECD Test Guideline 425
  - Assessment: The substance or mixture has no acute oral toxicity

**Components:**

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:

- **Acute inhalation toxicity**
  - LC0 (Rat): > 0.15 mg/l
  - Exposure time: 7 h
  - Test atmosphere: vapour
  - Method: Other guidelines

**Components:**

2,2'-(1-methylene)biscyclohexane:

- **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

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:

- **Acute dermal toxicity**
  - (Rabbit, male): > 4,000 mg/kg, 4.5 ml/kg
  - Assessment: The substance or mixture has no acute dermal toxicity

p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:

- **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
toxicity

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

Skin corrosion/irritation

**Components:**

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

Oxirane, mono[(C12-14-alkyloxy)methyl] dervs.:
Species: Rabbit
Exposure time: 24 h
Method: Acute Dermal Toxicity
Result: Irritating to skin.

p-tert-butyphenyl 1-(2,3-epoxy)propyl ether:
Species: Rat
Assessment: No skin irritation
Method: OECD Test Guideline 402
Result: No skin irritation

Serious eye damage/eye irritation

**Components:**

2,2'-[[1-methylene(1-phenyleneomethylene)]bisoxirane:
Species: Rabbit
Result: Irritating to eyes.
Assessment: Mild eye irritant
Method: OECD Test Guideline 405

Oxirane, mono[(C12-14-alkyloxy)methyl] dervs.:
Species: Rabbit
Result: slight irritation
Assessment: No eye irritation
Method: OECD Test Guideline 405

p-tert-butyphenyl 1-(2,3-epoxy)propyl ether:
Species: Rat
Assessment: No eye irritation
Method: OECD Test Guideline 405

Respiratory or skin sensitisation

**Components:**

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

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:
Test Type: Buehler Test
Exposure routes: Skin
Species: Guinea pig
Method: OPPTS 870.2600
Result: May cause sensitisation by skin contact.

p-tol-butylphenyl 1-(2,3-epoxy)propyl ether:
Exposure routes: Skin
Species: Mouse
Method: OECD Test Guideline 429
Result: The product is a skin sensitisser, sub-category 1A.

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

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:
Genotoxicity in vitro: Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: positive

Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Concentration: 0.5 - 5,000 µg/mL
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

p-tol-butylphenyl 1-(2,3-epoxy)propyl ether:
Genotoxicity in vitro: Test Type: Chromosome aberration test in vitro
Test system: Chinese hamster ovary cells
Concentration: 50 µg/plate
Metabolic activation: negative
Method: OECD Test Guideline 473
Result: positive

Test Type: Ames test
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Components:

2,2'-(1-methylethyldiene)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

Oxirane, mono(C12-14-alkyloxy)methyl derivs.:
Genotoxicity in vivo

Test Type: In vivo micronucleus test
Species: Mouse (male and female)
Cell type: Bone marrow
Application Route: Intraperitoneal injection
Exposure time: 24 hr, 48 hr, and 72 hr
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity

Components:

2,2'-(1-methylethyldiene)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

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-methylene)bis(4,1-phenyleneoxymethylene)]bisoxirane:
Effects on fertility
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.

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:
Species: Rat, male and female
Application Route: Dermal
Duration of Single Treatment: 13 Weeks
Frequency of Treatment: 5 days/week
General Toxicity - Parent: No observed adverse effect level: 100 mg/kg body weight
Method: OECD Test Guideline 411

Components:
2,2’-[(1-methylene)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:
160 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:
Species: Rat, female
Application Route: Dermal
Duration of Single Treatment: 6 h
General Toxicity Maternal: No observed adverse effect level:
200 mg/kg body weight
Developmental Toxicity: No observed adverse effect level:
200 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-methylene)dienylene]bis(4,1-phenyleneoxy)methylene)bisoxyrane:
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
Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:  
Species: Rat, male and female  
NOEL: 1 mg/kg  
LOAEL: 10 mg/kg  
Application Route: Skin contact  
Exposure time: 13 Weeks  
Number of exposures: 5 days/week for 13 weeks  
Method: OECD Test Guideline 411  

Repeated dose toxicity - Assessment  
: No data available

Aspiration toxicity  
No data available

Experience with human exposure  
General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution  
No data available

Neurological effects  
No data available

Further information  
Ingestion: No data available

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SECTION 12. ECOLOGICAL INFORMATION

Ecotoxicity

Components:
2,2'-(1-methylene)bis(4,1-phenyleneoxy)methylene)bisoxirane:
Toxicity to fish: LC50 (Oncorhynchus mykiss (rainbow trout)): 1.5 mg/l
**ARALDITE® LY 8604 US**

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<th>Version</th>
<th>Revision Date</th>
<th>SDS Number</th>
<th>Date of last issue</th>
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Exposure time: 96 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 203

**Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:**

**Toxicity to fish:**  
LL50 (Oncorhynchus mykiss (rainbow trout)): > 100 mg/l  
Exposure time: 96 h  
Test Type: semi-static test  
Method: OECD Test Guideline 203

**p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:**

**Toxicity to fish:**  
LC50 (Oncorhynchus mykiss (rainbow trout)): 7.5 mg/l  
Exposure time: 96 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 203

### Components:

2,2’-[(1-methylene)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

**Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:**

**Toxicity to daphnia and other aquatic invertebrates:**  
EL50 (Daphnia magna (Water flea)): 7.2 mg/l  
Exposure time: 48 h  
Test Type: static test  
Method: OECD Test Guideline 202

**p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:**

**Toxicity to daphnia and other aquatic invertebrates:**  
EC50 (Daphnia magna (Water flea)): ca. 67.9 mg/l  
Exposure time: 48 h  
Test Type: static test  
Test substance: Fresh water  
Method: OECD Test Guideline 202

### Components:

2,2’-[(1-methylene)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

**Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:**

**Toxicity to algae/aquatic plants:**  
IC50 (Selenastrum capricornutum (green algae)): 843.75 mg/l  
Exposure time: 72 h  
Test Type: static test  
Method: OECD Test Guideline 201

**p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:**

**Toxicity to algae/aquatic plants:**  
EbC50 (Selenastrum capricornutum (green algae)): ca. 9 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

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

Oxirane, mono[(C12-14-alkyloxy)methyl] derivs.:
Toxicity to microorganisms: IC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Method: OECD Test Guideline 209

p-tert-butyl/phenyl 1-(2,3-epoxy)propyl ether:
Toxicity to microorganisms: EC50: > 1,000 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

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 the environment : No data available

Persistence and degradability

Components:
2,2’-[(1-methylethylidene)bis(4,1-phenylenecoxymethylene)]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

Oxirane, mono[(C12-14-alkyloxy) methyl] der.:
Biodegradability : 
   - Test Type: aerobic
   - Inoculum: activated sludge
   - Concentration: 100 mg/l
   - Result: Readily biodegradable.
   - Biodegradation: 87 %
   - Exposure time: 28 d
   - Method: OECD Test Guideline 301F

p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:
Biodegradability : 
   - Test Type: aerobic
   - Inoculum: activated sludge
   - Concentration: 5 mg/l
   - Result: Not readily biodegradable.
   - Biodegradation: ca. 1.1 %
   - Exposure time: 28 d
   - Method: OECD Test Guideline 301D

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

Components:
2,2'-(1-methylene)bis(4,1-phenylenoxymethylene)]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

p-tolyl-butyropheryl 1-(2,3-epoxy)propyl ether:

Stability in water:
- Degradation half life (DT50): ca. 17 d (77 °F / 25 °C) pH: 7
  Method: OECD Test Guideline 111
  Remarks: Fresh water

- Degradation half life (DT50): ca. 7.98 d (77 °F / 25 °C) pH: 4
  Method: OECD Test Guideline 111
  Remarks: Fresh water

- Degradation half life (DT50): ca. 10.8 d (77 °F / 25 °C) pH: 9
  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-methylene)bis(4,1-phenylenoxymethylene)]bisoxirane:

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

Components:
2,2'-(1-methylene)bis(4,1-phenylenoxymethylene)]bisoxirane:

Partition coefficient: n-octanol/water:
- log Pow: 3.242 (77 °F / 25 °C)
  pH: 7.1
  Method: OECD Test Guideline 117

Oxirane, mono[(C12-14-alkyloxy)methyl] deriva.

Partition coefficient: n-octanol/water:
- log Pow: 3.77 (58 °F / 20 °C)
  Method: OECD Test Guideline 107

p-tert-butylyphenol 1-(2,3-epoxy)propyl ether:

Partition coefficient: n-octanol/water:
- log Pow: 3.59 (58 °F / 20 °C)
  pH: 7
  Method: OECD Test Guideline 107

Mobility in soil
ARALDITE® LY 8604 US

Mobility

Components:
2,2'-(1-methylenebis(4,1-phenylenenorbornylene))bis(bisoxirane):
Distribution among environmental compartments: Koc: 445
Distribution among p-tert-butylphenyl 1-(2,3-epoxy)propyl ether:
Distribution among environmental compartments: OECD Test Guideline 121
Koc: ca. 755, log Koc: ca. 2.88
Method: OECD Test Guideline 121

Stability in soil

Other adverse effects
Environmental fate and pathways

Results of PBT and vPvB assessment

Endocrine disrupting potential

Adsorbed organic bound 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 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)

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 3062
Proper shipping name : Environmentally hazardous substance, liquid, n.o.s.
(BISPHENOL A EPOXY RESIN)
Class : 9
Packing group : III
Labels : Miscellaneous
Packing instruction (cargo aircraft) : 964
Packing instruction (passenger aircraft) : 964

IMDG
UN number : UN 3062
Proper shipping name : ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.
(BISPHENOL A 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 3062
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)
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

<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>1-chloro-2,3-epoxypropane</td>
<td>106-69-8</td>
<td>100</td>
<td>*</td>
</tr>
</tbody>
</table>

*: Calculated RQ exceeds reasonably attainable upper limit.

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

WARNING: This product can expose you to chemicals including 4,4'-isopropylidenediphenol, which is/are known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

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

- CH INV : The formulation contains substances listed on the Swiss Inventory
- DSL : This product contains the following components listed on the Canadian NDSSL. All other components 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 : Not 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
SECTION 16. OTHER INFORMATION

Further information

NFPA 704:

<table>
<thead>
<tr>
<th>Health</th>
<th>Flammability</th>
<th>Special Hazard</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>0</td>
</tr>
</tbody>
</table>

HMIS® IV:

<table>
<thead>
<tr>
<th>HEALTH</th>
<th>FLAMMABILITY</th>
<th>PHYSICAL HAZARD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>0</td>
</tr>
</tbody>
</table>

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: 02/20/2019

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.
### ARALDITE® LY 8604 US

<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>1.1</td>
<td>02/20/2019</td>
<td>400001012463</td>
<td>10/06/2015</td>
<td>10/06/2015</td>
</tr>
</tbody>
</table>

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.
SECTION 1. IDENTIFICATION

Product name : ARADUR® 8604 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 : 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 29 CFR 1910.1200
Skin corrosion : Category 1B
Serious eye damage : Category 1
Respiratory sensitisation : Category 1
Skin sensitisation : Category 1
Reproductive toxicity : Category 2
Acute aquatic toxicity : Category 3

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.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H361 Suspected of damaging fertility or the unborn child.
H402 Harmful to aquatic life.
Precautionary statements

Prevention:
P201 Obtain special instructions before use.
P202 Do not handle until all safety precautions have been read and understood.
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/ protective clothing/ eye protection/ face protection.
P285 In case of inadequate ventilation wear respiratory protection.

Response:
P301 + P330 + P331 IF SWALLOWED: Rinse mouth. Do NOT induce vomiting.
P303 + P361 + P353 IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower.
P304 + P340 + P310 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Immediately call a POISON CENTER/doctor.
P305 + P351 + P338 + P310 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER/doctor.
P308 + 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.

Storage:
P405 Store locked up.

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

Other hazards
None known.

SECTION 3. COMPOSITION/INFORMATION ON INGREDIENTS

Substance / Mixture: Mixture

Hazardous components

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-[3-(dimethylamino)propyl]amino]propiononitrile</td>
<td>69852-45-5</td>
<td>60 - 100</td>
</tr>
<tr>
<td>N(^{\circ})-[3-aminopropyl]-N,N-dimethylpropane-1,3-diamine</td>
<td>10583-29-3</td>
<td>13 - 30</td>
</tr>
<tr>
<td>Triethanolamine</td>
<td>102-71-6</td>
<td>3 - 7</td>
</tr>
<tr>
<td>piperazine</td>
<td>110-85-0</td>
<td>1 - 3</td>
</tr>
<tr>
<td>Aminoethylpiperazine</td>
<td>140-31-8</td>
<td>0.1 - 1</td>
</tr>
</tbody>
</table>

The specific chemical identity and/or exact percentage (concentration) of composition has been 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
- Call a physician or poison control centre immediately.
- 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.

SECTION 5. FIREFIGHTING MEASURES

Suitable extinguishing media
- No data is available on the product itself.

Unsuitable extinguishing media
- High volume water jet

Specific hazards during firefighting
- No data is available on the product itself.
- Do not allow run-off from fire fighting to enter drains or water courses.

Hazardous combustion
- No hazardous combustion products are known
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. 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.

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>Triethanolamine</td>
<td>102-71-6</td>
<td>TWA</td>
<td>5 mg/m³</td>
<td>ACGIH</td>
</tr>
<tr>
<td>piperazine</td>
<td>110-85-0</td>
<td>TWA (Inhalable fraction and vapor)</td>
<td>0.03 ppm (as piperazine)</td>
<td>ACGIH</td>
</tr>
</tbody>
</table>

**Personal protective equipment**

**Respiratory protection**
In the case of vapour formation use a respirator with an approved filter.

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

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

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

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

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

**Appearance**
liquid

**Colour**
clear
amber

**Odour**
amine-like

**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.
Boiling point : No data is available on the product itself.
Flash point : > 93 °C
  Method: estimated, 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 : No data is available on the product itself.
Relative vapour density : No data is available on the product itself.
Relative density : 0.9
Density : No data is available on the product itself.
Solubility(ies)
  Water solubility : partly soluble
  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.
Thermal decomposition : No data is available on the product itself.
Self-Accelerating decomposition temperature (SADT) : No data is available on the product itself.
Viscosity : No data is available on the product itself.
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 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: No data available

Acute dermal toxicity - Product: Acute toxicity estimate: 4,523 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.

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

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

Triethanolamine:
Genotoxicity in vitro

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

Concentration: 0 - 1500 µg/L
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 476
Result: negative

piperazine:
Genotoxicity in vitro

Concentration: 0 - 10000 ug/plate
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 471
Result: negative

Concentration: 0 - 110 µg/L
Metabolic activation: with and without metabolic activation
Method: OECD Test Guideline 473
Result: negative

Concentration: 0 - 500 µg/L
Metabolic activation: Metabolic activation
Method: OECD Test Guideline 476
Result: positive

Concentration: 0 - 500 µg/L
Metabolic activation: negative
Method: OECD Test Guideline 476
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 462
Result: negative

Components:

piperazine:
Genotoxicity in vivo: Dose: 5000 mg/kg
                           Result: negative

Aminoethylpiperazine:
Genotoxicity in vivo: Application Route: Intraperitoneal injection
                                   Dose: 175 - 560 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

Triethanolamine:
Species: Rat, (male and female)
Application Route: Dermal
Exposure time: 103 weeks
Dose: 250 mg/kg
Frequency of Treatment: 5 daily
Method: OECD Test Guideline 451
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 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:
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.
Triethanolamine:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416
Result: No effects on fertility and early embryonic development were detected.

Piperazine:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 416

Aminoethyipiperazine:
Species: Rat, male and female
Application Route: Oral
Method: OECD Test Guideline 422
Result: No effects on fertility and early embryonic development were detected.

Components:
N\textsuperscript{\textregistered}\{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-fetal 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.

Triethanolamine:
Species: Rat, male and female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level: > 1,000 mg/kg body weight
Method: OECD Test Guideline 421
Result: No teratogenic effects

Species: Rat
Application Route: Dermal
General Toxicity Maternal: No observed adverse effect level: 75 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: 10 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects
piperazine:
Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
420 mg/kg body weight
Result: No teratogenic effects

Aminoethylpiperazine:
Test Type: Embryo-foetal development
Species: Rat, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
100 mg/kg body weight
Embryo-foetal toxicity: No observed adverse effect level:
1,000 mg/kg body weight
Method: OECD Test Guideline 414
Result: No teratogenic effects

Test Type: Fertility/early embryonic development
Species: Rabbit, female
Application Route: Oral
General Toxicity Maternal: No observed adverse effect level:
75 mg/kg body weight
Embryo-foetal toxicity: No observed adverse effect level: 75
mg/kg body weight
Method: OECD Test Guideline 414
Result: Teratogenicity and developmental toxicity

Components:
N\(^3\)-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:
Reproductive toxicity - Assessment: No evidence of adverse effects on sexual function and fertility,
on or on development, based on animal experiments.

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

Aminoethylpiperazine:
Reproductive toxicity - Assessment: Some evidence of adverse effects on development, based on
animal experiments.

STOT - single exposure
No data available

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:

N\(^\circ\)-(3-aminopropyl)-N,N-dimethylpropane-1,3-diamine:
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: >= 56.3 mg/kg/d
Application Route: Skin contact
Exposure time: 20 h
Number of exposures: 3 d
Method: Chronic toxicity

Triethanolamine:
Species: Rat, male and female
: 1000 mg/kg, 500 mg/m³
Application Route: Ingestion
Test atmosphere: dust/mist
Exposure time: 672 h
Method: OECD Test Guideline 412

Species: Rat, male and female
: 125 - 500 mg/kg, 420 mg/m³
Application Route: Skin contact
Test atmosphere: dust/mist
Exposure time: 2,160 h
Number of exposures: 6 h
Method: Subchronic toxicity

piperazine:
Species: Rat, male and female
NOAEL: 627 mg/kg/d
Application Route: Ingestion
Exposure time: 2,160 h
Number of exposures: 7 d
Method: Subchronic toxicity

Species: Humans
LOAEL: 30 mg/kg/d
Application Route: Ingestion
Exposure time: 168 h
Method: Subacute 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

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:**

**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

**Triethanolamine:**

- **Toxicity to fish**:
  - LC50 (Pimephales promelas (fathead minnow)): 11,803 mg/l
  - Exposure time: 96 h
  - Test Type: flow-through test
  - Test substance: Fresh water

**Piperazine:**

- **Toxicity to fish**:
  - LC50 (Poecilia reticulata (guppy)): > 1,800 mg/l
  - Exposure time: 96 h
  - Test Type: semi-static test
  - Test substance: Fresh water

**Aminoisopropylpiperazine:**

- **Toxicity to fish**:
  - LC50: 2,190 mg/l
  - Exposure time: 96 h
  - Test Type: static test
  - Test substance: Fresh water

**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

**Triethanolamine:**

- **Toxicity to daphnia and other aquatic invertebrates**:
  - EC50 (Ceriodaphnia dubia (Water flea)): 609.88 mg/l
  - Exposure time: 48 h
  - Test Type: static test
  - Test substance: Fresh water

**Piperazine:**

- **Toxicity to daphnia and other aquatic invertebrates**:
  - EC50 (Daphnia magna (Water flea)): 21 mg/l
aquatic invertebrates

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.

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

Triethanolamine:
Toxicity to algae

ErC50 (Desmodesmus subspicatus (Scenedesmus subspicatus)): 512 mg/l
Exposure time: 72 h
Test Type: static test
Test substance: Fresh water
Method: DIN 38412

piperazine:
Toxicity to algae

NOECr (Selenastrum capricornutum (green algae)): > 1,000 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

M-Factor (Acute aquatic toxicity)

No data available

Toxicity to fish (Chronic toxicity)

No data available

Components:

Triethanolamine:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)

NOEC (Daphnia magna (Water flea)): 16 mg/l
Exposure time: 21 d
Test Type: semi-static test
piperazine:
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC (Daphnia magna (Water flea)): 12.5 mg/l
Exposure time: 21 d
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

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

Components:
3-[3-(dimethylamino)propyl]amino]propiononitrile:
Toxicity to microorganisms : NOEC (activated sludge): 1,000 mg/l
Exposure time: 3 h
Test Type: Respiration inhibition
Method: OECD Test Guideline 209

: EC50 (activated sludge): 6.6 mg/l
Exposure time: 3 h
Test Type: Respiration inhibition
Method: OECD Test Guideline 209

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

Triethanolamine:
Toxicity to microorganisms : EC50 (activated sludge): > 1,000 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

Components:
Aminoethylpiperazine:
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
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
Further information:
No data available

### 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

**Triethanolamine:**

**Biodegradability**
- Inoculum: activated sludge
- Concentration: 5.7 mg/l
- Result: Readily biodegradable.
- Biodegradation: ca. 100 %
- Exposure time: 5 d

**piperazine:**

**Biodegradability**
- Inoculum: activated sludge
- Result: Readily biodegradable.
- Biodegradation: 70.2 %
- Exposure time: 28 d
- Method: OECD Test Guideline 301F

**Aminoethylpiperazine:**

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

#### Components:

**Aminoethylpiperazine:**

**Biochemical Oxygen Demand (BOD)**
- 5 mg/l
- Incubation time: 5 d

#### Components:

**Triethanolamine:**

**Chemical Oxygen Demand (COD)**
- 1600 mgO2/g

**Aminoethylpiperazine:**

**Chemical Oxygen Demand**
- 560 mg/l
(COD)
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:
piperazine:
Photodegradation : Test Type: Air
Rate constant: < .00001
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:
Triethanolamine:
Bioaccumulation : Species: Cyprinus carpio (Carp)
Bioconcentration factor (BCF): < 3.9
Exposure time: 42 d
Test substance: Fresh water
Method: flow-through test

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

Components:
N\(^{\circ}\)-(3-aminopropyl)-N,N-dimethylpropene-1,3-diamine:
Partition coefficient of n-octanol/water : log Pow: 0.5

log Pow: -0.56 (25 °C)
pH: 11.6
Method: OECD Test Guideline 107

Triethanolamine:
**ARADUR® 8604 US**

**Version** 1.0  
**Revision Date:** 11/17/2016  
**SDS Number:** 400001012854  
**Date of last issue:** -  
**Date of first issue:** 11/17/2016

Partition coefficient: n-octanol/water  
: log Pow: -2.3 (25 °C)  
: pH: 7.1  

Partition coefficient: n-octanol/water  
: log Pow: -1.17  

log Pow: -1.24 (25 °C)  

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

**Mobility in soil**  
Mobility  
: No data available

**Components:**  
Triethanolamine:  
Distribution among environmental compartments  
: Koc: 18  

piperazine:  
Distribution among environmental compartments  
: Koc: 507  
Method: OECD Test Guideline 106  

piperazine:  
Distribution among environmental compartments  
Aminoethylpiperazine:  
Distribution among environmental compartments  
Stability in soil  
: Koc: ca. 37000  
: 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.  
Harmful to aquatic life.
SAFETY DATA SHEET

ARADUR® 8604 US

Version: 1.0  Revision Date: 11/17/2016  SDS Number: 400001012854  Date of last issue: -

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.
(DIMETHYL DI/PROPYL TRIAMINE)

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.
(DIMETHYL DI/PROPYL TRIAMINE)

Class: 8
Packing group: II
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

SDS_US-AM – EN – 400001012654  20 / 23
DOT Classification
UN/ID/NA number: UN 2735
Proper shipping name: AMINES, LIQUID, CORROSIVE, N.O.S.
(DIETHYL DI/PROPYL TRIAMINE)
Class: 8
Packing group: II
Labels: CORROSIVE
ERG Code: 153
Marine pollutant: no

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</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,2'-iminodiolanol</td>
<td>111-42-2</td>
<td>100</td>
<td></td>
</tr>
</tbody>
</table>

*: Calculated RQ exceeds reasonably attainable upper limit.

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 cancer.

2,2'-iminodiolanol 111-42-2

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
TSCA: On the inventory, or in compliance with the inventory
DSL: This product contains one or several components listed in the Canadian NDSL.
AICS: Not in compliance with the inventory
NZIoC: Not 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: Not in compliance with the inventory
IECS: Not in compliance with the inventory
TCSI: Not in compliance with the inventory

Inventories
SAFETY DATA SHEET

ARADUR® 8604 US

Version 1.0
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SDS Number: 400001012854

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)
Exemptions from the obligation to register

SECTION 16. OTHER INFORMATION

Further information

NFPA: 1

HEALTH 3

FLAMMABILITY 1

PHYSICAL HAZARD 0

HMIS® IV: 1

HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks.

Revision Date : 11/17/2016

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