SAFETY DATA SHEET
according to Regulation (EC) No. 1907/2006

ARALDITE® 2018 ISOCYANATE (XD 4445)

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier
   Trade name: ARALDITE® 2018 ISOCYANATE (XD 4445)

1.2 Relevant identified uses of the substance or mixture and uses advised against
   Use of the Substance/Mixture: Adhesives and/or sealants

1.3 Details of the supplier of the safety data sheet
   Company: Huntsman Advanced Materials (Europe)BVBA
   Address: Everslaan 45
   3078 Everberg
   Belgium
   Telephone: +41 61 299 20 41
   Telefax: +41 61 299 20 40
   E-mail address of person responsible for the SDS: Global_Product_EHS_AdMat@huntsman.com

1.4 Emergency telephone number
   Emergency telephone number:
   EUROPE: +32 35 75 1234
   France ORFILA: +33(0)145425959
   ASIA: +65 6336-6011
   China: +86 20 39377888
   +86 532 83889090
   India: +91 22 42 87 5333
   Australia: 1800 786 152
   New Zealand: 0800 767 437
   USA: +1/800/424.9300

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture
   Classification (REGULATION (EC) No 1272/2008)
   Acute toxicity, Category 4
   H332: Harmful if inhaled.

   Skin sensitisation, Category 1
   H317: May cause an allergic skin reaction.

   Specific target organ toxicity - single exposure, Category 3, Respiratory system
   H335: May cause respiratory irritation.

2.2 Label elements
   Labelling (REGULATION (EC) No 1272/2008)
**ARALDITE® 2018 ISOCYANATE (XD 4445)**

**Hazard pictograms**

- ⚠️

**Signal word**

- Warning

**Hazard statements**

- H317: May cause an allergic skin reaction.
- H332: Harmful if inhaled.
- H335: May cause respiratory irritation.

**Precautionary statements**

**Prevention:**
- P261: Avoid breathing mist or vapours.
- P280: Wear protective gloves.

**Response:**
- P304 + P340 + P312: IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
- P333 + P313: If skin irritation or rash occurs: Get medical advice/attention.
- P362 + P364: Take off contaminated clothing and wash it before reuse.

**Storage:**
- P403 + P233: Store in a well-ventilated place. Keep container tightly closed.

**Hazardous components which must be listed on the label:**

- Hexamethylene diisocyanate, oligomers
- Hexamethylene diisocyanate

**2.3 Other hazards**

This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

**SECTION 3: Composition/information on ingredients**

**3.2 Mixtures**

**Hazardous components**

<table>
<thead>
<tr>
<th>Chemical name</th>
<th>CAS-No.</th>
<th>EC-No.</th>
<th>Index-No.</th>
<th>Registration number</th>
<th>Classification</th>
<th>Concentration (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexamethylene diisocyanate, oligomers</td>
<td>28182-81-2</td>
<td>500-060-2</td>
<td>01-2119485796-17</td>
<td></td>
<td>Acute Tox. 4; H332</td>
<td>&gt;= 90 - &lt;= 100</td>
</tr>
<tr>
<td></td>
<td>212-485-8</td>
<td>615-011-00-1</td>
<td>01-2119457571-37</td>
<td></td>
<td>Skin Sens. 1; H317</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>STOT SE 3; H335</td>
<td></td>
</tr>
</tbody>
</table>

| Hexamethylene diisocyanate                         | 822-06-0     | 212-485-8  | 615-011-00-1  | 01-2119457571-37   | Acute Tox. 4; H302      | >= 0.1 - < 1          |
|                                                    |              |            |               |                     | Acute Tox. 1; H330      |                      |
|                                                    |              |            |               |                     | Skin Corr. 1C; H314     |                      |
|                                                    |              |            |               |                     | Resp. Sens. 1; H334     |                      |
SECTION 4: First aid measures

4.1 Description of first aid measures

General advice:
Move out of dangerous area.
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:
If on skin, rinse well with water.

In case of eye contact:
Flush eyes with water as a precaution.
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 give milk or alcoholic beverages.
Never give anything by mouth to an unconscious person.
If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

None known.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment:
Treat symptomatically.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media:
Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Unsuitable extinguishing media:
High volume water jet

5.2 Special hazards arising from the substance or mixture

5.3 Advice for firefighters

Special protective equipment for firefighters:
Wear self-contained breathing apparatus for firefighting if necessary.
Specific extinguishing methods: No data is available on the product itself.

Further information: Standard procedure for chemical fires. Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions: Use personal protective equipment. Ensure adequate ventilation.

6.2 Environmental precautions

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.

6.3 Methods and material for containment and cleaning up

Methods for 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.

6.4 Reference to other sections

See Section 1 for emergency contact information. For personal protection see section 8. For disposal considerations see section 13.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Advice on safe handling: Avoid formation of aerosol. Do not breathe vapours or spray mist. 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. 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.

Advice on protection against fire and explosion: Normal measures for preventive fire protection.
Hygiene measures: When using do not eat or drink. When using do not smoke. Wash hands before breaks and at the end of workday.

7.2 Conditions for safe storage, including any incompatibilities

Requirements for storage areas and containers: Keep container tightly closed in a dry and well-ventilated place. Observe label precautions. Electrical installations / working materials must comply with the technological safety standards.

Recommended storage temperature: 2 - 40 °C

Further information on storage stability: No decomposition if stored and applied as directed.

7.3 Specific end use(s)

Specific use(s): No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

<table>
<thead>
<tr>
<th>Components</th>
<th>CAS-No.</th>
<th>Value type (Form of exposure)</th>
<th>Control parameters</th>
<th>Basis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hexamethylene diisocyanate, oligomers</td>
<td>28182-81-2</td>
<td>TWA</td>
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<table>
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<tr>
<th>Version</th>
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<th>Date of last issue</th>
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Further information

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Predicted No Effect Concentration (PNEC) according to Regulation (EC) No. 1907/2006:

<table>
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<tr>
<th>Substance name</th>
<th>Environmental Compartment</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>hexamethylene-diisocyanate, homopolymer</td>
<td>Fresh water</td>
<td>0.05 mg/l</td>
</tr>
<tr>
<td></td>
<td>Marine water</td>
<td>0.005 mg/l</td>
</tr>
<tr>
<td></td>
<td>Freshwater - intermittent</td>
<td>0.5 mg/l</td>
</tr>
<tr>
<td></td>
<td>Sewage treatment plant</td>
<td>55.6 mg/l</td>
</tr>
<tr>
<td></td>
<td>Fresh water sediment</td>
<td>1.33 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Marine sediment</td>
<td>0.133 mg/kg</td>
</tr>
<tr>
<td></td>
<td>Soil</td>
<td>0.066 mg/kg</td>
</tr>
<tr>
<td>Siloxanes and Silicones, di-Me, reaction products with silica</td>
<td>Fresh water sediment</td>
<td>&gt; 100 mg/kg</td>
</tr>
</tbody>
</table>

Remarks:

<table>
<thead>
<tr>
<th>Assessment Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soil</td>
</tr>
<tr>
<td>23 mg/kg</td>
</tr>
</tbody>
</table>

8.2 Exposure controls

**Personal protective equipment**

- **Eye protection**: Eye wash bottle with pure water
  - Tightly fitting safety goggles
Hand protection
Material: butyl-rubber
Break through time: > 8 h

Material: Nitrile rubber
Break through time: 10 - 480 min

Material: Ethyl Vinyl Alcohol Laminate (EVAL)
Break through time: > 8 h

Remarks:
The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it. Gloves should be discarded and replaced if there is any indication of degradation or chemical breakthrough. 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). The suitability for a specific workplace should be discussed with the producers of the protective gloves.

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

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

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance: paste

Colour: opaque

Odour: slight

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

pH: No data is available on the product itself.

Melting point: ca. -24 °C

Boiling point: > 200 °C

Flash point: 158 °C
Method: Pensky-Martens closed cup
Evaporation rate : No data is available on the product itself.
Flammability (solid, gas) : No data is available on the product itself.
Burning rate : No data is available on the product itself.
Upper explosion limit / Upper flammability limit : No data is available on the product itself.
Lower explosion limit / Lower flammability limit : No data is available on the product itself.
Vapour pressure : < 0.0001 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 : 1.16 g/cm³
Solubility(ies)
  Water solubility : Decomposes in contact with water. (20 °C)
Solubility in other solvents : No data is available on the product itself.
Partition coefficient: n-octanol/water : No data is available on the product itself.
Auto-ignition temperature : No data is available on the product itself.
Decomposition temperature : > 200 °C
Viscosity
  Viscosity, dynamic : 12,000 - 18,000 mPa.s (25 °C)
Explosive properties : No data is available on the product itself.
Oxidizing properties : No data is available on the product itself.

9.2 Other information
No data available

SECTION 10: Stability and reactivity

10.1 Reactivity
No decomposition if stored and applied as directed.

10.2 Chemical stability
No decomposition if stored and applied as directed.

10.3 Possibility of hazardous reactions
Hazardous reactions : Decomposes when moist.
No decomposition if stored and applied as directed.

10.4 Conditions to avoid
Conditions to avoid : Exposure to moisture

10.5 Incompatible materials
Materials to avoid : Strong acids and strong bases
Strong oxidizing agents

10.6 Hazardous decomposition products
Carbon oxides
Nitrogen oxides (NOx)
Burning produces noxious and toxic fumes.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Components:
Hexamethylene diisocyanate:
Acute oral toxicity : LD50 (Rat, male): 959 mg/kg
Method: OECD Test Guideline 401
LD50 (Rat, male): 746 mg/kg
Method: OECD Test Guideline 401

Acute inhalation toxicity - Product
Acute toxicity estimate : 1.08 mg/l
Exposure time: 4 h
Test atmosphere: dust/mist
Method: Calculation method

Components:
Hexamethylene diisocyanate, oligomers:
Acute dermal toxicity : LD50 (Rabbit): > 5,000 mg/kg

Hexamethylene diisocyanate:
Acute dermal toxicity : LD50 (Rat, male and female): > 7,000 mg/kg
Method: OECD Test Guideline 402

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

Skin corrosion/irritation

Components:
Hexamethylene diisocyanate, oligomers:
Species: Rabbit
Assessment: Mild skin irritant
Result: Slight irritation

Hexamethylene diisocyanate:
Species: Rabbit
Exposure time: 4 h
Method: OECD Test Guideline 404
Result: Corrosive after 1 to 4 hours of exposure

Serious eye damage/eye irritation

Components:
Hexamethylene diisocyanate, oligomers:
Species: Rabbit
Assessment: Mild eye irritant
Result: Slight irritation

Components:
Hexamethylene diisocyanate:
Species: Rabbit
Method: OECD Test Guideline 405
Result: Irreversible effects on the eye

Respiratory or skin sensitisation

Components:
Hexamethylene diisocyanate, oligomers:
Exposure routes: Skin
Species: Guinea pig
Method: OECD Test Guideline 406
Result: May cause sensitisation by skin contact.

Exposure routes: Respiratory Tract
Species: Guinea pig
Result: May cause sensitisation by inhalation.

Components:
Hexamethylene diisocyanate:
Assessment: Harmful if inhaled., Causes skin irritation., Causes serious eye irritation.
May cause an allergic skin reaction., May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Germ cell mutagenicity

Components:
Hexamethylene diisocyanate, oligomers:
Genotoxicity in vitro : Metabolic activation: with and without metabolic activation
Result: negative

Hexamethylene diisocyanate:
Genotoxicity in vitro : Test Type: In vitro mammalian cell gene mutation test
Test system: Chinese hamster ovary cells
Concentration: 1.0 - 10 ml
Metabolic activation: with and without metabolic activation
Result: negative

: Test Type: Ames test
Test system: Salmonella typhimurium
Concentration: 6, 12, 20, 25, 50 and 150 µL p
Metabolic activation: with and without metabolic activation
Result: negative

Components:
Hexamethylene diisocyanate:
Genotoxicity in vivo : Test Type: Micronucleus test
Test species: Mouse (male and female)
Cell type: Bone marrow
Application Route: Inhalation
Exposure time: 6 h
Dose: 1.47 ppm
Method: OECD Test Guideline 474
Result: negative

Carcinogenicity
Components:
Hexamethylene diisocyanate:
Species: Rat, male and female
Application Route: Inhalation
Exposure time: 24 month(s)
Dose: 0.164 ppm
Frequency of Treatment: 6 hour
Method: OECD Test Guideline 453
Result: negative

Carcinogenicity - Assessment : No data available

Reproductive toxicity
Components:
Hexamethylene diisocyanate:
Effects on fertility : Species: Rat, male and female
Application Route: Inhalation
Target Organs: Nasal inner lining
Method: OECD Test Guideline 422
Result: negative

Components:
Hexamethylene diisocyanate:
Effects on foetal development:
Species: Rat, male and female
Application Route: Inhalation
General Toxicity Maternal: No observed adverse effect level:
0.005 ppm
Method: OECD Test Guideline 414
Result: No teratogenic effects

Reproductive toxicity - Assessment: No data available

STOT - single exposure

Components:
Hexamethylene diisocyanate, oligomers:
Exposure routes: Inhalation
Target Organs: Respiratory Tract
Assessment: May cause respiratory irritation.

Hexamethylene diisocyanate:
Exposure routes: Inhalation
Target Organs: Respiratory Tract
Assessment: Causes damage to organs.

STOT - repeated exposure

Components:
Hexamethylene diisocyanate:
Target Organs: Nasal inner lining
Assessment: Causes damage to organs through prolonged or repeated exposure.

Repeated dose toxicity

Components:
Hexamethylene diisocyanate, oligomers:
Species: Rat
: 3.7 - 4.3
Exposure time: 3 Weeks
Species: Rat
: 3.3 - 3.4
Exposure time: 2,160 h
Hexamethylene diisocyanate:
Species: Rat, male and female
: 0.005
Application Route: inhalation (vapour)
Test atmosphere: vapour
Exposure time: 2 yrNumber of exposures: 6 h
Method: OECD Test Guideline 453

Components:
Hexamethylene diisocyanate:
Repeated dose toxicity - Assessment: Harmful if inhaled., Causes skin irritation., Causes serious eye irritation.

Aspiration toxicity
No data available

Experience with human exposure
General Information: No data available

Inhalation: No data available

Skin contact: No data available

Eye contact: No data available

Ingestion: No data available

Toxicology, Metabolism, Distribution
No data available

Neurological effects
No data available

Further information
Ingestion: No data available

SECTION 12: Ecological information

12.1 Toxicity

Components:
Hexamethylene diisocyanate, oligomers:
Toxicity to fish: IC0 (Brachydanio rerio (zebrafish)): > 100 mg/l Exposure time: 96 h
### Toxicity to daphnia and other aquatic invertebrates
- **IC0** (Daphnia magna (Water flea)): > 100 mg/l  
  Exposure time: 48 h

### Toxicity to algae
- **EC50** (Desmodesmus subspicatus (green algae)): > 1,000 mg/l  
  Exposure time: 72 h

### Toxicity to microorganisms
- **EC50** (activated sludge): > 1,000 mg/l  
  Exposure time: 3 h

### Hexamethylene diisocyanate:
#### Toxicity to fish
- **LC50** (Brachydanio rerio (zebrafish)): > 82.8 mg/l  
  Exposure time: 96 h  
  Test Type: static test  
  Test substance: Fresh water  

#### Toxicity to daphnia and other aquatic invertebrates
- **EC50** (Daphnia magna (Water flea)): > 89.1 mg/l  
  Exposure time: 48 h  
  Test Type: static test  
  Test substance: Fresh water  

#### Toxicity to algae
- **EgC50** (Desmodesmus subspicatus (green algae)): > 77.4 mg/l  
  Exposure time: 72 h  
  Test Type: static test  
  Test substance: Fresh water  

#### Toxicity to microorganisms
- **EC50** (activated sludge): 842 mg/l  
  Exposure time: 3 h  
  Test Type: static test  
  Test substance: Fresh water  
  Method: OECD Test Guideline 209

### Ecotoxicology Assessment
- **Acute aquatic toxicity**: This product has no known ecotoxicological effects.
- **Chronic aquatic toxicity**: This product has no known ecotoxicological effects.

### 12.2 Persistence and degradability
#### Components:
- **Hexamethylene diisocyanate, oligomers**:
  - **Biodegradability**: Result: Not readily biodegradable.  
    Biodegradation: 0 %  
    Exposure time: 28 d

- **Hexamethylene diisocyanate**:
  - **Biodegradability**: Inoculum: activated sludge  
    Concentration: 100 mg/l  
    Result: Not readily biodegradable.  
    Biodegradation: 48 %
12.3 Bioaccumulative potential

**Components:**
Hexamethylene diisocyanate:
- Bioaccumulation: Bioconcentration factor (BCF): 3.2
- Remarks: Bioaccumulation is unlikely.

12.4 Mobility in soil

**Components:**
Hexamethylene diisocyanate:
- Distribution among environmental compartments: Koc: 1665 - 5861

12.5 Results of PBT and vPvB assessment

**Product:**
- Assessment: This substance/mixture contains no components considered to be either persistent, bioaccumulative and toxic (PBT), or very persistent and very bioaccumulative (vPvB) at levels of 0.1% or higher.

12.6 Other adverse effects
- No data available

### SECTION 13: Disposal considerations

13.1 Waste treatment methods

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

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

### SECTION 14: Transport information

**IATA**
- Not regulated as dangerous goods

**IMDG**
- Not regulated as dangerous goods

**ADR**
Not regulated as dangerous goods

**RID**
Not regulated as dangerous goods

**Transport in bulk according to Annex II of Marpol and the IBC Code**
Not applicable for product as supplied.

## SECTION 15: Regulatory information

### 15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

**REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).**
This product does not contain substances of very high concern (Regulation (EC) No 1907/2006 (REACH), Article 57).

**REACH - List of substances subject to authorisation (Annex XIV)**
Not applicable

**REACH - List of substances subject to authorisation - Future sunset date**
Not applicable

**Other regulations:**
Take note of Directive 94/33/EC on the protection of young people at work or stricter national regulations, where applicable.

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

- **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), ENCS (Japan), KECI (Korea), NZIOC (New Zealand), PICCS (Philippines), TCSI (Taiwan), TSCA (United States of America (USA))

15.2 Chemical safety assessment

SECTION 16: Other information

Full text of H-Statements

H302 : Harmful if swallowed.
H314 : Causes severe skin burns and eye damage.
H317 : May cause an allergic skin reaction.
H330 : Fatal if inhaled.
H332 : Harmful if inhaled.
H334 : May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 : May cause respiratory irritation.

Full text of other abbreviations

Acute Tox. : Acute toxicity
Resp. Sens. : Respiratory sensitisation
Skin Corr. : Skin corrosion
Skin Sens. : Skin sensitisation
STOT SE : Specific target organ toxicity - single exposure
GB EH40 : UK. EH40 WEL - Workplace Exposure Limits
GB EH40 / TWA : Long-term exposure limit (8-hour TWA reference period)
GB EH40 / STEL : Short-term exposure limit (15-minute reference period)

Further information

Classification of the mixture: Classification procedure:

Acute Tox. 4 H332 Calculation method
Skin Sens. 1 H317 Calculation method
STOT SE 3 H335 Calculation method

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