SAFETY DATA SHEET

ARALDITE® 2029 ISOCYANATE

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

1.1 Product identifier

Product name : ARALDITE® 2029 ISOCYANATE

Product code : 00059278

Product description : Not available.

1.2 Relevant identified uses of the substance or mixture and uses advised against

Product use : Isocyanate for adhesive systems

1.3 Details of the supplier of the safety data sheet

Supplier : Huntsman Advanced Materials (Europe)BVBA
Everslaan 45
3078 Everberg / Belgium
Tel.: +41 61 299 20 41
Fax: +41 61 299 20 40

e-mail address of person responsible for this SDS : Global_Product_EHS_AdMat@huntsman.com

1.4 Emergency telephone number

Supplier

Telephone number : EUROPE: +32 35 75 1234
France ORFILA: +33(0)145425959
ASIA: +65 6336-6011
China: +86 20 39377888
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

Product definition : Mixture

Classification according to Directive 1999/45/EC [DPD]

The product is classified as dangerous according to Directive 1999/45/EC and its amendments.

Classification : Carc. Cat. 3; R40
Xn; R20, R48/20
Xi; R36/37/38
R42/43
R52/53

Human health hazards : Limited evidence of a carcinogenic effect. Harmful by inhalation. Harmful: danger of serious damage to health by prolonged exposure through inhalation. Irritating to eyes, respiratory system and skin. May cause sensitisation by inhalation and skin contact.

Environmental hazards : Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

See Section 16 for the full text of the R phrases or H statements declared above.

See Section 11 for more detailed information on health effects and symptoms.

2.2 Label elements

SECTION 2: Hazards identification

Hazard symbol or symbols :

Indication of danger : Harmful

Risk phrases : R40- Limited evidence of a carcinogenic effect.
R20- Harmful by inhalation.
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R36/37/38- Irritating to eyes, respiratory system and skin.
R42/43- May cause sensitisation by inhalation and skin contact.
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases : S23- Do not breathe vapour or spray.
S36/37- Wear suitable protective clothing and gloves.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

Hazardous ingredients : methylenediphenyl diisocyanate
isocyanates, reaction product of polyol with methylenediphenyl diisocyanate
diphenylmethanediisocyanate, isomers and homologues
4,4'-methylenediphenyl diisocyanate

Supplemental label elements : Contains isocyanates - See information supplied by the manufacturers. This information is supplied in the current Safety Data Sheet.

Special packaging requirements

Containers to be fitted with child-resistant fastenings : Not applicable.

Tactile warning of danger : Not applicable.

2.3 Other hazards

Other hazards which do not result in classification : Not available.

SECTION 3: Composition/information on ingredients

Substance/mixture : Mixture

Product/ingredient name	Identifiers	%	Classification 67/548/EEC	Classification Regulation (EC) No. 1272/2008 [CLP]	Type
methylenediphenyl diisocyanate	CAS: 26447-40-5 Index: 615-005-00-9	30 - 60	Carc. Cat. 3; R40 Xn; R20, R48/20 Xi; R36/37/38 R42/43	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 Carc. 2, H351 STOT SE 3, H335 STOT RE 2, H373	[1] [2]
isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	-	30 - 60	Carc. Cat. 3; R40 Xn; R20, R48/20 Xi; R36/37/38 R42/43	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 STOT SE 3, H335	[1]
diphenylmethanediisocyanate, isomers and	CAS: 9016-87-9	3 - 7	Carc. Cat. 3; R40 Xn; R20, R48/20	Acute Tox. 4, H332 Skin Irrit. 2, H315	[1] [2]

SECTION 3: Composition/information on ingredients

homologues			Xi; R36/37/38 R42/43	Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 Carc. 2, H351 STOT SE 3, H335 STOT RE 2, H373i	
4,4'-methylenediphenyl diisocyanate	CAS: 101-68-8 Index: 615-005-00-9	3 - 7	Carc. Cat. 3; R40 Xn; R20, R48/20 Xi; R36/37/38 R42/43	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 STOT SE 3, H335i	[1] [2]
homopolymer of methylenediphenyl diisocyanate	-	1 - 3	Xn; R20 Xi; R36/37/38 R42/43	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 STOT SE 3, H335	[1]
triphenyl phosphite	CAS: 101-02-0	0.1 - 1	Xi; R36/38 N; R50/53	Skin Irrit. 2, H315 Eye Irrit. 2, H319 Aquatic Acute 1, H400 Aquatic Chronic 1, H410	[1]
o-(p-isocyanatobenzyl)phenyl isocyanate	CAS: 5873-54-1 Index: 615-005-00-9	0.1 - 1	Carc. Cat. 3; R40 Xn; R20, R48/20 Xi; R36/37/38 R42/43	Acute Tox. 4, H332 Skin Irrit. 2, H315 Eye Irrit. 2, H319 Resp. Sens. 1, H334 Skin Sens. 1, H317 Carc. 2, H351 STOT SE 3, H335 STOT RE 2, H373i	[1] [2]
			See section 16 for the full text of the R-phrases declared above	**See Section 16 for the full text of the H statements declared above.**	

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

Type

[1] Substance classified with a health or environmental hazard
[2] Substance with a workplace exposure limit
[3] Substance meets the criteria for PBT according to Regulation (EC) No. 1907/2006, Annex XIII
[4] Substance meets the criteria for vPvB according to Regulation (EC) No. 1907/2006, Annex XIII

Occupational exposure limits, if available, are listed in Section 8.

SECTION 4: First aid measures

4.1 Description of first aid measures

Eye contact : Immediately flush eyes with plenty of water, occasionally lifting the upper and lower eyelids. Check for and remove any contact lenses. Continue to rinse for at least 10 minutes. Get medical attention.

Inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Get medical attention. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing

SECTION 4: First aid measures

such as a collar, tie, belt or waistband. In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours. In the event of any complaints or symptoms, avoid further exposure.

Skin contact : Flush contaminated skin with plenty of water. Remove contaminated clothing and shoes. Wash contaminated clothing thoroughly with water before removing it, or wear gloves. Continue to rinse for at least 10 minutes. Get medical attention. In the event of any complaints or symptoms, avoid further exposure. Wash clothing before reuse. Clean shoes thoroughly before reuse.

Ingestion : Wash out mouth with water. Remove dentures if any. Remove victim to fresh air and keep at rest in a position comfortable for breathing. If material has been swallowed and the exposed person is conscious, give small quantities of water to drink. Stop if the exposed person feels sick as vomiting may be dangerous. Do not induce vomiting unless directed to do so by medical personnel. If vomiting occurs, the head should be kept low so that vomit does not enter the lungs. Get medical attention. Never give anything by mouth to an unconscious person. If unconscious, place in recovery position and get medical attention immediately. Maintain an open airway. Loosen tight clothing such as a collar, tie, belt or waistband.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

4.2 Most important symptoms and effects, both acute and delayed

Potential acute health effects

Eye contact : Irritating to eyes.

Inhalation : Harmful by inhalation. Irritating to respiratory system. May cause sensitisation by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Skin contact : Irritating to skin. May cause sensitisation by skin contact.

Ingestion : Irritating to mouth, throat and stomach.

Over-exposure signs/symptoms

Eye contact : Adverse symptoms may include the following:
irritation
watering
redness

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma

Skin contact : Adverse symptoms may include the following:
irritation
redness

Ingestion : No specific data.

4.3 Indication of any immediate medical attention and special treatment needed

Notes to physician : In case of inhalation of decomposition products in a fire, symptoms may be delayed. The exposed person may need to be kept under medical surveillance for 48 hours.

Specific treatments : Symptomatic treatment and supportive therapy as indicated. Following severe exposure the patient should be kept under medical review for at least 48 hours.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use an extinguishing agent suitable for the surrounding fire.

Unsuitable extinguishing media : None known.

5.2 Special hazards arising from the substance or mixture

Hazards from the substance or mixture : In a fire or if heated, a pressure increase will occur and the container may burst.

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides
metal oxide/oxides

5.3 Advice for firefighters

Special precautions for fire-fighters : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. This material is harmful to aquatic organisms. Fire water contaminated with this material must be contained and prevented from being discharged to any waterway, sewer or drain.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode. Clothing for fire-fighters (including helmets, protective boots and gloves) conforming to European standard EN 469 will provide a basic level of protection for chemical incidents.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

For non-emergency personnel : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilt material. Avoid breathing vapour or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment.

For emergency responders : If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. See also Section 8 for additional information on hygiene measures.

6.2 Environmental precautions : Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air). Water polluting material.

6.3 Methods and materials for containment and cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

Large spill : Stop leak if without risk. Move containers from spill area. Approach the release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilt product.

SECTION 6: Accidental release measures

6.4 Reference to other sections : See Section 1 for emergency contact information.
See Section 8 for information on appropriate personal protective equipment.
See Section 13 for additional waste treatment information.

SECTION 7: Handling and storage

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

7.1 Precautions for safe handling

Protective measures : Put on appropriate personal protective equipment (see Section 8). Persons with a history of skin sensitisation problems or asthma, allergies or chronic or recurrent respiratory disease should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapour or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Empty containers retain product residue and can be hazardous. Do not reuse container.

Advice on general occupational hygiene : Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. See also Section 8 for additional information on hygiene measures.

7.2 Conditions for safe storage, including any incompatibilities : Store between the following temperatures: 2 to 40°C (35.6 to 104°F). Store in accordance with local regulations. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabelled containers. Use appropriate containment to avoid environmental contamination.

Storage hazard class Huntsman Advanced Materials : Storage class 12, Liquids, not dangerous

7.3 Specific end use(s)

Recommendations : Not available.

Industrial sector specific solutions : Not available.

SECTION 8: Exposure controls/personal protection

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

8.1 Control parameters

Occupational exposure limits

SECTION 8: Exposure controls/personal protection

Product/ingredient name	Exposure limit values
methylenediphenyl diisocyanate	**EH40/2005 WELs (United Kingdom (UK), 8/2007). Skin sensitiser. Notes: as NCO** STEL: 0.07 mg/m³, (as NCO) 15 minute(s). TWA: 0.02 mg/m³, (as NCO) 8 hour(s).
diphenylmethanediisocyanate, isomers and homologues	**EH40/2005 WELs (United Kingdom (UK), 8/2007). Skin sensitiser. Notes: as NCO** STEL: 0.07 mg/m³, (as NCO) 15 minute(s). TWA: 0.02 mg/m³, (as NCO) 8 hour(s).
4,4'-methylenediphenyl diisocyanate	**EH40/2005 WELs (United Kingdom (UK), 8/2007). Skin sensitiser.** STEL: 0.07 mg/m³, (as NCO) 15 minute(s). TWA: 0.02 mg/m³, (as NCO) 8 hour(s).
o-(p-isocyanatobenzyl)phenyl isocyanate	**EH40/2005 WELs (United Kingdom (UK), 8/2007). Skin sensitiser. Notes: as NCO** STEL: 0.07 mg/m³, (as NCO) 15 minute(s). TWA: 0.02 mg/m³, (as NCO) 8 hour(s).

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to European Standard EN 689 for methods for the assessment of exposure by inhalation to chemical agents and national guidance documents for methods for the determination of hazardous substances.

Derived effect levels

No DELs available.

Predicted effect concentrations

No PECs available.

8.2 Exposure controls

Appropriate engineering controls : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapour or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

Individual protection measures

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Contaminated work clothing should not be allowed out of the workplace. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Eye/face protection : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

Skin protection

Hand protection : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Material of gloves for long term application (BTT>480min): : Ethyl Vinyl Alcohol Laminate (EVAL), butyl rubber

SECTION 8: Exposure controls/personal protection

Material of gloves for short term/splash application (10min<BTT<480min): : neoprene, nitrile rubber

(BTT = Break Through Time)

Use gloves approved to relevant standards e.g. EN 374 (Europe), F739 (US). Suitability and durability of a glove is dependent on usage, e.g. frequency and duration of contact, chemical resistance of glove material and dexterity. Always seek advice from glove suppliers. Additional information can be found for instance at www.gisbau.de.

Body protection : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Other skin protection : Appropriate footwear and any additional skin protection measures should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory protection : In case of inadequate ventilation wear respiratory protection. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Environmental exposure controls : Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical state : Liquid. [Paste.]

Colour : Beige.

Odour : Characteristic.

Odour threshold : Not available.

pH : Not available.

Melting point/freezing point : Not available.

Initial boiling point and boiling range : Not available.

Flash point : Open cup: 180°C [DIN 51376 (Cleveland open cup)]

Evaporation rate : Not available.

Flammability (solid, gas) : Not available.

Burning time : Not applicable.

Burning rate : Not applicable.

Upper/lower flammability or explosive limits : Not available.

Vapour pressure : Not available.

Vapour density : Not available.

Relative density : Not available.

Solubility(ies)

Water solubility :

20 deg C

Reacts with water

Partition coefficient: n-octanol/water : Not available.

SECTION 9: Physical and chemical properties

Auto-ignition temperature : 600°C

Decomposition temperature : >300°C

Viscosity : Dynamic: 13000 to 20000 mPa·s 25 deg C

Explosive properties : Not available.

Oxidising properties : Not available.

9.2 Other information

Density : 1.21 g/cm^3 [25°C (77°F)]

SECTION 10: Stability and reactivity

10.1 Reactivity : No specific test data related to reactivity available for this product or its ingredients.

10.2 Chemical stability : The product is stable.

10.3 Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Hydrolysis in contact with water

10.4 Conditions to avoid : No specific data.

10.5 Incompatible materials :

strong acids, strong bases, Water

10.6 Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Acute toxicity

Product/ingredient name	Endpoint	Species	Result	Exposure
ARALDITE® 2029 ISOCYANATE	LD50 Oral	Rat	>5000 mg/kg	-
diphenylmethane-di-isocyanate	LC50 Inhalation Dusts and mists	Rat - Male, Female	>2.24 mg/L	1 hours
	LD50 Dermal	Rabbit - Male, Female	>9400 mg/kg	-
	LD50 Oral	Rat - Male, Female	>2000 mg/kg	-
diphenylmethanediisocyanate, isomers and homologues	LD50 Oral	Rat	>2000 mg/kg	-
diphenylmethane-4,4'-di-isocyanate	LD50 Dermal	Rabbit - Male, Female	>9400 mg/kg	-
	LD50 Intraperitoneal	Rabbit - Male	100 mg/kg	-
	LD50 Oral	Rat - Male	>10000 mg/kg	-
diphenylmethane-2,4'-di-isocyanate	LC50 Inhalation Dusts and mists	Rat	0.49 mg/L	4 hours
	LD50 Dermal	Rabbit - Male, Female	>9400 mg/kg	-
	LD50 Intraperitoneal	Rabbit - Male	100 mg/kg	-

Irritation/Corrosion

SECTION 11: Toxicological information

Product/ingredient name	Test	Species	Result
diphenylmethane-4,4'-di-isocyanate	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Irritant
diphenylmethane-2,4'-di-isocyanate	OECD 404 Acute Dermal Irritation/Corrosion	Rabbit	Irritant
	OECD 405 Acute Eye Irritation/Corrosion	Rabbit	Non-irritant.

Conclusion/Summary : Not available.

Skin : diphenylmethane-4,4'-di-isocyanate: Irritating to skin.

Sensitiser

Product/ingredient name	Test	Route of exposure	Species	Result
diphenylmethane-di-isocyanate	OECD 406 Skin Sensitization	skin	Guinea pig	Not sensitizing
	No official guidelines	Respiratory	Guinea pig	Sensitising
diphenylmethanediisocyanate, isomers and homologues	-	skin	Guinea pig	Sensitising
	-	Respiratory	Human	Sensitising
diphenylmethane-4,4'-di-isocyanate	No official guidelines	Respiratory	Guinea pig	Sensitising
diphenylmethane-2,4'-di-isocyanate	OECD 406 Skin Sensitization	skin	Guinea pig	Not sensitizing
	No official guidelines	Respiratory	Guinea pig	Sensitising

Conclusion/Summary : Not available.

Mutagenicity

Product/ingredient name	Test	Result
diphenylmethane-di-isocyanate	EU	Negative
	OECD 474 Mammalian Erythrocyte Micronucleus Test	Negative
diphenylmethanediisocyanate, isomers and homologues	OECD 474	Negative
	-	Equivocal
diphenylmethane-4,4'-di-isocyanate	EU	Negative
	OECD 474 Mammalian Erythrocyte Micronucleus Test	Negative
diphenylmethane-2,4'-di-isocyanate	OECD 471 Bacterial Reverse Mutation Test	Negative
	OECD 474 Mammalian Erythrocyte Micronucleus Test	Negative

Conclusion/Summary : Not available.

Carcinogenicity

Product/ingredient name	Test	Species	Exposure	Result	Route of exposure	Target organs
diphenylmethane-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	Rat	2 years; 5 days per week	Negative	Inhalation	-
	EU	Rat	2 years; 5 days per week	Negative	Inhalation	-
diphenylmethanediisocyanate, isomers and	OECD 453 Combined Chronic Toxicity/Carcinogenicity	Rat	2 years; 5 days per	Negative	Inhalation	-

SECTION 11: Toxicological information

homologues	Studies EU	Rat	week 2 years; 5 days per week	Negative	Inhalation	-
diphenylmethane-4,4'-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	Rat	2 years; 5 days per week	Positive	Inhalation	lungs
diphenylmethane-2,4'-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	Rat	2 years; 5 days per week	Positive	Inhalation	lungs

Reproductive toxicity

Product/ingredient name	Test	Species	Result/Result type	Target organs
diphenylmethane-di-isocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat	Inhalation: 4 mg/m3 NOAEL	-
diphenylmethanediisocyanate, isomers and homologues	OECD 414 Prenatal Developmental Toxicity Study	Rat	Inhalation: NOAEL	-

Teratogenicity

Product/ingredient name	Test	Species	Result/Result type
diphenylmethane-di-isocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat - Male, Female	12 mg/m3 NOAEL
diphenylmethanediisocyanate, isomers and homologues	OECD 414 Prenatal Developmental Toxicity Study	Rat - Male, Female	4 mg/m3 NOAEL
diphenylmethane-4,4'-di-isocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat - Male, Female	12 mg/m3 NOAEL
diphenylmethane-2,4'-di-isocyanate	OECD 414 Prenatal Developmental Toxicity Study	Rat - Male, Female	4 mg/m3 NOAEL

Information on the likely routes of exposure : Not available.

Potential acute health effects

Inhalation : Harmful by inhalation. Irritating to respiratory system. May cause sensitisation by inhalation. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.

Ingestion : Irritating to mouth, throat and stomach.

Skin contact : Irritating to skin. May cause sensitisation by skin contact.

Eye contact : Irritating to eyes.

Symptoms related to the physical, chemical and toxicological characteristics

Inhalation : Adverse symptoms may include the following:
respiratory tract irritation
coughing
wheezing and breathing difficulties
asthma

Ingestion : No specific data.

Skin contact : Adverse symptoms may include the following:
irritation
redness

Eye contact : Adverse symptoms may include the following:
irritation
watering
redness

Delayed and immediate effects and also chronic effects from short and long term exposure

Short term exposure

Potential immediate effects : Not available.

SECTION 11: Toxicological information

Potential delayed effects : Not available.

Long term exposure

Potential immediate effects : Not available.

Potential delayed effects : Not available.

Potential chronic health effects

Product/ingredient name	Test	Result type		Result	Target organs
diphenylmethane-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	NOEC	Dusts and mists	0.2 mg/m3	-
diphenylmethanediisocyanate, isomers and homologues	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	NOEC	Dusts and mists	0.2 mg/m3	-
	OECD 412 Repeated Dose Inhalation Toxicity: 28-day or 14-day Study	LOEC	Dusts and mists	1.1 mg/m3	-
diphenylmethane-4,4'-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	NOEC	Dusts and mists	0.2 mg/m3	-
diphenylmethane-2,4'-di-isocyanate	OECD 453 Combined Chronic Toxicity/Carcinogenicity Studies	NOEC	Dusts and mists	0.2 mg/m3	-

Conclusion/Summary : Not available.

General : Harmful: danger of serious damage to health by prolonged exposure through inhalation. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Carcinogenicity : May cause cancer, based on animal data. Limited evidence of a carcinogenic effect. Risk of cancer depends on duration and level of exposure.

Mutagenicity : No known significant effects or critical hazards.

Teratogenicity : No known significant effects or critical hazards.

Developmental effects : No known significant effects or critical hazards.

Fertility effects : No known significant effects or critical hazards.

Other information : Not available.

SECTION 12: Ecological information

12.1 Toxicity

Product/ingredient name	Test	Endpoint		Exposure	Species	Result	
diphenylmethane-di-isocyanate	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute	EC50	3 hours Static	Bacteria	>100	mg/L
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	24 hours Static	Daphnia	>1000	mg/L
	OECD 203 Fish, Acute Toxicity Test	Acute	LC50	96 hours Static	Fish	>1000	mg/L
	OECD 201 Alga, Growth Inhibition Test	Chronic	EC50	72 hours Static	Algae	>1640	mg/L
	OECD 211 Daphnia Magna Reproduction Test	Chronic	NOEC	21 days Semi-static	Daphnia	>10	mg/L
diphenylmethanediisocyanate, isomers and homologues	-	Acute	EC50	24 hours	Daphnia	>1000	mg/L
	-	Acute	LC0	96 hours	Fish	>1000	mg/L
diphenylmethane-4,4'-di-isocyanate	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute	EC50	3 hours Static	Bacteria	>100	mg/L
	OECD 202 *Daphnia* sp. Acute	Acute	EC50	24 hours	Daphnia	>1000	mg/L

SECTION 12: Ecological information

	Immobilisation Test			Static			
	OECD 203 Fish, Acute Toxicity Test	Acute	LC50	96 hours Static	Fish	>1000	mg/L
	OECD 211 Daphnia Magna Reproduction Test	Chronic	NOEC	21 days Semi-static	Daphnia	>10	mg/L
diphenylmethane-2,4'-di-isocyanate	OECD 209 Activated Sludge, Respiration Inhibition Test	Acute	EC50	3 hours Static	Bacteria	>100	mg/L
	OECD 202 *Daphnia* sp. Acute Immobilisation Test	Acute	EC50	24 hours Static	Daphnia	>1000	mg/L
	OECD 203 Fish, Acute Toxicity Test	Acute	LC50	96 hours Static	Fish	>1000	mg/L
	OECD 211 Daphnia Magna Reproduction Test	Chronic	NOEC	21 days Semi-static	Daphnia	>10	mg/L

12.2 Persistence and degradability

Product/ingredient name	Test	Period	Result
methylenediphenyl diisocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %
4,4'-methylenediphenyl diisocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %
o-(p-isocyanatobenzyl)phenyl isocyanate	OECD 302C Inherent Biodegradability: Modified MITI Test (II)	28 days	0 %

Product/ingredient name	Aquatic half-life	Photolysis	Biodegradability
methylenediphenyl diisocyanate	-	-	Not readily
diphenylmethanediisocyanate, isomers and homologues	Fresh water 0.8 days	-	-
4,4'-methylenediphenyl diisocyanate	-	-	Not readily
o-(p-isocyanatobenzyl)phenyl isocyanate	-	-	Not readily

12.3 Bioaccumulative potential

Product/ingredient name	$LogP_{ow}$	BCF	Potential
methylenediphenyl diisocyanate	4.51	439	high
diphenylmethanediisocyanate, isomers and homologues	-	200	high
4,4'-methylenediphenyl diisocyanate	4.51	200	high
o-(p-isocyanatobenzyl)phenyl isocyanate	4.51	200	high

12.4 Mobility in soil

Soil/water partition coefficient (K_{OC}) : Not available.

Mobility : Not available.

12.5 Results of PBT and vPvB assessment

Not applicable.

SECTION 12: Ecological information

12.6 Other adverse effects : No known significant effects or critical hazards.

12.7 Other ecological information

SECTION 13: Disposal considerations

The information in this section contains generic advice and guidance. The list of Identified Uses in Section 1 should be consulted for any available use-specific information provided in the Exposure Scenario(s).

13.1 Waste treatment methods

Product

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Significant quantities of waste product residues should not be disposed of via the foul sewer but processed in a suitable effluent treatment plant. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

Hazardous waste : Yes.

European waste catalogue (EWC)

Waste code	Waste designation
07 02 08*	other still bottoms and reaction residues

Packaging

Methods of disposal : The generation of waste should be avoided or minimised wherever possible. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible.

Special precautions : This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Avoid dispersal of spilt material and runoff and contact with soil, waterways, drains and sewers.

SECTION 14: Transport information

	14.1 UN number	14.2 UN proper shipping name
ADR/RID	Not regulated.	-
ADN/ADNR	Not available.	Not available.
IMDG	Not regulated.	-
IATA	Not regulated.	-

	ADR/RID	ADN/ADNR	IMDG	IATA
14.3 Transport hazard class(es)	-		-	-
14.4 Packing group	-		-	-

SECTION 14: Transport information

14.5 Environmental hazards	No.		No.	No.
14.6 Special precautions for user	Not available.		Not available.	Not available.
Additional information	-		**Emergency schedules (EmS)**	-

14.7 Transport in bulk according to Annex II of MARPOL 73/78 and the IBC Code : Not applicable.

SECTION 15: Regulatory information

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

EU Regulation (EC) No. 1907/2006 (REACH)

Annex XIV - List of substances subject to authorisation

Substances of very high concern

None of the components are listed.

Annex XVII - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles : Not applicable.

Other EU regulations

Europe inventory : All components are listed or exempted.

Black List Chemicals : Not listed

Priority List Chemicals : Listed

Integrated pollution prevention and control list (IPPC) - Air : Not listed

Integrated pollution prevention and control list (IPPC) - Water : Not listed

Product/ingredient name	Carcinogenic effects	Mutagenic effects	Developmental effects	Fertility effects
methylenediphenyl diisocyanate	Carc. Cat. 3; R40	-	-	-
isocyanates, reaction product of polyol with methylenediphenyl diisocyanate	Carc. Cat. 3; R40	-	-	-
diphenylmethanediisocyanate, isomers and homologues	Carc. Cat. 3; R40	-	-	-
4,4'-methylenediphenyl diisocyanate	Carc. Cat. 3; R40	-	-	-
o-(p-isocyanatobenzyl)phenyl isocyanate	Carc. Cat. 3; R40	-	-	-

SECTION 15: Regulatory information

National regulations

References : The provision of Safety Data Sheets comes under Regulation 6 of CHIP (CHIP is the recognised abbreviation for the Chemicals Hazard Information and Packaging Regulations). This is an addition to the Health and Safety at Work Act 1974.

International regulations

Chemical Weapons Convention List Schedule I Chemicals : Not listed

Chemical Weapons Convention List Schedule II Chemicals : Not listed

Chemical Weapons Convention List Schedule III Chemicals : Not listed

15.2 Chemical Safety Assessment : This product contains substances for which Chemical Safety Assessments are still required.

SECTION 16: Other information

Indicates information that has changed from previously issued version.

Abbreviations and acronyms : ATE = Acute Toxicity Estimate
CLP = Classification, Labelling and Packaging Regulation [Regulation (EC) No. 1272/2008]
DNEL = Derived No Effect Level
EUH statement = CLP-specific Hazard statement
PNEC = Predicted No Effect Concentration
RRN = REACH Registration Number

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Acute Tox. 4, H332
Skin Irrit. 2, H315
Eye Irrit. 2, H319
Resp. Sens. 1, H334
Skin Sens. 1, H317
Carc. 2, H351
STOT SE 3, H335
STOT RE 2, H373
Aquatic Chronic 3, H412

Procedure used to derive the classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Classification	Justification
Acute Tox. 4, H332	Calculation method
Skin Irrit. 2, H315	Calculation method
Eye Irrit. 2, H319	Calculation method
Resp. Sens. 1, H334	Calculation method
Skin Sens. 1, H317	Calculation method
Carc. 2, H351	Calculation method
STOT SE 3, H335	Calculation method
STOT RE 2, H373	Calculation method
Aquatic Chronic 3, H412	Calculation method

SECTION 16: Other information

Full text of abbreviated H statements :

H315 Causes skin irritation.
H317 May cause an allergic skin reaction.
H319 Causes serious eye irritation.
H332 Harmful if inhaled.
H334 May cause allergy or asthma symptoms or breathing difficulties if inhaled.
H335 May cause respiratory irritation.
H335i May cause respiratory irritation.
H351 Suspected of causing cancer.
H373 May cause damage to organs through prolonged or repeated exposure.
H373i May cause damage to organs through prolonged or repeated exposure if inhaled.
H400 Very toxic to aquatic life.
H410 Very toxic to aquatic life with long lasting effects.
H412 Harmful to aquatic life with long lasting effects.

Full text of classifications [CLP/GHS] :

Acute Tox. 4, H332	ACUTE TOXICITY: INHALATION - Category 4
Aquatic Acute 1, H400	AQUATIC TOXICITY (ACUTE) - Category 1
Aquatic Chronic 1, H410	AQUATIC TOXICITY (CHRONIC) - Category 1
Aquatic Chronic 3, H412	AQUATIC TOXICITY (CHRONIC) - Category 3
Carc. 2, H351	CARCINOGENICITY - Category 2
Eye Irrit. 2, H319	SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
Resp. Sens. 1, H334	RESPIRATORY SENSITIZATION - Category 1
Skin Irrit. 2, H315	SKIN CORROSION/IRRITATION - Category 2
Skin Sens. 1, H317	SKIN SENSITIZATION - Category 1
STOT RE 2, H373	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE) - Category 2
STOT RE 2, H373i	SPECIFIC TARGET ORGAN TOXICITY (REPEATED EXPOSURE): INHALATION - Category 2
STOT SE 3, H335	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) [Respiratory tract irritation] - Category 3
STOT SE 3, H335i	SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE): INHALATION [Respiratory tract irritation] - Category 3

Full text of abbreviated R phrases :

R40- Limited evidence of a carcinogenic effect.
R20- Harmful by inhalation.
R48/20- Harmful: danger of serious damage to health by prolonged exposure through inhalation.
R36/38- Irritating to eyes and skin.
R36/37/38- Irritating to eyes, respiratory system and skin.
R42/43- May cause sensitisation by inhalation and skin contact.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Full text of classifications [DSD/DPD] :

Carc. Cat. 3 - Carcinogen category 3
Xn - Harmful
Xi - Irritant
N - Dangerous for the environment

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Notice to reader

SECTION 16: Other information

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