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

1.1 Product identifier

Trade name : Denpur™ Hardener

Unique Formula Identifier (UFI) : GQ72-400F-9005-YQ1Q

1.2 Relevant identified uses

Hardener for coating materials or adhesives.
For details of the identified uses according to Regulation (EU) No. 1907/2006 refer to the annex of this safety data sheet.

1.3 Details of the supplier of the safety data sheet

Dencoat™
E-mail: info@dencoat.com
Website: www.dencoat.com

1.4 Emergency telephone number

Emergency telephone number : EUROPE: +32 35 75 1234
USA: +1 800 424 9300
ASIA: +65 6542 9595
China: +86 20 39377888
+86 532 83889090
India: + 91 22 42 87 5333
Australia: 1 800 786 152
New Zealand: 0 800 767 437
Belgian Poison center : +32 70 245 245

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 irritation, Category 2	H315: Causes skin irritation.
Eye irritation, Category 2	H319: Causes serious eye irritation.

Respiratory sensitisation, Category 1	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled.
Skin sensitisation, Category 1	H317: May cause an allergic skin reaction.
Carcinogenicity, Category 2	H351: Suspected of causing cancer.
Specific target organ toxicity - single exposure, Category 3, Respiratory system	H335: May cause respiratory irritation.
Specific target organ toxicity - repeated exposure, Category 2	H373: May cause damage to organs through prolonged or repeated exposure.

2.2 Label elements

Labeling (REGULATION (EC) No 1272/2008)

Hazard pictograms :

Signal word : Danger

Hazard 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.
H351	Suspected of causing cancer.
H373	May cause damage to organs through prolonged or repeated exposure.

Precautionary statements :

Prevention:

P201	Obtain special instructions before use.
P260	Do not breathe mist or vapours.
P264	Wash skin thoroughly after handling.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection/ hearing protection.

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.
P342 + P311	If experiencing respiratory symptoms: Call a POISON CENTER/ doctor.

Hazardous components which must be listed on the label:

Isocyanic acid, polymethylenepolyphenylene ester
Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate
4,4'-methylenediphenyl diisocyanate

Additional Labelling

"As from 24 August 2023 adequate training is required before industrial or professional use."

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.

Ecological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher

Toxicological information: The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher

SECTION 3: Composition/information on ingredients

3.2 Mixtures

Chemical nature : Isocyanates

Hazardous components

Chemical name	CAS-No. EC-No. Index-No. Registration number	Classification	Concentration (% w/w)
Isocyanic acid, polymethylenepolyphenylene ester	9016-87-9 Polymer	Acute Tox. 4; H332 Skin Irrit. 2; H315 Eye Irrit. 2; H319 Resp. Sens. 1; H334 Skin Sens. 1B; H317 Carc. 2; H351 STOT SE 3; H335 (Respiratory system) STOT RE 2; H373	>= 70 - < 90
Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate	- - 01-2119457015-45	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 (Respiratory system) STOT RE 2; H373 specific concentration limit Eye Irrit. 2; H319 >= 5 % STOT SE 3; H335 >= 5 %	>= 10 - < 20

		Skin Irrit. 2; H315 >= 5 % Resp. Sens. 1; H334 >= 0,1 %	
4,4'-methylenediphenyl diisocyanate	101-68-8 202-966-0 615-005-00-9 01-2119457014-47	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 (Respiratory system) STOT RE 2; H373 specific concentration limit Eye Irrit. 2; H319 >= 5 % STOT SE 3; H335 >= 5 % Skin Irrit. 2; H315 >= 5 % Resp. Sens. 1; H334 >= 0,1 %	>= 5 - < 10

For explanation of abbreviations see section 16.

SECTION 4: First aid measures

4.1 Description of first aid measures

General advice : Move out of dangerous area.
Do not leave the victim unattended.
Get medical attention immediately if symptoms occur.
Show this safety data sheet to the doctor in attendance.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training.
It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.
If potential for exposure exists refer to Section 8 for specific personal protective equipment.
First Aid responders should pay attention to self-protection and use the recommended protective clothing

If inhaled : If breathed in, move person into fresh air.
Call a physician or poison control centre immediately.
Keep patient warm and at rest.
Keep respiratory tract clear.
If breathing is difficult, give oxygen.
If breathing is irregular or stopped, administer artificial respiration.
If unconscious, place in recovery position and seek medical

advice.
Consult a physician immediately if symptoms such as shortness of breath or asthma are observed.
A hyper-reactive response to even minimal concentrations of diisocyanates may develop in sensitised persons.
The exposed person may need to be kept under medical surveillance for 48 hours.
LC50 (rat) : ca. 490 mg/m³ (4 hours) : using experimentally produced respirable aerosol having aerodynamic diameter <5microns.
Methods used to generate the exposure concentrations in the animal studies use extreme laboratory conditions and does not represent actual exposure conditions of the material in the workplace, storage, transportation or expected use on the market due to the very low vapor pressure. Therefore, these test results cannot be used to for hazard classification of the material. Rather, an acute toxicity estimate is calculated based on weight of evidence and expert judgement and is used to justify a modified classification for acute inhalation toxicity.

In case of skin contact : In case of contact, immediately flush skin with soap and plenty of water.
Take off contaminated clothing and shoes immediately.
Wash contaminated clothing before reuse.
Thoroughly clean shoes before reuse.
Call a physician if irritation develops or persists.
An MDI study has demonstrated that a polyglycol-based skin cleanser (such as D-Tam™, PEG-400) or corn oil may be more effective than soap and water.

In case of eye contact : Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes.
If easy to do, remove contact lens, if worn.
Protect unharmed eye.
Keep eye wide open while rinsing.
Seek medical advice.

If swallowed : Gently wipe or rinse the inside of the mouth with water.
DO NOT induce vomiting unless directed to do so by a physician or poison control center.
Keep respiratory tract clear.
Keep at rest.
If a person vomits when lying on his back, place him in the recovery position.
Never give anything by mouth to an unconscious person.
Take victim immediately to hospital.
If symptoms persist, call a physician.

4.2 Most important symptoms and effects, both acute and delayed

Symptoms : Severe allergic skin reactions, bronchiospasm and anaphylactic shock

Risks : This product is a respiratory irritant and potential respiratory

sensitiser: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitisation.
Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing.
The onset of the respiratory symptoms may be delayed for several hours after exposure.
A hyper-reactive response to even minimal concentrations of MDI may develop in sensitised persons.

Causes skin irritation.
May cause an allergic skin reaction.
Causes serious eye irritation.
Harmful if inhaled.
May cause allergy or asthma symptoms or breathing difficulties if inhaled.
May cause respiratory irritation.
Suspected of causing cancer.
May cause damage to organs through prolonged or repeated exposure.

4.3 Indication of any immediate medical attention and special treatment needed

Treatment : Symptomatic and supportive therapy as needed. Following severe exposure medical follow-up should be monitored for at least 48 hours.

The first aid procedure should be established in consultation with the doctor responsible for industrial medicine.

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media : Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.
Foam
Carbon dioxide (CO2)
Dry powder

Unsuitable extinguishing media : Water may be used if no other available and then in copious quantities. Reaction between water and hot isocyanate may be vigorous.

5.2 Special hazards arising from the substance or mixture

Specific hazards during firefighting : Do not allow run-off from fire fighting to enter drains or water courses.
The pressure in sealed containers can increase under the influence of heat.
Exposure to decomposition products may be a hazard to health.

Hazardous combustion products	:	Combustion products may include: carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and HCN. In the event of extreme heat (>500 degrees C), aniline is suspected of being formed.

5.3 Advice for firefighters

Special protective equipment for firefighters	:	Wear an approved positive pressure self-contained breathing apparatus in addition to standard fire fighting gear. 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.
Specific extinguishing methods	:	Cool containers/tanks with water spray.
Further information	:	Standard procedure for chemical fires. Due to reaction with water producing CO2-gas, a hazardous build-up of pressure could result if contaminated containers are re-sealed. Collect contaminated fire extinguishing water separately. This must not be discharged into drains. Prevent fire extinguishing water from contaminating surface water or the ground water system. Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions	:	Immediately evacuate personnel to safe areas. Use personal protective equipment. If specialised clothing is required to deal with the spillage, take note of any information in Section 8 on suitable and unsuitable materials. Ensure adequate ventilation. Keep people away from and upwind of spill/leak. Only qualified personnel equipped with suitable protective equipment may intervene. For additional precautions and advice on safe handling, see section 7. Never return spills in original containers for re-use. Make sure that there is a sufficient amount of neutralizing/ absorbent material near the storage area. The danger areas must be delimited and identified using relevant warning and safety signs. Treat recovered material as described in the section "Disposal considerations". For disposal considerations see section 13.

6.2 Environmental precautions

Environmental precautions : Do not allow uncontrolled discharge of product into the environment.
Do not allow material to contaminate ground water system.
Prevent product from entering drains.
Prevent further leakage or spillage if safe to do so.
Local authorities should be advised if significant spillages cannot be contained.
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 : Clean-up methods - small spillage
Contain spillage, soak up with non-combustible absorbent material, (e.g. sand, earth, diatomaceous earth, vermiculite) and transfer to a container for disposal according to local / national regulations (see section 13).
Clean contaminated surface thoroughly.
Sweep up or vacuum up spillage and collect in suitable container for disposal.
Neutralize small spillages with decontaminant.
The compositions of liquid decontaminants are given in Section 16.
Remove and dispose of residues.
Clean-up methods - large spillage
If the product is in its solid form:
Spilled MDI flakes should be picked up carefully.
The area should be vacuum cleaned to remove remaining dust particles completely.
If the product is in its liquid form:
Soak up with inert absorbent material (e.g. sand, silica gel, acid binder, universal binder, sawdust).
Leave to react for at least 30 minutes.
Shovel into open-top drums for further decontamination.
Wash the spillage area with water.
Test atmosphere for MDI vapour.
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., The compositions of liquid decontaminants are given in Section 16.

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Technical measures : Ensure that eyewash stations and safety showers are close to the workstation location.

Local/Total ventilation : Use only with adequate ventilation.

Advice on safe handling : For personal protection see section 8.
Avoid formation of aerosol.
Do not breathe vapours or spray mist.

Do not breathe vapours/dust.
Do not swallow.
Do not get in eyes or mouth or on skin.
Do not get on skin or clothing.
Avoid exposure - obtain special instructions before use.
Smoking, eating and drinking should be prohibited in the application area.
Provide sufficient air exchange and/or exhaust in work rooms.
Keep container closed when not in use.
Open drum carefully as content may be under pressure.
Dispose of rinse water in accordance with local and national regulations.
Repeated or prolonged skin contact may cause skin irritation and/or dermatitis and sensitisation of susceptible persons.
Medical supervision of all employees who handle or come in contact with respiratory sensitisers is recommended.
Persons allergic to isocyanates, and particularly those suffering from asthma or other respiratory conditions, should not work with isocyanates.
Industrial use of aprotic polar solvents for cleaning can release hazardous primary aromatic amines (>0.1%)
Sudden Release of Pressure Hazard

Advice on protection against fire and explosion	:	Normal measures for preventive fire protection.
Hygiene measures	:	Handle in accordance with good industrial hygiene and safety practice. Wash face, hands and any exposed skin thoroughly after handling. Remove contaminated clothing and protective equipment before entering eating areas. When using do not eat, drink or smoke. Contaminated work clothing should not be allowed out of the workplace. Wash hands before breaks and immediately after handling the product. 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 containers tightly closed in a dry, cool and well-ventilated place. Keep in properly labelled containers. Observe label precautions. Protect from moisture. Electrical installations / working materials must comply with the technological safety standards. Containers which are opened must be carefully resealed and kept upright to prevent leakage.
Advice on common storage	:	For incompatible materials please refer to Section 10 of this SDS.
Recommended storage temperature	:	15 - 25 °C
Further information on storage stability	:	Stable under normal conditions.

7.3 Specific end use(s)

Specific use(s) : No data available

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational Exposure Limits

Components	CAS-No.	Value type (Form of exposure)	Control parameters	Basis
4,4'-methylenediphenyl diisocyanate	101-68-8	TLV 8 hr	0,005 ppm 0,052 mg/m3	BE OEL

Derived No Effect Level (DNEL) according to Regulation (EC) No. 1907/2006:

Substance name	End Use	Exposure routes	Potential health effects	Value
4,4'-methylenediphenyl diisocyanate	Workers	Inhalation	Long-term local effects	0,05 mg/m3
	Workers	Inhalation	Acute local effects	0,1 mg/m3
	Consumers	Inhalation	Long-term local effects	0,025 mg/m3
	Consumers	Inhalation	Acute local effects	0,05 mg/m3
Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate	Workers	Inhalation	Long-term local effects	0,05 mg/m3
	Workers	Inhalation	Acute local effects	0,1 mg/m3
	Consumers	Inhalation	Long-term local effects	0,025 mg/m3
	Consumers	Inhalation	Acute local effects	0,05 mg/m3
Isocyanic acid, polymethylenepolyphenylene ester	Workers	Inhalation	Long-term local effects	0,05 mg/m3
	Workers	Inhalation	Acute local effects	0,1 mg/m3
	Consumers	Inhalation	Long-term local effects	0,025 mg/m3
	Consumers	Inhalation	Acute local effects	0,05 mg/m3

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

Substance name	Environmental Compartment	Value
4,4'-methylenediphenyl diisocyanate	Fresh water	3,7 µg/l
	Remarks:Assessment Factors	
	Freshwater - intermittent	37 µg/l
	Remarks:Assessment Factors	
	Marine water	0,37 µg/l
	Remarks:Assessment Factors	
	Fresh water sediment	11,7 mg/kg dry

		weight (d.w.)
	Remarks:Equilibrium method	
	Marine sediment	1,17 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
	Soil	2,33 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate	Fresh water	3,7 µg/l
	Remarks:Assessment Factors	
	Freshwater - intermittent	37 µg/l
	Remarks:Assessment Factors	
	Marine water	0,37 µg/l
	Remarks:Assessment Factors	
	Fresh water sediment	11,7 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
	Marine sediment	1,17 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
	Soil	2,33 mg/kg
	Remarks:Equilibrium method	
Isocyanic acid, polymethylenepolyphenylene ester	Fresh water	1 mg/l
	Fresh water	3,7 µg/l
	Remarks:Assessment Factors	
	Freshwater - intermittent	37 µg/l
	Remarks:Assessment Factors	
	Marine water	0,37 µg/l
	Remarks:Assessment Factors	
	Fresh water sediment	11,7 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
	Marine sediment	1,17 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	
	Soil	2,33 mg/kg dry weight (d.w.)
	Remarks:Equilibrium method	

8.2 Exposure controls

Personal protective equipment

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.
Chemical splash goggles.
Always wear eye protection when the potential for inadvertent eye contact with the product cannot be excluded.
Please follow all applicable local/national requirements when

selecting protective measures for a specific workplace.
Ensure that eyewash stations and safety showers are close to the workstation location.

Hand protection

Material	:	Neoprene
Break through time	:	>= 480 min
Glove thickness	:	>= 0,5 mm

Material	:	Nitrile rubber
Break through time	:	>= 480 min
Glove thickness	:	>= 0,35 mm

Material	:	butyl-rubber
Break through time	:	>= 480 min
Glove thickness	:	>= 0,5 mm

Material	:	Fluorinated rubber
Break through time	:	>= 480 min
Glove thickness	:	>= 0,4 mm

Remarks : Protective gloves should be worn when handling freshly made polyurethane products to avoid contact with trace residual materials which may be hazardous in contact with skin.

Use chemical resistant gloves classified under Standard EN374: protective gloves against chemicals and microorganisms. Examples of glove materials that might provide suitable protection include: Butyl rubber, Chlorinated polyethylene, Polyethylene, Ethyl vinyl alcohol copolymers laminated (“EVAL”), Polychloroprene (Neoprene*), Nitrile/butadiene rubber (“nitrile” or “NBR”), Polyvinyl chloride (“PVC” or “vinyl”), Fluoroelastomer (Viton*).

When prolonged or frequently repeated contact may occur, a glove with protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN374) is recommended.

When only brief contact is expected, a glove with protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN374) is recommended.
Notice: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all requisite workplace factors such as, but not limited to : other chemicals that may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), as well as instructions/specifications provided by the glove supplier The selected protective gloves have to satisfy the specifications of Regulation (EU) 2016/425 and the standard EN 374 derived from it. By industrial use of aprotic polar solvents for cleaning : Butyl rubber (0.7mm), Nitrile rubber (0.4mm), Chloroprene (0.5mm)

Skin and body protection	:	Impervious clothing Choose body protection according to the amount and concentration of the dangerous substance at the work place. Recommended: Overall (preferably heavy cotton) or Tyvek-Pro Tech 'C' , Tyvek Pro 'F' disposable coverall.
Respiratory protection	:	Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator. In emergency, non-routine and unknown exposure situations, including confined space entries, a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA)or a full facepiece pressure demand supplied air respirator (SAR) with auxiliary self-contained air supply, should be used. Use respiratory protection unless adequate local exhaust ventilation is provided or exposure assessment demonstrates that exposures are within recommended exposure guidelines Equipment should conform to EN 14387
Filter type	:	Combined particulates and organic vapour type (A-P)
Protective measures	:	Personal protective equipment comprising: suitable protective gloves, safety goggles and protective clothing The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace. Ensure that eye flushing systems and safety showers are located close to the working place.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Physical state	:	liquid
Colour	:	Clear, brown
Odour	:	No data is available on the product itself.
Odour Threshold	:	No data is available on the product itself.
Melting point/freezing point	:	No data is available on the product itself.
Boiling point	:	No data is available on the product itself.

Flammability (solid, gas)	:	No data is available on the product itself.
Lower explosion limit / Lower flammability limit	:	No data is available on the product itself.
Upper explosion limit / Upper flammability limit	:	No data is available on the product itself.
Flash point	:	220 °C Method: closed cup
Auto-ignition temperature	:	No data is available on the product itself.
Decomposition temperature	:	No data is available on the product itself.
pH	:	substance/mixture reacts with water
Viscosity		
Viscosity, dynamic	:	85 mPa.s (25 °C)
Solubility(ies)		
Water solubility	:	No data is available on the product itself.
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.
Vapour pressure	:	No data is available on the product itself.
Density	:	1,23 g/cm3 (25 °C)
Relative density	:	1,23 (25 °C)
Relative vapour density	:	No data is available on the product itself.
Particle characteristics	:	No data is available on the product itself.

9.2 Other information

No data is available on the product itself.

SECTION 10: Stability and reactivity

10.1 Reactivity

No dangerous reaction known under conditions of normal use.

10.2 Chemical stability

Stable under normal conditions.

10.3 Possibility of hazardous reactions

Hazardous reactions : Reaction with water (moisture) produces CO2-gas.
Exothermic reaction with materials containing active hydrogen groups.
The reaction becomes progressively more vigorous and can be violent at higher temperatures if the miscibility of the reaction partners is good or is supported by stirring or by the presence of solvents.
MDI is insoluble with, and heavier than water and sinks to the bottom but reacts slowly at the interface.
A solid water-insoluble layer of polyurea is formed at the interface by liberating carbon dioxide gas.

10.4 Conditions to avoid

Conditions to avoid : Extremes of temperature and direct sunlight.
Exposure to air or moisture over prolonged periods.

10.5 Incompatible materials

Materials to avoid : Acids
Amines
Bases
Metals
water

10.6 Hazardous decomposition products

Combustion products may include: carbon monoxide, carbon dioxide, nitrogen oxides, hydrocarbons and HCN. In the event of extreme heat (>500 degrees C), aniline is suspected of being formed.

SECTION 11: Toxicological information

11.1 Information on hazard classes as defined in Regulation (EC) No 1272/2008

Acute toxicity

Harmful if inhaled.

Product:

Acute inhalation toxicity : Assessment: The substance/mixture is not toxic on inhalation as defined by dangerous goods regulations.
Remarks: Methods used to generate the exposure concentrations in the animal studies use extreme laboratory conditions and does not represent actual exposure conditions of the material in the workplace, storage, transportation or expected use on the market due to the very low vapor pressure. Therefore, these test results cannot be used to for hazard classification of the material. Rather, an acute toxicity estimate is calculated based on weight of evidence and expert judgement and is used to justify a modified classification for acute inhalation toxicity.

Acute toxicity estimate: 11 mg/l
Exposure time: 4 h
Test atmosphere: vapour

Method: Calculation method

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Acute oral toxicity : LD50 (Rat, male): > 10 000 mg/kg
Method: OECD Test Guideline 401
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat, male and female): 431.18 mg/m3
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The component/mixture is moderately toxic after short term inhalation.

Acute dermal toxicity : LD50 (Rabbit, male and female): > 9 400 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Acute oral toxicity : LD50 (Rat, male and female): > 2 000 mg/kg
Assessment: The substance or mixture has no acute oral toxicity

Acute inhalation toxicity : LC50 (Rat, male and female): 431.18 mg/m3
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The component/mixture is moderately toxic after short term inhalation.
Remarks: Information given is based on data obtained from similar substances.

Acute dermal toxicity : LD50 (Rabbit, male and female): > 9 400 mg/kg
Method: OECD Test Guideline 402
Assessment: The substance or mixture has no acute dermal toxicity
Remarks: Information given is based on data obtained from similar substances.

LD50 (Rabbit, male and female): > 7 940 mg/kg
Assessment: The substance or mixture has no acute dermal toxicity
Remarks: Information given is based on data obtained from similar substances.

4,4'-methylenediphenyl diisocyanate:

Acute oral toxicity : LD50 (Rat, male and female): > 2 000 mg/kg
Assessment: The substance or mixture has no acute oral

toxicity
Remarks: Information given is based on data obtained from similar substances.

Acute inhalation toxicity : LC50 (Rat, male and female): 431.18 mg/m3
Exposure time: 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
Assessment: The component/mixture is moderately toxic after short term inhalation.

Acute dermal toxicity : LD50 (Rabbit): > 9 400 mg/kg
Remarks: Information given is based on data obtained from similar substances.

Skin corrosion/irritation

Causes skin irritation.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Assessment : Irritating to skin.
Result : Irritating to skin.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Species : Rabbit
Assessment : Irritating to skin.
Method : OECD Test Guideline 404
Result : Irritating to skin.
GLP : yes

4,4'-methylenediphenyl diisocyanate:

Species : Rabbit
Assessment : Irritating to skin.
Method : OECD Test Guideline 404
Result : Irritating to skin.

Serious eye damage/eye irritation

Causes serious eye irritation.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Species : Rabbit
Method : OECD Test Guideline 405
Result : Mild eye irritation
Remarks : largely based on human evidence

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Species : Rabbit
Assessment : No eye irritation

Method	:	OECD Test Guideline 405
Result	:	No eye irritation
GLP	:	yes

Species	:	Humans
Assessment	:	Irritating to eyes.
Result	:	Irritating to eyes.

4,4'-methylenediphenyl diisocyanate:

Species	:	Rabbit
Assessment	:	Irritating to eyes.
Method	:	OECD Test Guideline 405
Result	:	Irritating to eyes.

Respiratory or skin sensitisation

Skin sensitisation

May cause an allergic skin reaction.

Respiratory sensitisation

May cause allergy or asthma symptoms or breathing difficulties if inhaled.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Exposure routes	:	Skin
Assessment	:	The product is a skin sensitiser, sub-category 1B.
Result	:	The product is a skin sensitiser, sub-category 1B.
Remarks	:	Information given is based on data obtained from similar substances.

Test Type	:	Local lymph node assay (LLNA)
Exposure routes	:	Respiratory Tract
Species	:	Rat
Assessment	:	May cause sensitisation by inhalation.
Result	:	May cause sensitisation by inhalation.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Exposure routes	:	Skin
Species	:	Guinea pig
Assessment	:	May cause sensitisation by skin contact.
Method	:	OECD Test Guideline 406
Result	:	May cause sensitisation by skin contact.
Remarks	:	Information given is based on data obtained from similar substances.

Exposure routes	:	Respiratory Tract
Species	:	Guinea pig
Assessment	:	May cause sensitisation by inhalation.
Result	:	May cause sensitisation by inhalation.
Remarks	:	Information given is based on data obtained from similar substances.

Assessment	:	May cause allergy or asthma symptoms or breathing difficulties if inhaled.

4,4'-methylenediphenyl diisocyanate:

Exposure routes	:	Skin
Species	:	Guinea pig
Assessment	:	May cause sensitisation by skin contact.
Method	:	OECD Test Guideline 406
Result	:	May cause sensitisation by skin contact.

Test Type	:	Local lymph node assay (LLNA)
Exposure routes	:	Respiratory Tract
Species	:	Guinea pig
Assessment	:	May cause sensitisation by inhalation.
Result	:	May cause sensitisation by inhalation.

Assessment	:	May cause allergy or asthma symptoms or breathing difficulties if inhaled., May cause an allergic skin reaction.

Germ cell mutagenicity

Not classified due to lack of data.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Genotoxicity in vitro	:	Metabolic activation: with and without metabolic activation Method: OECD Test Guideline 471 Result: Not classified due to inconclusive data. GLP: yes Test Type: reverse mutation assay Test system: Salmonella typhimurium Concentration: 0 - 1200 µg/plate Metabolic activation: with and without metabolic activation Method: Mutagenicity (Salmonella typhimurium - reverse mutation assay) Result: negative
Genotoxicity in vivo	:	Test Type: comet assay Species: Rat (male) Cell type: Liver cells Application Route: inhalation (dust/mist/fume) Dose: 2.5/4.9/12 mg/m3 Method: OECD Test Guideline 489 Result: negative Remarks: Information given is based on data obtained from similar substances. Test Type: Micronucleus test Species: Rat (male) Cell type: Somatic Application Route: Inhalation Exposure time: 3 Weeks

Dose: 113 mg/m3
Method: OECD Test Guideline 474
Result: negative
Remarks: Information given is based on data obtained from similar substances.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Genotoxicity in vitro : Test Type: reverse mutation assay
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: Directive 67/548/EEC, Annex, B.13/14
Result: negative

Genotoxicity in vivo : Test Type: comet assay
Species: Rat (male)
Cell type: Liver cells
Application Route: inhalation (dust/mist/fume)
Dose: 2.5/4.9/12 mg/m3
Method: OECD Test Guideline 489
Result: negative
Remarks: Information given is based on data obtained from similar substances.

Test Type: Micronucleus test
Species: Rat (male)
Cell type: Somatic
Application Route: Inhalation
Exposure time: 3 Weeks
Method: OECD Test Guideline 474
Result: negative
Remarks: Information given is based on data obtained from similar substances.

4,4'-methylenediphenyl diisocyanate:

Genotoxicity in vitro : Test Type: reverse mutation assay
Test system: Salmonella typhimurium
Metabolic activation: with and without metabolic activation
Method: Directive 67/548/EEC, Annex, B.13/14
Result: negative

Genotoxicity in vivo : Test Type: Micronucleus test
Species: Rat (male)
Cell type: Somatic
Application Route: Inhalation
Exposure time: 3 Weeks
Method: OECD Test Guideline 474
Result: negative

Test Type: comet assay
Species: Rat (male)
Cell type: Liver cells
Application Route: inhalation (dust/mist/fume)
Dose: 2.5/4.9/12 mg/m3

Method: OECD Test Guideline 489
Result: negative

Carcinogenicity

Suspected of causing cancer.

Product:

Remarks : Rats have been exposed for two years to a respirable aerosol of polymeric MDI which resulted in a chronic pulmonary irritation at high concentrations. Only at the top level (6 mg/m3), there was a significant incidence of a benign tumour of the lung (adenoma) and one malignant tumour (adenocarcinoma). There were no lung tumours at 1 mg/m3 and no effects at 0.2 mg/m3. Overall, the tumour incidence, both benign and malignant, and the number of animals with the tumours were not different from controls. The increased incidence of lung tumours is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumour formation will occur.

Remarks : Industrial use of aprotic polar solvents for cleaning can release hazardous primary aromatic amines (>0.1%)
Based on animal studies, primary aromatic amines are considered as potential carcinogen to humans. Some of those chemicals are proven carcinogens to humans
Provided the recommended personal protective equipment and hygiene measures are applied, no adverse effects to human health are to be expected

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Species	:	Rat, female
Application Route	:	Inhalation
Exposure time	:	24 month(s)
Dose	:	.7 mg/m³
Frequency of Treatment	:	5 daily
Result	:	negative

Species	:	Rat, male and female
Application Route	:	inhalation (dust/mist/fume)
Exposure time	:	24 mon
Activity duration	:	6 h
Dose	:	0, 0.2, 1.0, 6.0 mg/m³
Frequency of Treatment	:	5 days/week
NOAEL	:	1 mg/m³
LOAEL	:	6 mg/m³
Method	:	OECD Test Guideline 453

Carcinogenicity - Assessment	:	Suspected human carcinogens

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Species	:	Rat, male and female
Application Route	:	Inhalation
Exposure time	:	24 month(s)
Dose	:	1 mg/m³
Frequency of Treatment	:	5 days/week
NOAEL	:	1 mg/m³
Target Organs	:	Lungs
Remarks	:	Information given is based on data obtained from similar substances.
Carcinogenicity - Assessment	:	Suspected human carcinogens

4,4'-methylenediphenyl diisocyanate:

Species	:	Rat, female
Application Route	:	Inhalation
Exposure time	:	24 month(s)
Activity duration	:	17 h
Dose	:	0, 0.2, 0.7, 2.1 mg/m3 mg/m³
Frequency of Treatment	:	5 days/week
NOEL	:	0,7 mg/m³
LOAEL	:	0,23 mg/m³
Result	:	positive
Target Organs	:	Lungs
Carcinogenicity - Assessment	:	Suspected human carcinogens

Reproductive toxicity

Not classified due to lack of data.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Effects on foetal development	:	Test Type: Pre-natal Species: Rat, females Application Route: inhalation (dust/mist/fume) Dose: 0/1/4/12 mg/m3 General Toxicity Maternal: NOAEC: 4 mg/m³ Method: OECD Test Guideline 414 Result: No teratogenic effects

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Effects on foetal development	:	Test Type: Pre-natal Species: Rat, females Application Route: Inhalation General Toxicity Maternal: NOAEC: 4 mg/m³ Developmental Toxicity: NOAEC: 4 mg/m³ Result: No teratogenic effects

Remarks: Information given is based on data obtained from similar substances.

Test Type: Pre-natal
Species: Rat, females
Application Route: Inhalation
Duration of Single Treatment: 15 d
Frequency of Treatment: 7 days/week
General Toxicity Maternal: LOAEC: <= 9 mg/m³
Developmental Toxicity: NOAEC: 3 mg/m³
Result: No teratogenic effects
Remarks: Information given is based on data obtained from similar substances.

STOT - single exposure

May cause respiratory irritation.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Exposure routes	:	Inhalation
Target Organs	:	Respiratory Tract
Assessment	:	May cause respiratory irritation.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Exposure routes	:	Inhalation
Target Organs	:	Respiratory system
Assessment	:	May cause respiratory irritation., The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.
Remarks	:	Information given is based on data obtained from similar substances.

4,4'-methylenediphenyl diisocyanate:

Exposure routes	:	Inhalation
Target Organs	:	Respiratory system
Assessment	:	May cause respiratory irritation., The substance or mixture is classified as specific target organ toxicant, single exposure, category 3 with respiratory tract irritation.

STOT - repeated exposure

May cause damage to organs through prolonged or repeated exposure.

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Exposure routes	:	inhalation (dust/mist/fume)
Assessment	:	May cause damage to organs through prolonged or repeated exposure.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Exposure routes	:	Inhalation
Target Organs	:	Respiratory Tract
Assessment	:	The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2., May cause damage to organs through prolonged or repeated exposure.
Remarks	:	Information given is based on data obtained from similar substances.

4,4'-methylenediphenyl diisocyanate:

Exposure routes	:	Inhalation
Target Organs	:	Respiratory system
Assessment	:	May cause damage to organs through prolonged or repeated exposure., The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

Repeated dose toxicity

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Species	:	Rat, female
LOEC	:	1 mg/m3
Application Route	:	Inhalation
Test atmosphere	:	dust/mist
Exposure time	:	2 years 17 h
Number of exposures	:	5 days/week
Dose	:	0, 0.2, 0.7, 2.1 mg/m3
Method	:	Chronic toxicity
Assessment	:	The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Species	:	Rat, female
LOEC	:	1 mg/m3
Application Route	:	Inhalation
Test atmosphere	:	dust/mist
Exposure time	:	2 years 17 h
Number of exposures	:	5 days/week
Dose	:	0, 0.2, 0.7, 2.1 mg/m3
Method	:	Chronic toxicity
Assessment	:	The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

4,4'-methylenediphenyl diisocyanate:

Species	:	Rat, female
LOEC	:	1 mg/m3
Application Route	:	Inhalation
Test atmosphere	:	dust/mist
Exposure time	:	2 years 17 h
Number of exposures	:	5 days/week

Dose	:	0, 0.2, 0.7, 2.1 mg/m3
Method	:	Chronic toxicity
Assessment	:	The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

Aspiration toxicity

Not classified due to lack of data.

11.2 Information on other hazards

Endocrine disrupting properties

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher

Experience with human exposure

No data available

Toxicology, Metabolism, Distribution

No data available

Neurological effects

No data available

Further information

No data available

SECTION 12: Ecological information

12.1 Toxicity

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Toxicity to fish	:	LC50 (Brachydanio rerio (zebrafish)): > 1 000 mg/l End point: mortality Exposure time: 96 h Test Type: static test Test substance: Fresh water Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EL50 (Daphnia magna (Water flea)): 31,7 mg/l End point: Immobilization Exposure time: 48 h Test Type: semi-static test Test substance: Fresh water Method: OECD Test Guideline 202 GLP: yes
Toxicity to algae/aquatic plants	:	EL50 (Desmodesmus subspicatus (green algae)): > 100 mg/l Exposure time: 72 h Test substance: Fresh water

Method: OECD Test Guideline 201
Remarks: Information given is based on data obtained from similar substances.

EL10 (Desmodesmus subspicatus (green algae)): > 100 mg/l
Exposure time: 72 h
Test substance: Fresh water
Method: OECD Test Guideline 201
Remarks: Information given is based on data obtained from similar substances.

Toxicity to microorganisms : EC50 (activated sludge): > 100 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209

EC50 (activated sludge): > 1 000 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209
Remarks: Information given is based on data obtained from similar substances.

NOEC (activated sludge): 250 mg/l
Exposure time: 3 h
Test Type: static test
Test substance: Fresh water
Method: OECD Test Guideline 209
Remarks: Information given is based on data obtained from similar substances.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity) : NOEC: >= 10 mg/l
Exposure time: 21 d
Species: Daphnia magna (Water flea)
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 211

Toxicity to soil dwelling organisms : LC50: > 1 000 mg/kg
Exposure time: 14 d
Species: Eisenia fetida (earthworms)
Method: OECD Test Guideline 207

Plant toxicity : EC50: >1000 milligram per kilogram
Exposure time: 14 d
Species: Avena sativa (oats)
Method: OECD Test Guideline 208

NOEC: >=1000 milligram per kilogram
Exposure time: 14 d
Species: Avena sativa (oats)

EC50: >1000 milligram per kilogram

Exposure time: 14 d
Species: Lactuca sativa (lettuce)

NOEC: >=1000 milligram per kilogram
Exposure time: 14 d
Species: Lactuca sativa (lettuce)
Method: OECD Test Guideline 208

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Toxicity to fish : LL50 (Fish): > 100 mg/l
End point: mortality
Exposure time: 96 h
Test substance: Fresh water
Method: OECD Test Guideline 203
Remarks: Information given is based on data obtained from similar substances.

Toxicity to daphnia and other aquatic invertebrates : EL50 (Daphnia magna (Water flea)): 3,7 mg/l
End point: Immobilization
Exposure time: 48 h
Test Type: semi-static test
Test substance: Fresh water
Method: OECD Test Guideline 202
GLP: yes
Remarks: Information given is based on data obtained from similar substances.

Toxicity to algae/aquatic plants : ErC50 (algae): > 100 mg/l
Exposure time: 72 h
Test substance: Fresh water
Method: OECD Test Guideline 201
Remarks: Information given is based on data obtained from similar substances.

NOELR (algae): > 100 mg/l
Exposure time: 72 h
Test substance: Fresh water
Method: OECD Test Guideline 201
Remarks: Information given is based on data obtained from similar substances.

Toxicity to microorganisms : EC50 (activated sludge): > 1 000 mg/l
Exposure time: 3 h
Test substance: Fresh water
Method: OECD Test Guideline 209
Remarks: Information given is based on data obtained from similar substances.

NOEC (activated sludge): 250 mg/l
Exposure time: 3 h
Test substance: Fresh water
Method: OECD Test Guideline 209
Remarks: Information given is based on data obtained from

similar substances.

Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: >= 10 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Test Type: semi-static test Test substance: Fresh water Method: OECD Test Guideline 211
Toxicity to soil dwelling organisms	:	EC50: > 1 000 mg/kg Exposure time: 14 d Species: Eisenia fetida (earthworms) Method: OECD Test Guideline 207 Remarks: Information given is based on data obtained from similar substances.
Plant toxicity	:	EC50: >1000 milligram per kilogram Exposure time: 14 d Species: Avena sativa (oats) Method: OECD Test Guideline 208 NOEC: >=1000 milligram per kilogram Exposure time: 14 d Species: Avena sativa (oats) EC50: >1000 milligram per kilogram Exposure time: 14 d Species: Lactuca sativa (lettuce) NOEC: >=1000 milligram per kilogram Exposure time: 14 d Species: Lactuca sativa (lettuce) Method: OECD Test Guideline 208

4,4'-methylenediphenyl diisocyanate:

Toxicity to fish	:	LC50 (Brachydanio rerio (zebrafish)): > 100 mg/l End point: mortality Exposure time: 96 h Test substance: Fresh water Method: OECD Test Guideline 203
Toxicity to daphnia and other aquatic invertebrates	:	EL50 (Daphnia magna (Water flea)): 9 mg/l End point: Immobilization Exposure time: 48 h Test Type: semi-static test Test substance: Fresh water Method: OECD Test Guideline 202
Toxicity to algae/aquatic plants	:	EC50 (Desmodesmus subspicatus (green algae)): > 100 mg/l Exposure time: 72 h Test Type: static test Test substance: Fresh water Method: OECD Test Guideline 201 GLP: yes

Toxicity to microorganisms	:	EC50 (activated sludge): > 1 000 mg/l Exposure time: 3 h Test Type: static test Method: OECD Test Guideline 209
Toxicity to daphnia and other aquatic invertebrates (Chronic toxicity)	:	NOEC: >= 10 mg/l Exposure time: 21 d Species: Daphnia magna (Water flea) Test Type: semi-static test Test substance: Fresh water Method: OECD Test Guideline 211 Remarks: Information given is based on data obtained from similar substances.
Toxicity to soil dwelling organisms	:	NOEC: >= 1 000 mg/kg Exposure time: 336 h Species: Eisenia fetida (earthworms)
Plant toxicity	:	EC50: >1000 milligram per kilogram Exposure time: 14 d Species: Avena sativa (oats) EC50: >1000 milligram per kilogram Exposure time: 14 d Species: Lactuca sativa (lettuce)

Ecotoxicology Assessment

Acute aquatic toxicity	:	Toxic to aquatic life.

12.2 Persistence and degradability

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Biodegradability	:	Test Type: aerobic Inoculum: Domestic sewage Concentration: 30 mg/l Result: Not biodegradable Biodegradation: 0 % Exposure time: 28 d Method: Inherent Biodegradability: Modified MITI Test (II) Test substance: Fresh water
Biochemical Oxygen Demand (BOD)	:	77 mg/l Incubation time: 28 d Test substance: Fresh water Method: OECD Test Guideline 302C
Stability in water	:	Degradation half life (DT50): 0,8 d (25 °C) Method: No information available. GLP: no Remarks: Fresh water

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Biodegradability	:	Result: Not readily biodegradable. Biodegradation: 0 % Exposure time: 28 d Remarks: Information given is based on data on the components and the ecotoxicology of similar products.
Biochemical Oxygen Demand (BOD)	:	77 mg/l Incubation time: 28 d Remarks: Biochemical Oxygen Demand (BOD)
Stability in water	:	Degradation half life (DT50): < 5 min (20 °C) pH: 4 - 9 Method: OECD Test Guideline 111 Remarks: Information taken from reference works and the literature.

4,4'-methylenediphenyl diisocyanate:

Biodegradability	:	Test Type: aerobic Inoculum: activated sludge, non-adapted Result: Not readily biodegradable. Biodegradation: 0 % Exposure time: 28 d Method: OECD Test Guideline 301F Test substance: Fresh water
Stability in water	:	Degradation half life (DT50): 20 hrs (25 °C) Remarks: Fresh water

12.3 Bioaccumulative potential

Components:

Isocyanic acid, polymethylenepolyphenylene ester:

Bioaccumulation	:	Species: Cyprinus carpio (Carp) Exposure time: 28 d Concentration: 0,08 mg/l Bioconcentration factor (BCF): 200 Test substance: Fresh water Remarks: Based on data from similar materials

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Bioaccumulation	:	Bioconcentration factor (BCF): 200 Method: OECD Test Guideline 305 GLP: yes Remarks: Bioaccumulation is unlikely.
Partition coefficient: n-octanol/water	:	log Pow: 5,2 Method: QSAR

4,4'-methylenediphenyl diisocyanate:

Bioaccumulation	:	Species: Cyprinus carpio (Carp) Exposure time: 28 d Concentration: 0.08 µg/l Bioconcentration factor (BCF): 200 Method: OECD Test Guideline 305 Remarks: Bioaccumulation is unlikely.
Partition coefficient: n-octanol/water	:	log Pow: 4,51 (22 °C) pH: 7 Method: OECD Test Guideline 117

12.4 Mobility in soil

Components:

Reaction mass of 4,4'-methylenediphenyl diisocyanate and o-(p-isocyanatobenzyl)phenyl isocyanate:

Distribution among environmental compartments	:	log Koc: 4,5 Method: QSAR Remarks: Information taken from reference works and the literature.

4,4'-methylenediphenyl diisocyanate:

Distribution among environmental compartments	:	log Koc: 4,5 Method: QSAR
Stability in soil	:	Soil temperature: 22 °C Dissipation time: 24 h Method: OECD Test Guideline 307

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 Endocrine disrupting properties

Product:

Assessment	:	The substance/mixture does not contain components considered to have endocrine disrupting properties according to REACH Article 57(f) or Commission Delegated regulation (EU) 2017/2100 or Commission Regulation (EU) 2018/605 at levels of 0.1% or higher

12.7 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

14.1 UN number or ID number

ADN	:	Not regulated as dangerous goods
ADR	:	Not regulated as dangerous goods
RID	:	Not regulated as dangerous goods
IMDG	:	Not regulated as dangerous goods
IATA	:	Not regulated as dangerous goods

14.2 UN proper shipping name

ADN	:	Not regulated as dangerous goods
ADR	:	Not regulated as dangerous goods
RID	:	Not regulated as dangerous goods
IMDG	:	Not regulated as dangerous goods
IATA	:	Not regulated as dangerous goods

14.3 Transport hazard class(es)

ADN	:	Not regulated as dangerous goods
ADR	:	Not regulated as dangerous goods
RID	:	Not regulated as dangerous goods
IMDG	:	Not regulated as dangerous goods
IATA	:	Not regulated as dangerous goods

14.4 Packing group

ADN	:	Not regulated as dangerous goods
ADR	:	Not regulated as dangerous goods
RID	:	Not regulated as dangerous goods
IMDG	:	Not regulated as dangerous goods
IATA (Cargo)	:	Not regulated as dangerous goods
IATA (Passenger)	:	Not regulated as dangerous goods

14.5 Environmental hazards

Not regulated as dangerous goods

14.6 Special precautions for user

Not applicable

14.7 Maritime transport in bulk according to IMO instruments

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 - List of substances subject to authorisation (Annex XIV)	:	Not applicable
REACH - Candidate List of Substances of Very High Concern for Authorisation (Article 59).	:	This product does not contain substances of very high concern.
REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, mixtures and articles (Annex XVII)	:	Conditions of restriction for the following entries should be considered: Number on list 75, 3 If you intend to use this product as tattoo ink, please contact your vendor. 4,4'-methylenediphenyl diisocyanate (Number on list 74, 56) o-(p-isocyanatobenzyl)phenyl isocyanate (Number on list 74, 56)
Seveso III: Directive 2012/18/EU of the European Parliament and of the Council on the control of major-accident hazards involving dangerous substances.		Not applicable

Other regulations:

Take note of Directive 92/85/EEC regarding maternity protection or stricter national regulations, where applicable.

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
AIIC	:	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	:	All substances listed as active on the TSCA inventory

Inventories

AICS (Australia), AIIC (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

Chemical Safety Assessments for all substances in this product are either Complete or Not applicable.

SECTION 16: Other information

Full text of 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.
H351	:	Suspected of causing cancer.
H373	:	May cause damage to organs through prolonged or repeated exposure.
H373	:	May cause damage to organs through prolonged or repeated exposure if inhaled.

Full text of other abbreviations

Acute Tox.	:	Acute toxicity
Carc.	:	Carcinogenicity
Eye Irrit.	:	Eye irritation
Resp. Sens.	:	Respiratory sensitisation
Skin Irrit.	:	Skin irritation
Skin Sens.	:	Skin sensitisation
STOT RE	:	Specific target organ toxicity - repeated exposure
STOT SE	:	Specific target organ toxicity - single exposure
BE OEL	:	Belgium. Occupational exposure limit values

BE OEL / TLV 8 hr	:	Long term exposure limit

Further information

Other information	:	Liquid decontaminants (percentages by weight or volume) : Decontaminant 1 : *- sodium carbonate : 5 - 10 % *- liquid detergent : 0.2 - 2 % *- water : to make up to 100 % Decontaminant 2 : *- concentrated ammonia solution : 3 - 8 % *- liquid detergent : 0.2 - 2 % *- water : to make up to 100 % Decontaminant 1 reacts slower with diisocyanates but is more environmentally friendly than decontaminant 2. Decontaminant 2 contains ammonia. Ammonia presents health hazards. (See supplier safety information.)

Classification of the mixture:		**Classification procedure:**
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

The information and recommendations in this publication are to the best of our knowledge, information and belief accurate at the date of publication, NOTHING HEREIN IS TO BE CONSTRUED AS A WARRANTY, EXPRESS OR OTHERWISE.

IN ALL CASES, IT IS THE RESPONSIBILITY OF THE USER TO DETERMINE THE APPLICABILITY OF SUCH INFORMATION AND RECOMMENDATIONS AND THE SUITABILITY OF ANY PRODUCT FOR ITS OWN PARTICULAR PURPOSE.

THE PRODUCT MAY PRESENT HAZARDS AND SHOULD BE USED WITH CAUTION. WHILE CERTAIN HAZARDS ARE DESCRIBED IN THIS PUBLICATION, NO GUARANTEE IS MADE THAT THESE ARE THE ONLY HAZARDS THAT EXIST.

Hazards, toxicity and behaviour of the products may differ when used with other materials and are dependent upon the manufacturing circumstances or other processes. Such hazards, toxicity and behaviour should be determined by the user and made known to handlers, processors and end users.