

MATERIAL SAFETY DATA SHEET

1) Identification of the substance/Preparation and Company

1.1 Product Identifier

Trade Name: ENVIROSTIK HARDENER (including Hardener Additive, Multi Purpose Adhesive Hardener Additive, and SPORT-FIX Hardener Additive)

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

Use: Hardener for adhesives
Identified uses according to Regulation (EU) No. 1907/2006 for details refer to the annex of this Safety Data Sheet:
- Industrial use for rigid foam, coatings and adhesives and sealants
- Professional end use in rigid foam, coatings, adhesives and sealants and other composite material

1.3 Supplier: EnviroStik Ltd,
Airfield Industrial Estate
Hixon
Stafford
ST18 OPF
England

Tel: +44 (0)1889 271751
e-mail: enquiries@envirostik.com

1.4 Emergency telephone number

National Chemical Emergency Centre - UK
Tel: +44 1865 407 333

2) Hazards Identification

2.1. Classification of the substance or mixture

Acute toxicity, Inhalative, Category 4 (H332)
Skin irritation, Category 2 (H315)
Eye irritation, Category 2 (H319)
Sensitization of the respiratory airways, Category 1 (H334)
Sensitization of the skin, Category 1 (H317)
Carcinogenicity, Category 2 (H351)
Specific target organ toxicity (single exposure), Category 3 (H335)
Specific target organ toxicity (repeated exposure), Category 2 (H373)

2.2. Label elements

Hazardous components, which must be listed on the label

diphenylmethane-diisocyanate, isomers and homologues
diphenylmethane-4,4'-diisocyanate
Diphenylmethane-2,4'-diisocyanate

Signal words: Danger

Hazard pictograms: GHS07: Exclamation mark GHS08: Health hazard





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:

- P201 Obtain special instructions before use.
- P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
- P280 Wear protective gloves/ protective clothing/ eye protection/ face protection.
- P284 Wear respiratory protection.
- P304 + P340 + P312 IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER/doctor if you feel unwell.
- P308 + P313 IF exposed or concerned: Get medical advice/ attention.

Supplementary hazardous characteristics and labelling elements:

EUH204 Contains isocyanates. May produce an allergic reaction.

2.3. Other hazards

In case of hypersensitivity of the respiratory tract (e.g. asthmatics and those who suffer from chronic bronchitis) it is inadvisable to work with the product.

Symptoms affecting the respiratory tract can also occur several hours after overexposure.

Dust, vapors and aerosols are the primary risk to the respiratory tract.

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.

3) Composition/Information on Ingredients

3.1. Type of product: Mixture

polyisocyanate based on diphenylmethane diisocyanate

Hazardous ingredients:

Diphenylmethane-diisocyanate, isomers and homologues

Concentration [wt.-%]: >= 75 - < 100

Index-No.: 615-005-00-9

CAS-No.: 9016-87-9

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Sens. Resp. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Diphenylmethane-4,4'-diisocyanate

Concentration [wt.-%]: >= 10 - < 20

REACH Registration Number: 01-2119457014-47-0006, 01-2119457014-47-0007, 01-2119457014-47-0008, 01-2119457014-47-0009

CAS-No.: 101-68-8

EINECS-No.: 202-966-0

Index-No.: 615-005-00-9

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Sens. Resp. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Resp. Sens. 1	H334	>= 0.1 %
Eye Irrit. 2	H319	>= 5 %
Skin Irrit. 2	H315	>= 5 %
STOT SE 3	H335	>= 5 %

Diphenylmethane-2,4'-diisocyanate

Concentration [wt.-%]: >= 5 - < 10

REACH Registration Number: 01-2119480143-45-0000, 01-2119480143-45-0001, 01-2119480143-45-0002

CAS-No.: 5873-54-1

EINECS-No.: 227-534-9

Index-No.: 615-005-00-9

Classification (1272/2008/CE): Acute Tox. 4 Inhalative H332 Skin Irrit. 2 H315 Eye Irrit. 2 H319 Sens. Resp. 1 H334 Skin Sens. 1 H317 Carc. 2 H351 STOT SE 3 H335 STOT RE 2 Inhalative H373

Specific threshold concentration (GHS):

Resp. Sens. 1	H334	>= 0.1 %
Eye Irrit. 2	H319	>= 5 %
Skin Irrit. 2	H315	>= 5 %
STOT SE 3	H335	>= 5 %

Candidate List of Substances of Very High Concern for Authorisation

This product contains no substances of very high concern in concentrations where an information obligation applies (REACH Regulation (EC) No. 1907/2006, Article 59).

4) First Aid Measures

4.1. Description of first aid measures

General advice: Soiled, soaked clothing and shoes must be immediately removed, decontaminated and disposed of.

If inhaled: Take the person into the fresh air and keep him warm, let him rest; if there is difficulty in breathing, medical advice is required.

In case of skin contact: In the event of contact with the skin, preferably wash with a cleanser based on polyethylene glycol or with plenty of warm water and soap. Consult a doctor in the event of a skin reaction.

In case of eye contact: Hold the eyes open and rinse with preferably lukewarm water for a sufficiently long period of time (at least 10 minutes). Contact an ophthalmologist.

If swallowed: DO NOT induce vomiting. Wash/clean mouth with water. Medical advice is required.

4.2. Most important symptoms and effects, both acute and delayed

Notes to physician: The product irritates the respiratory tract and may trigger sensitisation of the skin and respiratory tract. Treatment of acute irritation or bronchial constriction is primarily symptomatic. Extended medical treatment may be required depending on the degree of exposure and the severity of the symptoms.

4.3. Indication of any immediate medical attention and special treatment needed

Therapeutic measures: No information available.

5) Fire Fighting Measures

5.1. Extinguishing media

Suitable extinguishing media: Carbon dioxide (CO₂), Foam, extinguishing powder, in cases of larger fires, water spray should be used.

Unsuitable extinguishing media: High volume water jet



5.2. Special hazards arising from the substance or mixture

Exposure hazards: In combustion emits toxic fumes of carbon monoxide, carbon dioxide, oxides of nitrogen, isocyanate vapours and traces of hydrogen cyanide. In the event of fire and/or explosion do not breathe fumes.

Fire in vicinity poses risk of pressure build-up and rupture. Containers at risk from fire should be cooled with water and, if possible, removed from the danger area.

5.3. Advice for fire-fighters:

During fire-fighting respirator with independent air-supply and airtight garment is required.

Do not allow contaminated extinguishing water to enter the soil, ground-water or surface waters.

6) Accidental Release Measures

6.1. Personal precautions, protective equipment and emergency procedures

Personal precautions: Put on protective equipment (see section 8). Ensure adequate ventilation/exhaust extraction. Keep unauthorized persons away.

6.2. Environmental precautions

Environmental precautions: Do not allow to escape into waterways, wastewater or soil.

6.3. Methods and material for containment and cleaning up

Clean-up procedures: Remove mechanically; cover the remainder with wet, absorbent material (e.g. sawdust, chemical binder based on calcium silicate hydrate, sand). After approx. one hour transfer to waste container and do not seal (evolution of CO₂!). Keep damp in a safe ventilated area for several days.

Spill area can be decontaminated with the following recommended decontamination solution:

Decontamination solution 1: 8-10% sodium carbonate and 2% of liquid soap in water

Decontamination solution 2: Liquid/yellow soap (potassium soap with ~15% anionic tenside): 20ml; Water:700ml; Polyethylenglycol (PEG 400): 350ml

Decontamination solution 3: 30 % commercial laundry detergent containing monoethanolamine, 70 % water

6.4. Reference to other sections

Reference to other sections: Refer to section 8 of SDS. For further disposal measures see section 13.

7) Handling and Storage

7.1. Precautions for safe handling

If an annex according to REACH-Regulation (EU) No. 1907/2006 is attached to this MSDS, the general conditions of use are further specified in the corresponding exposure scenarios.

Handling requirements: Provide sufficient air exchange and/or exhaust in work rooms. Exhaust ventilation necessary if product is sprayed. The threshold limit values noted in Chapter 8 must be monitored.

In all areas where isocyanate aerosols and/or vapour concentrations are produced in elevated concentrations, exhaust ventilation must be provided in such a way that the workplace exposure limits (WEL) is not exceeded. The air should be drawn away from the personnel handling the product.

The personal protective measures described in Chapter 8 must be observed. The precautions required in the handling of isocyanates must be taken. Avoid contact with skin and eyes and the inhalation of vapour.

Keep away from foodstuffs, drinks and tobacco. Wash hands before breaks and at end of work and use skin-protecting ointment. Keep working clothes separately. Take off all contaminated clothing immediately. Decontaminate, destroy and dispose of soiled protective clothing (see Section 13)

7.2. Conditions for safe storage, including any incompatibilities

Storage conditions: Store in cool, well ventilated area. Keep container tightly closed and dry.

Suitable packaging: Must only be kept in original packaging.

Storage class (TRGS 510): 10: Combustible liquids

Cleaning with Aprotic Polar Solvents (meeting the IUPAC definition) may lead to formation of (hazardous) primary aromatic amines (> 0,1 %). See section 11.

7.3. Specific end use(s)

Specific end use(s): adhesive hardener

8) Exposure Controls/Personal Protection

If an annex according to Regulation (EU) No. 1907/2006 is attached to this MSDS, the general RMMs are further specified in the corresponding exposure scenarios.

Provide general ventilation.
 Provide suitable exact ventilation.
 Inspect and maintain equipment.
 Hygiene measures:
 Avoid skin and eye contact.
 Wash off skin contamination immediately
 Clear spills immediately
 Provide hazard information and training to personnel

UK Workplace Exposure Limits (WEL), per EH40 document (Health & Safety Executive). If no UK value exists, EU exposure limits given where available.

8.1. Control parameters

Components with workplace control parameters

Substance	CAS-No.	Basis	Type	Value	Ceiling Limit Value	Remarks
diphenylmethane-4,4'-diisocyanate	101-68-8	EH40 WEL	TWA	0.02 mg/m ³		measured as NCO
diphenylmethane-4,4'-diisocyanate	101-68-8	EH40 WEL	STEL	0.07 mg/m ³		measured as NCO
diphenylmethanediisocyanate, isomers and homologues	9016-87-9	EH40 WEL	TWA	0.02 mg/m ³		measured as NCO
diphenylmethanediisocyanate, isomers and homologues	9016-87-9	EH40 WEL	STEL	0.07 mg/m ³		measured as NCO
Diphenylmethane-2,4'-diisocyanate	5873-54-1	EH40 WEL	TWA	0.02 mg/m ³		measured as NCO
Diphenylmethane-2,4'-diisocyanate	5873-54-1	EH40 WEL	STEL	0.07 mg/m ³		measured as NCO
2,2'-Methylenediphenyl diisocyanate	2536-05-2	EH40 WEL	TWA	0.02 mg/m ³		measured as NCO
2,2'-Methylenediphenyl diisocyanate	2536-05-2	EH40 WEL	STEL	0.07 mg/m ³		measured as NCO

The product may contain traces of phenylisocyanate.

Derived No Effect Level (DNEL)**Diphenylmethane-4,4'-diisocyanate**

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects		No hazard identified
Workers	Inhalation	Acute systemic effects		No hazard identified
Workers	Inhalation	Long-term local effects	0.05 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Workers	Inhalation	Acute local effects	0.01 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Workers	Dermal	Long-term systemic effects		No hazard identified
Workers	Dermal	Acute systemic effects		No hazard identified
Workers	Dermal	Long-term local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Workers	Dermal	Acute local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Workers	Eye Contact	Local effects		Medium hazard
Consumers	Inhalation	Long-term systemic effects		No hazard identified
Consumers	Inhalation	Acute systemic effects		No hazard identified
Consumers	Inhalation	Long-term local effects	0.025 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Consumers	Inhalation	Acute local effects	0.05 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Consumers	Dermal	Long-term systemic effects		No hazard identified
Consumers	Dermal	Acute systemic effects		No hazard identified
Consumers	Dermal	Long-term local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Consumers	Dermal	Acute local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Consumers	Oral	Long-term systemic effects		No hazard identified
Consumers	Oral	Acute systemic effects		No hazard identified
Consumers	Eye Contact	Local effects		Medium hazard

Diphenylmethane-2,4'-diisocyanate

Value type	Route of exposure	Health Effects	Value	Remarks
Workers	Inhalation	Long-term systemic effects		No hazard identified
Workers	Inhalation	Acute systemic effects		No hazard identified
Workers	Inhalation	Long-term local effects	0.05 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Workers	Inhalation	Acute local effects	0.01 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Workers	Dermal	Long-term systemic effects		No hazard identified
Workers	Dermal	Acute systemic effects		No hazard identified
Workers	Dermal	Long-term local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)



Workers	Dermal	Acute local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Workers	Eye Contact	Local effects		Medium hazard
Consumers	Inhalation	Long-term systemic effects		No hazard identified
Consumers	Inhalation	Acute systemic effects		No hazard identified
Consumers	Inhalation	Long-term local effects	0.025 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Consumers	Inhalation	Acute local effects	0.05 mg/m3	Most sensitive endpoint: irritation (respiratory tract)
Consumers	Dermal	Long-term systemic effects		No hazard identified
Consumers	Dermal	Acute systemic effects		No hazard identified
Consumers	Dermal	Long-term local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Consumers	Dermal	Acute local effects		Medium hazard Most sensitive endpoint: Sensitisation (skin)
Consumers	Oral	Long-term systemic effects		No hazard identified
Consumers	Oral	Acute systemic effects		No hazard identified
Consumers	Eye Contact	Local effects		Medium hazard

Predicted No Effect Concentration (PNEC)

Diphenylmethane-4,4'-diisocyanate

Freshwater: 1 mg/l
 Marine water: 0.1 mg/l
 Sewage treatment plant: 1 mg/l
 Soil: 1 mg/kg dry weight
 Intermittent use/release: 10mg/l

Diphenylmethane-2,4'-diisocyanate

Freshwater: 1 mg/l
 Marine water: 0.1 mg/l
 Sewage treatment plant: 1 mg/l
 Soil: 1 mg/kg dry weight
 Intermittent use/release: 10mg/l

8.2. Exposure controls

Respiratory protection

Respiratory protection required in insufficiently ventilated working areas and during spraying. An air-fed mask, or for short periods of work, a combination of charcoal filter and particulate filter A2-P2 (EN529) is recommended.

If applicable, further recommendations regarding respiratory protection can be found in the annex.

In case of hypersensitivity of the respiratory tract (e.g. asthmatics and those who suffer from chronic bronchitis) it is inadvisable to work with the product.

Hand protection

Suitable materials for safety gloves; EN 374:

Butyl rubber, nitrile rubber, chloroprene rubber (neoprene).

Notice: suitable materials that provide sufficient protection for industrial cleaning with Aprotic Polar Solvents

(meeting the IUPAC definition): butyl rubber.

When prolonged or frequently repeated contact may occur, a glove with a 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 a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN374) is recommended.

Glove thickness alone is not a good indicator of the level of protection a glove provides against a chemical substance as this level of protection is also highly dependent of the specific composition of the material a glove is fabricated from. The thickness of the glove must depending on model and type of material, generally be more than 0,35 mm to offer sufficient protection for prolonged and frequent contact with the substance. As an exception to this general rule it is known that multilayer laminate gloves may offer prolonged protection at thicknesses less than 0,35 mm. Other glove materials with a thickness of less than 0,35 mm may offer sufficient protection when only brief contact is expected.

Example:

Polychloroprene - CR: thickness $\geq 0,5$ mm; breakthrough time ≥ 480 min.

Nitrile rubber - NBR: thickness $\geq 0,35$ mm; breakthrough time ≥ 480 min.

Butyl rubber - IIR: thickness $\geq 0,5$ mm; breakthrough time ≥ 480 min.

Fluorinated rubber - FKM: thickness $\geq 0,4$ mm; breakthrough time ≥ 480 min.

Recommendation: contaminated gloves should be disposed of.

Eye protection

Use safety glasses with side shields, conforming to EN 166.

Skin and body protection

Use protective clothing (chemically resistant).

In case of hypersensitivity of the skin it is inadvisable to work with the product.

9) Physical and Chemical Properties

9.1. Information on basic physical and chemical properties

Appearance: liquid

Colour: brown

Odour: earthy, musty

Odour Threshold: not established

pH: not measurable

Pour point: ca. -30 °C ISO 3016

Boiling point/boiling range: > 300 °C at 1,013 hPa

Flash point: ca. 229 °C

Evaporation rate: not established

Flammability (solid, gas): not applicable

Burning number: not applicable

Vapour pressure: Diphenyl-methane-diisocyanate, (MDI)

$< 0,00001$ hPa at 20 °C

$< 0,0005$ hPa (50 °C)

For products with a very low vapor pressure, the apparent vapor pressure may exceed the vapor pressure of the pure product due to conditions of manufacturing, storage or transportation, e.g. by solved gases like nitrogen or carbon dioxide:

11 hPa at 20 °C

20 hPa at 50 °C

22 hPa at 55 °C

Vapour density: not established

Density: 1.23 g/cm³ at 20 °C

Miscibility with water: immiscible at 15 °C

Surface tension: not established

Partition coefficient (n-octanol/water): not established

Autoignition temperature: not applicable

Ignition temperature: > 500 °C

Decomposition temperature: not established

Viscosity, dynamic: 145 mPa.s at 20 °C

Explosive properties: not established
Dust explosion class: not applicable
Oxidising properties: not established

9.2 Other information:

The indicated values do not necessarily correspond to the product specification. Please refer to the technical information sheet for specification data.

10) Stability and Reactivity

10.1. Reactivity

Reactivity: Stable under recommended transport or storage conditions.

10.2. Chemical stability

Chemical stability: Polymerises at about 200 °C with evolution of CO₂.

10.3. Possibility of hazardous reactions

Hazardous reactions: Exothermic reaction with amines and alcohols; reacts with water forming CO₂; in closed containers, risk of bursting owing to increase of pressure. Hazardous reactions will not occur under normal transport or storage conditions. Decomposition may occur on exposure to conditions or materials listed below.

10.4. Conditions to avoid

Conditions to avoid: Heat.

10.5. Incompatible materials

Materials to avoid: Strong oxidising agents. Strong acids.

10.6. Hazardous decomposition products

Haz. decomp. products: In combustion emits toxic fumes. No hazardous decomposition products when stored and handled correctly.

11) Toxicological Information

11.1. Information on toxicological effects

Toxicological studies on the product are not yet available.
Please find below the toxicological data available to us for the components (hazardous components).

Acute toxicity, oral:

diphenylmethane-diisocyanate, isomers and homologues
LD50 rat, male: > 10,000 mg/kg
Method: OECD Test Guideline 401

diphenylmethane-4,4'-diisocyanate
LD50 rat, male/female: > 2,000 mg/kg
Method: Directive 84/449/EEC, B.1
Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
LD50 rat, male/female: > 2,000 mg/kg
Method: Directive 84/449/EEC, B.1
Toxicological studies of a comparable product.

Acute toxicity, dermal:

diphenylmethane-diisocyanate, isomers and homologues
LD50 rabbit, male/female: > 9,400 mg/kg

Method: OECD Test Guideline 402

diphenylmethane-4,4'-diisocyanate
LD50 rabbit, male/female: > 9,400 mg/kg
Method: OECD Test Guideline 402
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
LD50 rabbit, male/female: > 9,400 mg/kg
Method: OECD Test Guideline 402
Studies of a comparable product.

Acute toxicity, inhalation:

ATEmix (inhal.): 1.5 mg/l, 4 h
Test atmosphere: dust/mist
Method: Calculation method

diphenylmethane-diisocyanate, isomers and homologues
LC50 rat, male/female: 0.31 mg/l, 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful by inhalation.

Converted acute toxicity point estimate 1.5 mg/l
Test atmosphere: dust/mist
Method: Expert judgement

diphenylmethane-4,4'-diisocyanate
LC50 rat, male: 0.368 mg/l, 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful if inhaled.

Converted acute toxicity point estimate 1.5 mg/l
Test atmosphere: dust/mist
Method: Expert judgement

Diphenylmethane-2,4'-diisocyanate
LC50 rat, male: 0.387 mg/l, 4 h
Test atmosphere: dust/mist
Method: OECD Test Guideline 403
The test atmosphere generated in the animal study is not representative of workplace environments, how the substance is placed on the market, and how it can reasonably be expected to be used. Therefore the test result cannot be directly applied for the purpose of assessing hazard. Based on expert judgment and the weight of the evidence, a modified classification for acute inhalation toxicity is justified.

Assessment: Harmful by inhalation.

Converted acute toxicity point estimate 1.5 mg/l

Test atmosphere: dust/mist
Method: Expert judgement

Primary skin irritation:

diphenylmethane-diisocyanate, isomers and homologues

Species: rabbit

Result: slight irritant

Classification: No skin irritation.

Method: OECD Test Guideline 404

diphenylmethane-4,4'-diisocyanate

Species: rabbit

Result: irritating

Classification: Causes skin irritation.

Method: OECD Test Guideline 404

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Species: rabbit

Result: irritating

Classification: Causes skin irritation.

Method: OECD Test Guideline 404

Toxicological studies of a comparable product.

Primary mucosae irritation:

diphenylmethane-diisocyanate, isomers and homologues

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

diphenylmethane-4,4'-diisocyanate

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Species: rabbit

Result: non-irritant

Method: OECD Test Guideline 405

Toxicological studies of a comparable product.

Sensitisation:

diphenylmethane-diisocyanate, isomers and homologues

Skin sensitisation according to Magnusson/Kligmann (maximizing test):

Species: guinea pig

Result: negative

Classification: Does not cause skin sensitization.

Method: OECD Test Guideline 406

Skin sensitization (local lymph node assay (LLNA)):

Species: mouse

Result: positive

Classification: May cause sensitization by skin contact

Method: OECD Test Guideline 429

Toxicological studies of a comparable product.

Respiratory sensitization

Species: rat

Result: positive

Classification: May cause sensitization by inhalation.



diphenylmethane-4,4'-diisocyanate
Skin sensitisation according to Buehler (epicutaneous test):
Species: guinea pig
Result: negative
Classification: Does not cause skin sensitization
Method: OECD Test Guideline 406

Skin sensitization (local lymph node assay (LLNA)):
Species: mouse
Result: positive
Classification: May cause sensitization by skin contact
Method: OECD Test Guideline 429

Respiratory sensitization
Species: guinea pig
Result: positive
Classification: May cause sensitization by inhalation.

Diphenylmethane-2,4'-diisocyanate
Skin sensitisation according to Buehler (epicutaneous test):
Species: guinea pig
Result: negative
Classification: Does not cause skin sensitization.
Method: OECD Test Guideline 406
Toxicological studies of a comparable product.

Skin sensitization (local lymph node assay (LLNA)):
Species: mouse
Result: positive
Classification: May cause sensitization by skin contact.
Method: OECD Test Guideline 429
Toxicological studies of a comparable product.

Respiratory sensitization
Species: guinea pig
Result: positive
Classification: May cause sensitization by inhalation.
Toxicological studies of a comparable product.

Subacute, subchronic and prolonged toxicity:
diphenylmethane-diisocyanate, isomers and homologues
NOAEL: 0,2 mg/m³
LOAEL (Lowest observable adverse effect level): 1 mg/m³
Application Route: Inhalative
Species: rat, male/female
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Exposure duration: 2 a
Frequency of treatment: 6 hours a day, 5 days a week
Target Organs: Lungs, Nasal inner lining
Test substance: as aerosol
Method: OECD Test Guideline 453
Findings: Irritation to nasal cavity and to lungs.
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate
NOAEL: 0,2 mg/m³
LOAEL (Lowest observable adverse effect level): 1 mg/m³
Application Route: Inhalative
Species: rat, male/female
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Exposure duration: 2 a

Frequency of treatment: 6 hours a day, 5 days a week
Target Organs: Lungs, Nasal inner lining
Test substance: as aerosol
Method: OECD Test Guideline 453
Findings: Irritation to nasal cavity and to lungs.
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
NOAEL: 0,2 mg/m³
LOAEL (Lowest observable adverse effect level): 1 mg/m³
Application Route: Inhalative
Species: rat, male/female
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Exposure duration: 2 a
Frequency of treatment: 6 hours a day, 5 days a week
Target Organs: Lungs, Nasal inner lining
Test substance: as aerosol
Method: OECD Test Guideline 453
Findings: Irritation to nasal cavity and to lungs.
Studies of a comparable product.

Carcinogenicity:

diphenylmethane-diisocyanate, isomers and homologues
Species: rat, male/female
Application Route: Inhalative
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Test substance: as aerosol
Exposure duration: 2 a
Frequency of treatment: 6 hours/day, 5 days/week
Method: OECD Test Guideline 453
Occurrence of tumors in the highest dose group.

diphenylmethane-4,4'-diisocyanate
Species: rat, male/female
Application Route: Inhalative
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Test substance: as aerosol
Exposure duration: 2 a
Frequency of treatment: 6 hours/day, 5 days/week
Method: OECD Test Guideline 453
Occurrence of tumors in the highest dose group.
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
Species: rat, male/female
Application Route: Inhalative
Dose Levels: 0 - 0,2 - 1 - 6 mg/m³
Test substance: as aerosol
Exposure duration: 2 a
Frequency of treatment: 6 hours/day, 5 days/week
Method: OECD Test Guideline 453
Occurrence of tumors in the highest dose group.
Studies of a comparable product.

Reproductive toxicity/Fertility:

diphenylmethane-diisocyanate, isomers and homologues
No data available.

diphenylmethane-4,4'-diisocyanate
No data available.

Diphenylmethane-2,4'-diisocyanate

No data available.

Reproductive toxicity/Teratogenicity:

diphenylmethane-diisocyanate, isomers and homologues

NOAEL (teratogenicity): 12 mg/m³

NOAEL (maternal): 4 mg/m³

NOAEL (developmental toxicity): 4 mg/m³

Species: rat, female

Application Route: Inhalative

Dose Levels: 0 - 1 - 4 - 12 mg/m³

Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))

Test period: 20 d

Test substance: as aerosol

Method: OECD Test Guideline 414

NOAEL (developmental toxicity): 4 mg/m³

Did not show teratogenic effects in animal experiments.

diphenylmethane-4,4'-diisocyanate

NOAEL (teratogenicity): 12 mg/m³

NOAEL (maternal): 4 mg/m³

NOAEL (developmental toxicity): 4 mg/m³

Species: rat, female

Application Route: Inhalative

Dose Levels: 0 - 1 - 4 - 12 mg/m³

Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))

Test period: 20 d

Test substance: as aerosol

Method: OECD Test Guideline 414

NOAEL (developmental toxicity): 4 mg/m³

Did not show teratogenic effects in animal experiments.

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

NOAEL (teratogenicity): 12 mg/m³

NOAEL (maternal): 4 mg/m³

NOAEL (developmental toxicity): 4 mg/m³

Species: rat, female

Application Route: Inhalative

Dose Levels: 0 - 1 - 4 - 12 mg/m³

Frequency of treatment: 6 hours/day (Exposure duration: 10 days (day 6 - 15 p.c.))

Test period: 20 d

Test substance: as aerosol

Method: OECD Test Guideline 414

NOAEL (developmental toxicity): 4 mg/m³

Did not show teratogenic effects in animal experiments.

Studies of a comparable product.

Genotoxicity in vitro:

diphenylmethane-diisocyanate, isomers and homologues

Test type: Salmonella/microsome test (Ames test)

Test system: Salmonella typhimurium

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 471

diphenylmethane-4,4'-diisocyanate

Test type: Salmonella/microsome test (Ames test)

Test system: Salmonella typhimurium

Metabolic activation: with/without

Result: negative

Method: OECD Test Guideline 471

Toxicological studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
Test type: Salmonella/microsome test (Ames test)
Test system: Salmonella typhimurium
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471

Genotoxicity in vivo:

diphenylmethane-diisocyanate, isomers and homologues
Test type: Micronucleus test
Species: rat, male
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)
Result: negative
Method: OECD Test Guideline 474
Toxicological studies of a comparable product.

diphenylmethane-4,4'-diisocyanate
Test type: Micronucleus test
Species: rat, male
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)
Result: negative
Method: OECD Test Guideline 474

Diphenylmethane-2,4'-diisocyanate
Test type: Micronucleus test
Species: rat, male
Application Route: Inhalative (exposure period: 3x1h/day over 3 weeks)
Result: negative
Method: OECD Test Guideline 474
Toxicological studies of a comparable product.

STOT evaluation – one-time exposure:

diphenylmethane-diisocyanate, isomers and homologues
Route of exposure: Inhalation
Target Organs: Respiratory Tract
May cause respiratory irritation.

diphenylmethane-4,4'-diisocyanate
Route of exposure: Inhalation
Target Organs: Respiratory Tract
May cause respiratory irritation.

Diphenylmethane-2,4'-diisocyanate
Route of exposure: Inhalation
Target Organs: Respiratory Tract
May cause respiratory irritation.

STOT evaluation – repeated exposure:

diphenylmethane-diisocyanate, isomers and homologues
Route of exposure: Inhalation
Target Organs: Respiratory Tract
May cause damage to organs through prolonged or repeated exposure.

diphenylmethane-4,4'-diisocyanate
Route of exposure: Inhalation
Target Organs: Respiratory Tract
May cause damage to organs through prolonged or repeated exposure.

Diphenylmethane-2,4'-diisocyanate
Route of exposure: Inhalation
Target Organs: Respiratory Tract



May cause damage to organs through prolonged or repeated exposure.

Aspiration toxicity:

diphenylmethane-diisocyanate, isomers and homologues
Based on available data, the classification criteria are not met.

diphenylmethane-4,4'-diisocyanate
Based on available data, the classification criteria are not met.

Diphenylmethane-2,4'-diisocyanate
Based on available data, the classification criteria are not met.

CMR Assessment:

diphenylmethane-diisocyanate, isomers and homologues
Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).
Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.
Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.
Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

diphenylmethane-4,4'-diisocyanate
Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).
Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.
Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.
Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

Diphenylmethane-2,4'-diisocyanate
Carcinogenicity: Suspected of causing cancer by inhalation (Carc. 2).
Mutagenicity: In vitro and in vivo tests did not show mutagenic effects. Based on available data, the classification criteria are not met.
Teratogenicity: Did not show teratogenic effects in animal experiments. Based on available data, the classification criteria are not met.
Reproductive toxicity/Fertility: Based on available data, the classification criteria are not met.

Toxicology Assessment:

diphenylmethane-diisocyanate, isomers and homologues
Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.
Sensitization: May cause sensitization by inhalation and skin contact.

diphenylmethane-4,4'-diisocyanate
Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.
Sensitization: May cause sensitization by inhalation and skin contact.

Diphenylmethane-2,4'-diisocyanate
Acute effects: Harmful if inhaled. The product causes irritation of eyes, skin and mucous membranes.
Sensitization: May cause sensitization by inhalation and skin contact.

Additional information:

Industrial cleaning with Aprotic Polar Solvents (meeting the IUPAC definition) may lead to formation of (hazardous) primary aromatic amines (> 0.1 %). Primary aromatic amines are chemicals that are regarded as potentially carcinogenic for humans based on animal testing. Some of these chemicals are known human carcinogens. Compliance with the control measures recommended in the exposure scenario is expected to protect against these effects.

Special properties/effects: Over-exposure entails the risk of concentration-dependent irritating effects on eyes, nose throat, and respiratory tract. Delayed appearance of the complaints and development of hypersensitivity (difficult breathing, coughing, asthma) are possible. Hypersensitive persons may suffer from these effects even at low isocyanate concentrations, including concentrations below the UK Workplace Exposure Limit (WEL). Prolonged contact with the skin may cause tanning and irritant effects.

Animal tests and other research indicate that skin contact with diisocyanates can play a role in causing isocyanate sensitization and respiratory reaction.

12) Ecological Information

Ecotoxicological studies of the product are not available.

Do not allow to escape into waterways, wastewater or soil.

Please find below the ecotoxicological data available to us for the components.

12.1. Toxicity

Acute Fish toxicity:

diphenylmethane-diisocyanate, isomers and homologues

LC50 > 1,000 mg/l

Test type: static test

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

diphenylmethane-4,4'-diisocyanate

LC50 > 1,000 mg/l

Test type: Acute Fish toxicity

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

LC50 > 1,000 mg/l

Test type: Acute Fish toxicity

Species: Danio rerio (zebra fish)

Exposure duration: 96 h

Method: OECD Test Guideline 203

Studies of a comparable product.

Chronic Fish toxicity

diphenylmethane-diisocyanate, isomers and homologues

Study scientifically not justified.

diphenylmethane-4,4'-diisocyanate

Study scientifically not justified.

Diphenylmethane-2,4'-diisocyanate

Study scientifically not justified.

Acute toxicity for daphnia:

diphenylmethane-diisocyanate, isomers and homologues

EC50 > 1,000 mg/l

Test type: static test

Species: Daphnia magna (Water flea)

Exposure duration: 24 h
Method: OECD Test Guideline 202

diphenylmethane-4,4'-diisocyanate
EC50 > 1,000 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 24 h
Method: OECD Test Guideline 202
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
EC50 > 1,000 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 24 h
Method: OECD Test Guideline 202
Studies of a comparable product.

Chronic toxicity to daphnia:
diphenylmethane-diisocyanate, isomers and homologues
NOEC (Reproduction) > 10 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 202

diphenylmethane-4,4'-diisocyanate
NOEC (Reproduction) > 10 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 202
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
NOEC (Reproduction) > 10 mg/l
Species: Daphnia magna (Water flea)
Exposure duration: 21 d
Method: OECD Test Guideline 202
Studies of a comparable product.

Acute toxicity for algae:
diphenylmethane-diisocyanate, isomers and homologues
EC50 > 1,640 mg/l
Test type: Growth inhibition
Species: scenedesmus subspicatus
Exposure duration: 72 h
Method: OECD Test Guideline 201

diphenylmethane-4,4'-diisocyanate
EC50 > 1,640 mg/l
Test type: Growth inhibition
Species: scenedesmus subspicatus
Exposure duration: 72 h
Method: OECD Test Guideline 201
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
EC50 > 1,640 mg/l
Test type: Growth inhibition
Species: scenedesmus subspicatus
Exposure duration: 72 h
Method: OECD Test Guideline 201
Studies of a comparable product.

Acute bacterial toxicity:

diphenylmethane-diisocyanate, isomers and homologues
EC50 > 100 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209

diphenylmethane-4,4'-diisocyanate
EC50 > 100 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
EC50 > 100 mg/l
Test type: Respiration inhibition
Species: activated sludge
Exposure duration: 3 h
Method: OECD Test Guideline 209
Studies of a comparable product.

Toxicity to soil dwelling organisms:

diphenylmethane-diisocyanate, isomers and homologues
NOEC (mortality) > 1,000 mg/kg
Species: Eisenia fetida (earthworms)
Exposure duration: 14 d
Method: OECD Test Guideline 207

diphenylmethane-4,4'-diisocyanate
NOEC (mortality) > 1,000 mg/kg
Species: Eisenia fetida (earthworms)
Exposure duration: 14 d
Method: OECD Test Guideline 207
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
NOEC (mortality) > 1,000 mg/kg
Species: Eisenia fetida (earthworms)
Exposure duration: 14 d
Method: OECD Test Guideline 207
Studies of a comparable product.

Toxicity to terrestrial plants:

diphenylmethane-diisocyanate, isomers and homologues
NOEC (seedling emergence) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208

NOEC (Growth rate) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208

NOEC (seedling emergence) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208

NOEC (Growth rate) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208

diphenylmethane-4,4'-diisocyanate
NOEC (seedling emergence) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (Growth rate) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (seedling emergence) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (Growth rate) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate
NOEC (seedling emergence) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (Growth rate) > 1,000 mg/kg
Species: Avena sativa (oats)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (seedling emergence) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

NOEC (Growth rate) > 1,000 mg/kg
Species: Lactuca sativa (lettuce)
Exposure duration: 14 d
Method: OECD Test Guideline 208
Studies of a comparable product.

Ecotoxicology Assessment:

diphenylmethane-diisocyanate, isomers and homologues

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to absorb on soil. The substance is graded as non-critical to soil-dwelling organisms.



Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

diphenylmethane-4,4'-diisocyanate

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to absorb on soil. The substance is graded as non-critical to soil-dwelling organisms.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

Diphenylmethane-2,4'-diisocyanate

Acute aquatic toxicity: Based on available data, the classification criteria are not met.

Chronic aquatic toxicity: There is no evidence of a chronic aquatic toxicity.

Toxicity Data on Soil: Not expected to absorb on soil. The substance is graded as non-critical to soil-dwelling organisms.

Impact on Sewage Treatment: Because of the low bacterial toxicity, there is no risk of an adverse effect on the performance of biological waste water treatment plants.

12.2 Persistence and degradability

Biodegradability:

diphenylmethane-diisocyanate, isomers and homologues

Test type: aerobic

Inoculum: activated sludge

Biodegradation: 0 %, 28 d, Not inherently degradable.

Method: OECD Test Guideline 302 C

According to the results of tests of biodegradability this product is not readily biodegradable.

diphenylmethane-4,4'-diisocyanate

Biodegradation: 0 %, 28 d, Not inherently biodegradable.

Method: OECD Test Guideline 302 C

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Biodegradation: 0 %, 28 d, Not inherently biodegradable.

Method: OECD Test Guideline 302 C

Studies of a comparable product.

Stability in water:

diphenylmethane-diisocyanate, isomers and homologues

Test type: Hydrolysis

Half life: 20 h at 25 °C

The substance hydrolyzes rapidly in water.

Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate

Test type: Hydrolysis

Half life: 20 h at 25 °C

The substance hydrolyzes rapidly in water.

Studies of a comparable product.

Diphenylmethane-2,4'-diisocyanate

Test type: Hydrolysis

Half life: 20 h at 25 °C

The substance hydrolyzes rapidly in water.

Studies of a comparable product.

Photodegradation:

diphenylmethane-diisocyanate, isomers and homologues

Test type: Phototransformation in air

Temperature: 25 °C

sensitizer: OH-radicals
Concentration sensibilisator: 500,000 1/cm³
Half-life indirect photolysis: 0.92 d
Method: SRC - AOP (calculation)
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.
Studies of a comparable product.

diphenylmethane-4,4'-diisocyanate
Test type: Phototransformation in air
sensitizer: OH-radicals
Concentration sensibilisator: 500,000 1/cm³
Rate constant: 1.16E-11 cm³/s
Half-life indirect photolysis: 0.92 d
Method: SRC - AOP (calculation)
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

Diphenylmethane-2,4'-diisocyanate
Test type: Phototransformation in air
sensitizer: OH-radicals
Concentration sensibilisator: 500,000 1/cm³
Rate constant: 1.16E-11 cm³/s
Half-life indirect photolysis: 0.92 d
Method: SRC - AOP (calculation)
After evaporation or exposure to the air, the product will be moderately degraded by photochemical processes.

Volatility (Henry's Law constant):

diphenylmethane-4,4'-diisocyanate
Calculated value = 0.0229 Pa*m³/mol
The substance has to be scored as being slightly volatile from water.

Diphenylmethane-2,4'-diisocyanate
Calculated value = 0.0229 Pa*m³/mol
The substance has to be scored as being slightly volatile from water.

12.3. Bioaccumulative potential

Bioaccumulation:

diphenylmethane-diisocyanate, isomers and homologues
Bioconcentration factor (BCF): < 14
Species: Cyprinus carpio (Carp)
Exposure duration: 42 d
Concentration: 0.2 mg/l
Method: OECD Test Guideline 305 C
An accumulation in aquatic organisms is not to be expected.
The substance hydrolyzes rapidly in water.
Studies of hydrolysis products.

diphenylmethane-4,4'-diisocyanate
Bioconcentration factor (BCF): 200
Species: Cyprinus carpio (Carp)
Exposure duration: 28 d
Concentration: 0.00008 mg/l
Test substance: 14C-labelled
Method: OECD Test Guideline 305 E
An accumulation in aquatic organisms is not to be expected.

Diphenylmethane-2,4'-diisocyanate
Bioconcentration factor (BCF): 200
Species: Cyprinus carpio (Carp)

Exposure duration: 28 d
Concentration: 0.00008 mg/l
Test substance: 14C-labelled
Method: OECD Test Guideline 305 E
An accumulation in aquatic organisms is not to be expected.
Studies of a comparable product.

12.4. Mobility in soil

Distribution among environmental compartments:

diphenylmethane-4,4'-diisocyanate
Adsorption/Soil
not applicable

Diphenylmethane-2,4'-diisocyanate
Adsorption/Soil
not applicable

Environmental distribution:

diphenylmethane-diisocyanate, isomers and homologues
no data available

diphenylmethane-4,4'-diisocyanate
no data available

Diphenylmethane-2,4'-diisocyanate
no data available

12.5. Results of PBT and vPvB assessment

diphenylmethane-diisocyanate, isomers and homologues
This substance does not meet the criteria for classification as PBT or vPvB.

diphenylmethane-4,4'-diisocyanate
This substance does not meet the criteria for classification as PBT or vPvB.

Diphenylmethane-2,4'-diisocyanate
This substance does not meet the criteria for classification as PBT or vPvB.

12.6. Other adverse effects

The product reacts with water at the interface forming CO₂ and a solid insoluble product with high melting point (polyurea). This reaction is accelerated by surfactants (e.g. detergents) or by watersoluble solvents. Previous experience shows that polyurea is inert and non-degradable.

13) Disposal Considerations

Dispose in accordance with applicable international, national and local laws, ordinances and statutes.

For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

13.1. Waste treatment methods

Waste treatment methods

After final product withdrawal, all residues must be removed from containers (drip-free, powder free or paste-free). Once the product residues adhering to the walls of the containers have been rendered harmless, the product and hazard labels must be invalidated. These containers can be returned for recycling to the appropriate centres set up within the framework of the existing take-back scheme of the chemical industry. Containers must be recycled in compliance with national legislation and environmental regulations.

None disposal into waste water.



Disposal operations: Transfer to a suitable container and arrange for collection by specialised disposal company.

Disposal of packaging: Arrange for disposal by a licenced waste disposal company

NB: The user's attention is drawn to the possible existence of regional or national regulations regarding disposal. For disposal within the EC, the appropriate code according to the European Waste Catalogue (EWC) should be used.

14) Transport Information

Transport class: This product does not require a classification for transport.

ADR/RID

14.1 UN number : Not dangerous goods
 14.2 UN proper shipping name : Not dangerous goods
 14.3 Transport hazard class(es) : Not dangerous goods
 14.4 Packing group : Not dangerous goods
 14.5 Environmental hazards : Not dangerous goods

ADN

14.1 UN number : Not dangerous goods
 14.2 UN proper shipping name : Not dangerous goods
 14.3 Transport hazard class(es) : Not dangerous goods
 14.4 Packing group : Not dangerous goods
 14.5 Environmental hazards : Not dangerous goods

IATA

14.1 UN number : Not dangerous goods
 14.2 UN proper shipping name : Not dangerous goods
 14.3 Transport hazard class(es) : Not dangerous goods
 14.4 Packing group : Not dangerous goods
 14.5 Environmental hazards : Not dangerous goods

IMDG

14.1 UN number : Not dangerous goods
 14.2 UN proper shipping name : Not dangerous goods
 14.3 Transport hazard class(es) : Not dangerous goods
 14.4 Packing group : Not dangerous goods
 14.5 Environmental hazards : Not dangerous goods

14.6 Special precautions for user

See sections 6 -8.

Additional information: Not dangerous cargo.
 Keep dry. Avoid heat above +40 °C.
 Avoid temperatures below +10 °C.
 Keep away from foodstuffs, acids and alkalis.

15) Regulatory Information

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

Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances.
 not applicable



REACH - Restrictions on the manufacture, placing on the market and use of certain dangerous substances, preparations and articles (Annex XVII)

Conditions of restriction for the following entries should be considered: 3, 56, 56

This product contains substances subject to EU Regulation 1907/2006 (REACH), Annex XVII.

diphenylmethane-4,4'-diisocyanate
CAS-No.: 101-68-8, EC-No.: 202-966-0
Subject to REACH Annex XVII, No. 56

Diphenylmethane-2,4'-diisocyanate
CAS-No.: 5873-54-1
Subject to REACH Annex XVII, No. 56

Water contaminating class (Germany)

1 slightly water endangering
(in accordance with Annex 4 to the Directive on Water-Hazardous Substances)

Any existing national regulations on the handling of isocyanates must be observed.

15.2. Chemical Safety Assessment

Chemical safety assessment: A chemical safety assessment has been carried out for:

diphenylmethane-4,4'-diisocyanate
Diphenylmethane-2,4'-diisocyanate

16) Other Information

Full text of hazardous (H) warnings of the CLP classification (1272/2008/CE) referred to under sections 2, 3 and 10.

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.

ISOPA directives for safe loading/unloading, transport and storage of TDI and MDI. See ISOPA website: www.isopa.org (Product Stewardship "Walk the Talk").

Legal disclaimer:

This product is for professional use only and should be used as directed by EnviroStik Ltd. For further information consult the application data sheet.
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The company shall not be held liable for any damage resulting from handling or from contact with the above product.

This version replaces all previous versions.

Annex - Exposure Scenario

1. Short title of Exposure Scenario

- Professional end use in adhesives and sealants and other composite material

Sector of use : Industrial uses: Uses of substances as such or in preparations at industrial sites (SU 3)

Professional uses: Public domain (administration, education, entertainment services, craftsmen) (SU 22)

Process category : Use in closed, continuous process with occasional controlled exposure (PROC2), Use in closed batch process (synthesis or formulation) (PROC3), Use in batch and other process (synthesis) where opportunity for exposure arises (PROC4), Mixing or blending in batch processes for formulation of preparations and articles (multistage and/ or significant contact) (PROC5), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at non-dedicated facilities (PROC8a), Transfer of substance or preparation (charging/ discharging) from/ to vessels/ large containers at dedicated facilities (PROC8b), Roller application or brushing (PROC10), Treatment of articles by dipping and pouring (PROC13), Production of preparations or articles by tableting, compression, extrusion, palletisation (PROC14).

Environmental release category:

Industrial use resulting in inclusion into or onto a matrix (ERC5), Wide dispersive indoor use resulting in inclusion into or onto a matrix (ERC8c), Wide dispersive outdoor use resulting in inclusion into or onto a matrix (ERC8f).

Lead substances for the respective exposure routes:

Priority substance(s), Respiratory sensitiser: - diphenylmethane-diisocyanate, isomers and homologues For RMMs see chapter 8 of the SDS. diphenylmethane-4,4'-diisocyanate

Lead substance(s), Oral: - diphenylmethane-diisocyanate, isomers and homologues For RMMs see chapter 8 of the SDS. diphenylmethane-4,4'-diisocyanate

Lead substance(s), Inhalative: - diphenylmethane-4,4'-diisocyanate

Lead substance(s), Dermal: - diphenylmethane-diisocyanate, isomers and homologues For RMMs see chapter 8 of the SDS. diphenylmethane-4,4'-diisocyanate

Lead substance(s), Eyes: - diphenylmethane-diisocyanate, isomers and homologues For RMMs see chapter 8 of the SDS. diphenylmethane-4,4'-diisocyanate

Lead substance(s), aquatic environment: - Not relevant

2. Description of activities/process(es) covered in the Exposure Scenario

Only the uses defined in the short title and the use descriptors listed in 1 above are regarded as safe/covered within this Exposure Scenario.

3. Operational conditions

Indoor/Outdoor use

Duration and frequency

Workers

Covers daily exposures up to 8 hours (unless stated differently).

Environment

Emission days per year: 365

4.1 Physical form

Liquid substance (unless stated differently)

Biodegradability: Not biodegradable

4.2 Concentration of substance in the mixture

Covers the percentage of the substance in the product up to 100 % (unless stated differently).



5. Other operational conditions

Used in open systems
Dry processes

Human factors not influenced by risk management

None identified for this scenario.

Environmental factors not influenced by risk management

Local freshwater dilution factor: 10 (default, used in calculation of worst case scenarios)
Local marine water dilution factor: 100 (default, used in calculation of worst case scenarios)

6. Risk Management Measures

6.1.1 Occupational measures

These measures are for all contributing scenarios at product temperatures BELOW 40 °C for pure MDI or BELOW 45 °C for other MDI based substances:

Technical protective measures: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour).

Personal protective measures: Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin.

These measures are for all contributing scenarios at product temperatures ABOVE 40 °C for pure MDI or ABOVE 45 °C for other MDI based substances:

Technical protective measures: Provide a good standard of general ventilation (not less than 3 to 5 air changes per hour). Provide extraction ventilation at points where emissions occur. Provide extract ventilation to material transfer points and other openings. Handle in a fume cupboard or under extract ventilation.

Personal protective measures: Avoid all skin contact with product, clean up contamination/spills as soon as they occur. Wear gloves (tested to EN374) if hand contamination likely, wash off any skin contamination immediately. Provide basic employee training to prevent / minimize exposures and to report any skin problems that may develop. Use suitable eye protection and gloves. Wear suitable coveralls to prevent exposure to the skin. If above technical/organisational control measures are not feasible, then adopt following PPE: Wear a respirator conforming to EN140 with Type A filter or better.

Additional measures are specific for the following contributing scenarios:

6.1.2 Consumer related measures

No consumer uses identified.

6.2 Environment related measures

- Fraction of emissions to the different environmental compartments:

Release fraction to air from process:

0.15

Release fraction to wastewater from process:

0.01

Release fraction to soil from process (regional only):

0.005

- Technical conditions and measures at process level (source) to prevent release:

Common practices vary across sites thus conservative process release estimates used.

- Technical onsite conditions and measures to reduce or limit discharges, air emissions and releases to soil:

Air: No air emission controls required; required removal efficiency is 0%.

Soil: Soil emission controls are not applicable as there is no direct release to soil.

- Organizational measures to prevent/limit release from site:

Water: Prevent discharge of undissolved substance to or recover from wastewater.

Safety Data Sheet according to Regulation (EU) No. 1907/2006

- Conditions and measures related to municipal sewage treatment plant:

Estimated substance removal from wastewater via domestic sewage treatment is 40%.

Assumed domestic sewage treatment plant effluent flow is 2000 m³/d.

Sludge should be incinerated, contained or reclaimed for incineration.

7. Waste related measures

Not applicable.

8. Prediction of exposure

8.1. Health

RMM efficiencies for inhalation exposure:

Local exhaust ventilation: Variable, reflected in measured data.

Short term exposure:

Workers (inhalation)

Method: Measured data has been used for estimation

PROC 2 : 0.026 mg/m³
PROC 3 : 0.018 mg/m³
PROC 4 : 0.016 mg/m³
PROC 5 : 0.058 mg/m³
PROC 8a : 0.058 mg/m³
PROC 8b : 0.058 mg/m³
PROC 10 : 0.034 mg/m³

Indoor use

PROC 10 : 0.034 mg/m³

Outdoor use

PROC 13 : 0.035 mg/m³
PROC 14 : 0.012 mg/m³

Workers (dermal)

Method: Qualitative approach used to conclude safe use.

Due to the applied RMMs it is considered that the risks of dermal exposure are sufficiently controlled.

Long term exposure:

Workers (inhalation)

Method: Measured data has been used for estimation

PROC 2 : 0.013 mg/m³
PROC 3 : 0.009 mg/m³
PROC 4 : 0.008 mg/m³
PROC 5 : 0.029 mg/m³
PROC 8a : 0.029 mg/m³
PROC 8b : 0.029 mg/m³
PROC 10 : 0.017 mg/m³

Indoor use

PROC 10 : 0.017 mg/m³

Outdoor use

PROC 13 : 0.017 mg/m³
PROC 14 : 0.006 mg/m³

Workers (dermal)

Method: Qualitative approach used to conclude safe use.

Due to the applied RMMs it is considered that the risks of dermal exposure are sufficiently controlled.

8.2. Environment

Method: Used EUSES model

PEC

Air : Not relevant
Freshwater : 0.056 mg/l
(adhesives and sealants)
Marine water : 0.00869 mg/l
(adhesives and sealants)



Sediment : Not relevant
Soil : 0.271 mg/kg dry weight
STP (sewage-treatment plant) : 0.492 mg/l
(adhesives and sealants)
Secondary poisoning : Not relevant
Humans via the environment : Not relevant

Based on the applied RMMs the risk towards humans and the environment is sufficiently controlled (RCR \leq 1).

9. Guidance to downstream user

Predicted exposures are not expected to exceed the DN(M)EL when the Risk Management Measures/Operational Conditions outlined in Section 6 are implemented.

Where other Risk Management Measures/Operational Conditions are adopted, then users should ensure that risks are managed to at least equivalent levels.

Further information on the assumptions contained in this Exposure Scenario can be found at: www.ISOPA.org