

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

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
2,2'-Methylenediphenyl 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:

P260 Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
 P280: Wear protective gloves/protective clothing/eye protection/face protection.
 P302+352: IF ON SKIN: Wash with plenty of soap and water.
 P304 + P340 IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
 P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
 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

No information available.

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

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

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-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.-%]: $\geq 5 - < 10$
 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 $\geq 0.1 \%$
 Eye Irrit. 2 H319 $\geq 5 \%$
 Skin Irrit. 2 H315 $\geq 5 \%$
 STOT SE 3 H335 $\geq 5 \%$

2,2'-Methylenediphenyl diisocyanate
 Concentration [wt.-%]: $\geq 1 - < 5$
 REACH Registration Number: 01-2119927323-43-0000, 01-2119927323-43-0001
 CAS-No.: 2536-05-2
 EINECS-No.: 219-799-4
 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 $\geq 0.1 \%$
 Eye Irrit. 2 H319 $\geq 5 \%$
 Skin Irrit. 2 H315 $\geq 5 \%$
 STOT SE 3 H335 $\geq 5 \%$

4) First Aid Measures

4.1. Description of first aid measures

Skin contact: Remove all contaminated clothes and footwear immediately unless stuck to skin. Wash immediately with plenty of soap and water.
Eye contact: Bathe the eye with running water for 15 minutes. Consult a doctor.
Ingestion: Wash out mouth with water. Consult a doctor.
Inhalation: Remove casualty from exposure ensuring one's own safety whilst doing so.

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

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 them warm, let them 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 the patient to vomit, medical advice is required.

Delayed / immediate effects: Immediate effects can be expected after short-term exposure.

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

Immediate / special treatment: Eye bathing equipment should be available on the premises.

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.



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.

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.

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

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.

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

Exposition assessment value (EBW) per TGRS 430: Polyisocyanate content (MDI oligomers and/or prepolymers) 45 %. Use an exposition assessment value of 0,05 mg/m³.

The product may contain traces of phenylisocyanate.

Derived No Effect Level (DNEL) or Derived Minimal Effect Level (DMEL):

Diphenylmethane-4,4'-diisocyanate

Worker (short-term)

DNEL Dermal – systematic effects: 50 mg/Kg body weight/day

DNEL Inhalation – systematic effects: 0.1 mg/m³ air

DNEL Dermal - local effects: 28.7 mg/cm²

DNEL Inhalation - local effects: 0.1 mg/m³ air

Worker (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.

DNEL Inhalation - systemic effects: 0.05 mg/m³ air

DNEL Dermal - local effects: No quantitative risk assessment possible.

DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (short-term)

DNEL Dermal – systematic effects: 25 mg/Kg body weight/day

DNEL Inhalation – systematic effects: 0.05 mg/m³ air

DNEL Oral – systematic effects: 20 mg/Kg body weight/day

DNEL Dermal - local effects: 17.2 mg/cm²

DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.

DNEL Inhalation - systemic effects: 0.025 mg/m³ air
DNEL Oral - systematic effects: No quantitative risk assessment possible.
DNEL Dermal - local effects: No quantitative risk assessment possible.
DNEL Inhalation - local effects: 0.025 mg/m³ air

Diphenylmethane-2,4'-diisocyanate

Worker (short-term)

DNEL Dermal – systematic effects: 50 mg/Kg body weight/day
DNEL Inhalation – systematic effects: 0.1 mg/m³ air
DNEL Dermal - local effects: 28.7 mg/cm²
DNEL Inhalation - local effects: 0.1 mg/m³ air

Worker (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.
DNEL Inhalation - systemic effects: 0.05 mg/m³ air
DNEL Dermal - local effects: No quantitative risk assessment possible.
DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (short-term)

DNEL Dermal – systematic effects: 25 mg/Kg body weight/day
DNEL Inhalation – systematic effects: 0.05 mg/m³ air
DNEL Oral – systematic effects: 20 mg/Kg body weight/day
DNEL Dermal - local effects: 17.2 mg/cm²
DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.
DNEL Inhalation - systemic effects: 0.025 mg/m³ air
DNEL Oral - systematic effects: No quantitative risk assessment possible.
DNEL Dermal - local effects: No quantitative risk assessment possible.
DNEL Inhalation - local effects: 0.025 mg/m³ air

2,2'-Methylenediphenyl diisocyanate

Worker (short-term)

DNEL Dermal – systematic effects: 50 mg/Kg body weight/day
DNEL Inhalation – systematic effects: 0.1 mg/m³ air
DNEL Dermal - local effects: 28.7 mg/cm²
DNEL Inhalation - local effects: 0.1 mg/m³ air

Worker (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.
DNEL Inhalation - systemic effects: 0.05 mg/m³ air
DNEL Dermal - local effects: No quantitative risk assessment possible.
DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (short-term)

DNEL Dermal – systematic effects: 25 mg/Kg body weight/day
DNEL Inhalation – systematic effects: 0.05 mg/m³ air
DNEL Oral – systematic effects: 20 mg/Kg body weight/day
DNEL Dermal - local effects: 17.2 mg/cm²
DNEL Inhalation - local effects: 0.05 mg/m³ air

General Population (long-term)

DNEL Dermal - systemic effects: No quantitative risk assessment possible.
DNEL Inhalation - systemic effects: 0.025 mg/m³ air
DNEL Oral - systematic effects: No quantitative risk assessment possible.
DNEL Dermal - local effects: No quantitative risk assessment possible.
DNEL Inhalation - local effects: 0.025 mg/m³ air

Predicted No Effect Concentration (PNEC):

Diphenylmethane-4,4'-diisocyanate

Freshwater: > 1 mg/l

Marine water: > 0.1 mg/l

Sediment: Not relevant

Soil: > 1 mg/kg dry weight

STP (sewage-treatment plant): > 1 mg/l

Oral: Not relevant



Diphenylmethane-2,4'-diisocyanate
Freshwater: > 1 mg/l
Marine water: > 0.1 mg/l
Sediment: Not relevant
Soil: > 1 mg/kg dry weight
STP (sewage-treatment plant): > 1 mg/l
Oral: Not relevant

2,2'-Methylenediphenyl diisocyanate
Freshwater: > 1 mg/l
Marine water: > 0.1 mg/l
Sediment: Not relevant
Soil: > 1 mg/kg dry weight
STP (sewage-treatment plant): > 1 mg/l
Oral: Not relevant

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 is recommended.

Further recommendations regarding respiratory protection can be found in the individual exposure scenarios in the appendix.

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:

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

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

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

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

Recommendation: contaminated gloves should be disposed of.

Eye protection:

Wear eye/face protection.

Skin and body protection:

Wear suitable protective clothing.

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 applicable

Pour point: ca. $-30\text{ }^{\circ}\text{C}$ ISO 3016

Boiling point/boiling range: $> 300\text{ }^{\circ}\text{C}$ at 1,013 hPa

Flash point: ca. $229\text{ }^{\circ}\text{C}$

Evaporation rate: not established

Flammability (solid, gas): not applicable

Burning number: not applicable

Vapour pressure: ca. 11 hPa at $20\text{ }^{\circ}\text{C}$

ca. 20 hPa at $50\text{ }^{\circ}\text{C}$

ca. 22 hPa at $55\text{ }^{\circ}\text{C}$

Diphenyl-methane-diisocyanate (MDI) $< 0,00001\text{ hPa}$ at $20\text{ }^{\circ}\text{C}$

Vapour density: not established

Density: ca. 1.23 g/cm^3 at $20\text{ }^{\circ}\text{C}$ DIN 51757



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 DIN 51794
Decomposition temperature: not established
Viscosity, dynamic: ca. 145 mPa.s at 20 °C DIN 53019
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.

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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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

2,2'-Methylenediphenyl diisocyanate

LC50 rat, male: 0.527 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

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.

2,2'-Methylenediphenyl diisocyanate
Species: rabbit
Result: slight irritant
Classification: No 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.

2,2'-Methylenediphenyl diisocyanate
Species: rabbit
Result: slight irritant
Classification: No eye irritation
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.

2,2'-Methylenediphenyl diisocyanate
Species: mouse
Result: positive
Classification: May cause sensitization by skin contact.
Method: OECD Test Guideline 429
Studies on the 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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

2,2'-Methylenediphenyl diisocyanate
Test type: Salmonella/microsome test (Ames test)
Test system: Salmonella typhimurium
Metabolic activation: with/without
Result: negative
Method: OECD Test Guideline 471
Studies on the product.

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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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:

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.

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.

2,2'-Methylenediphenyl 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.

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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl diisocyanate
EC50 > 100 mg/l
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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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

2,2'-Methylenediphenyl 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

2,2'-Methylenediphenyl 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.

2,2'-Methylenediphenyl 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 temperatures below +10 °C.
Avoid heat above +50 °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

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

2,2'-Methylenediphenyl 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 Guidelines for safe loading/unloading, transport and storage of TDI and MDI. ISOPA
Order No.: PSC-0005-GUIDL

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.