

SAFETY INFORMATION

Properties, Hazards and Safety Information for MDI

(For more details see the supplier's Safety Data Sheet)

Products: **Monomeric MDI** (M)
Polymeric MDI, "PMDI" (P)

(M)	Diphenylmethane-4,4'-diisocyanate CAS No.: 101-68-8
(P)	Diphenylmethane diisocyanate, isomers and homologues CAS No.: 9016-87-9

Typical Physical and Chemical Data

	Monomeric	Polymeric
Appearance	Crystalline solid at 20°C and 1013 hPa	Viscous liquid
Colour	White	Brown*
Odour	Slightly musty	Slightly musty
Specific gravity (EEC A3 method)	1.32 (at 20 °C) 1.20 (at 50 °C)	1.24 (at 20 °C)*
Viscosity	4.7 mPas (at 50 °C)	200 mPas (at 25 °C)*
Vapour density	8.5 (air = 1)	8.5 (air = 1)
Vapour pressure	approx. 6.2×10^{-6} hPa (at 20 °C)	7×10^{-6} hPa (at 20 °C)
Saturated vapour concentration	1,5 mg/m ³ (calculated at 45 °C)	<0,15 mg/m ³ (calculated at 25 °C)
Solubility in water	Not soluble; reacts with water and generates CO ₂	Not soluble; reacts with water and generates CO ₂
Boiling point (EEC A2 method)	>300 °C (at 1013 hPa) decomposes/polymerises	>300 °C (at 1011 hPa) decomposes/polymerises
Freezing/ melting point	41 ± 2 °C	0 °C
Flash point	>211 °C (at 1013 hPa) (EEC A9 method)	>208 °C
Auto-ignition Temperature (EEC A15 method)	>600 °C	>600 °C
Explosion limits (upper and lower)	Not applicable	Not applicable
Thermal degradation	>230 °C	>230 °C
Hazardous degradation products	CO, CO ₂ , NO _x , HCN and other toxic products	
Hazardous reactions with	Water, alcohols, amines, acids, bases	

* To be specified by producer



CLASSIFICATION AND LABELLING ACCORDING TO REGULATION (EC) No 1272/2008 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 16 December 2008 on classification, labelling and packaging of substances and mixtures, as amended up to third Adaptation to Technical Progress COMMISSION REGULATION (EU) No 618/2012

Signal Word

Danger

Labelling

Hazard symbol	GHS07: exclamation mark	
	GHS08: health hazard	
Chemical name	Diphenylmethane-4,4'-diisocyanate (M) or Diphenylmethanediisocyanate, isomers and homologues (P)	

Hazard Statements

H351	Suspected of causing cancer.
H332	Harmful if inhaled.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H315	Causes skin irritation.
H334	May cause allergy to asthma symptoms or breathing difficulties if inhaled.
H317	May cause an allergic skin reaction.
H373	May cause damage to respiratory system through prolonged or repeated exposure by inhalation

Precautionary Statements

P260	Do not breathe dust, vapour or spray.
P280	Wear protective gloves/protective clothing/eye protection.
P285	In case of inadequate ventilation wear respiratory protection.
P302+P352	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.
P309+P311	IF exposed or if you feel unwell: Call a POISON CENTER or doctor/physician.

Additional labeling requirements (CLP supplemental hazard statement):

EUH204	Contains isocyanates. May produce an allergic reaction.
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Toxicology / Health Hazard Data

Short-Term Exposure

Inhalation	LC ₅₀ (rat): ca. 490 mg/m ³ (4 hours): using experimentally produced respirable aerosol having aerodynamic diameter <5 microns. This product is a respiratory irritant and potential respiratory sensitizer: repeated inhalation of vapour or aerosol at levels above the occupational exposure limit could cause respiratory sensitization. Symptoms may include irritation to the eyes, nose, throat and lungs, possibly combined with dryness of the throat, tightness of chest and difficulty in breathing. The onset of the respiratory symptoms may be delayed for several hours after exposure. A hyper-reactive response to even minimal concentrations of MDI may develop in sensitized persons.
Eye contact	May cause slight to moderate irritation and reversible corneal injury.
Skin contact	Dermal LD ₅₀ (rabbit) >9400 mg/kg. Irritation to skin. May cause sensitization by skin contact. Animal studies have shown respiratory sensitization can be induced by skin contact with known respiratory sensitizers including diisocyanates. These results emphasize the need for protective clothing including gloves to be worn at all times when handling these chemicals or in maintenance work.
Ingestion	Single dose oral toxicity is low: LD ₅₀ (oral rat) : >10000 mg/kg (PMDI). Ingestion may cause irritation to the gastro-intestinal tract.

Repeated and long-term exposure

Inhalation	May cause sensitisation by inhalation. Chronic exposure by inhalation may result in permanent decrease in lung function.
Skin contact	May cause sensitisation by skin contact.
Carcinogenicity	Rats have been exposed for two years to a respirable aerosol of polymeric MDI which resulted in chronic pulmonary irritation at high concentrations. Only at the top level (6 mg/m ³), there was a significant incidence of a benign tumour of the lung (adenoma) and one malignant tumour (adenocarcinoma). There were no lung tumours at 1 mg/m ³ and no effects at 0.2 mg/m ³ . Overall, the tumour incidence, both benign and malignant, and the number of animals with the tumours were not different from controls. The increased incidence of lung tumours is associated with prolonged respiratory irritation and the concurrent accumulation of yellow material in the lung, which occurred throughout the study. In the absence of prolonged exposure to high concentrations leading to chronic irritation and lung damage, it is highly unlikely that tumour formation will occur.
Reproductive toxicity	No birth defects were seen in two independent animal (rat) studies. Fetotoxicity was observed at doses that were extremely toxic (including lethal) to the mother. Fetotoxicity was not observed at doses that were not maternally toxic. The doses used in these studies were maximal, respirable concentrations, which are well in excess of defined occupational exposure limits.

First Aid Procedures

Inhalation	If inhaled, remove to fresh air. If not breathing, give artificial respiration. Get medical attention immediately. Treatment is symptomatic for primary irritation or bronchospasm. If breathing is laboured, oxygen should be administered by qualified personnel.
Eye contact	In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.
Skin contact	After contact with skin, wash immediately with plenty of warm soapy water. Get medical attention if irritation develops. Wash clothing before reuse. Clean shoes thoroughly before reuse. An MDI study has demonstrated that a polyglycol-based skin cleanser (such as D-Tam™, PEG-400) or corn oil may be more effective than soap and water.
Ingestion	Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Provided the patient is conscious, wash out mouth with water. Get medical attention if symptoms appear.

Ecology

Ecotoxicology	<p>The measured ecotoxicity is that of the hydrolysed product, generally under conditions maximising production of soluble species. Even so, the observed ecotoxicity to bacteria is low (LC50 > 100 mg/l), to fish and invertebrates is very low (EC50/LC50 > 1000 mg/l), and to worms and plants is very low (LC/EC50 >= 1.000 mg/l).</p> <p>The chronic NOEC for daphnia is >10 mg/l.</p> <p>A pond study showed gross contamination caused no significant toxic effects on a wide variety of flora in all trophic levels (including fish), no detectable diaminodiphenyl-methane (MDA), and no evidence of bioaccumulation of MDI or MDA.</p>
Degradation	<p>Reacts readily with water to form, predominantly, insoluble polyureas which are chemically and biologically inert. Conversion to soluble products, including diaminodiphenyl-methane (MDA), is very low under the optimal laboratory test conditions of good dispersion and low concentration.</p> <p>In air, the predominant degradation process is predicted to be a relatively rapid OH radical attack, by calculation and by analogy with related diisocyanates.</p>

Transport Classification

Not classified as dangerous for transport.

During the course of product training for drivers, it should always be remembered to take the most recent SDS sheet into account.

Further information

If you have questions or would like further information, please contact the ISOPA secretariat.



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ISOPA is an affiliated organisation within the European Chemical Industry Council (Cefic)

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