

October 2019



Properties, Hazards and Safety Information for H12MDI*

**Product: H12MDI (4,4'-Methylene dicyclohexyl diisocyanate;
CAS No. 5124-30-1)**

Physical and chemical data

Physical state	liquid
Colour	colourless to light yellow
Odour	slight inherent odour, lachrymatory
Melting point/range	approx. 20 °C
Boiling point/range	Decomposition above 300°C at normal pressure
Flash point	200°C
Self-Ignition temperature	225 °C at 1013 hPa
Vapour pressure	0.0000122 hPa at 20 °C
Density	1.07 (25°C)
Water solubility	reacts with water
Viscosity	approx. 12.7 mPa*s at 55 °C
Hazardous decomposition products	no dangerous decomposition products if properly stored and handled
Hazardous reactions	with amines, acids, bases, strong oxidants, alcohols. Decomposes in water with formation of CO ₂ (leading to an increase in pressure in closed containers!)

*** More detailed information should be taken from the suppliers' Material Safety Data Sheets**

Toxicological Information

Short term exposure

Ingestion	Acute oral toxicity is low: LD ₅₀ (rat) = 18,200 mg/kg Ingestion may irritate the gastro-intestinal tract.
Skin contact	Acute dermal toxicity is low: LD ₅₀ (rat) > 7,000 mg/kg H12MDI is a skin irritant and a skin sensitizer.
Eye contact	Animal studies have shown that H12MDI is irritating to the eye.
Inhalation	H12MDI is toxic by inhalation of aerosols (LC50, rat = 0.330-0.434 mg/l/4h). Vapors and aerosols are irritating to the respiratory tract. In sensitized people very low concentrations may lead to asthmatic symptoms, the onset of which may be delayed for several hours.

Repeated exposure / long-term effects

Skin contact	May cause sensitization by skin contact.
Inhalation	May cause sensitization by inhalation. Chronic exposure by inhalation may result in permanent decrease in lung function. In a 28-day-inhalation study with rats primarily the upper respiratory tract was the target of H12MDI. With regard to histopathological changes, all lesions observed were related to portal-of-entry, local irritant effects (nasal passages, pharynx, and larynx).
Genotoxicity	H12MDI did not induce genotoxic effects in several studies with bacteria and mammalian cell culture
Carcinogenicity	No animal studies have been performed yet.
Reproductive toxicity	In inhalation studies H12MDI did not reveal signs of developmental toxicity nor adverse effects on the reproduction of rats in the absence of parental toxicity.

Exposure controls/Personal protection equipment

General	Workers with a hypersensitivity of the respiratory tract and/or the skin (e.g. asthmatics or those suffering from chronic bronchitis or chronic skin complaint) should not be exposed to this chemical.					
OELs	In many countries occupational exposure limits for H12MDI have been set up. These can be found under →OELs H12MDI (see website under Library – Regulatory Information)					
DNEL	Application Area	Workers			Workers	
	Route of Exposure	Inhalation			Inhalation	
	Health Effect	Acute - local effects			Long-term - local effects	
		0.6 mg/m ³			0.3 mg/m ³	
PNEC	PNEC freshwater	PNEC marine water	PNEC intermittent release	PNEC sediment	PNEC soil	PNEC STP
	>0.005 mg/l	>0.0005 mg/l	>0.05 mg/l	>21.75 mg/kg dw	>4.3 mg/kg dw	1.91 mg/l
Respiratory protection	Respiratory protection is required if an inhalative exposure can not be excluded. Depending on the exposure scenario relevant for the interesting application more details are given in the extended MSDS of the supplier.					
Hand protection	Chemical resistant protective gloves should be worn, e.g. <ul style="list-style-type: none"> - butyl rubber with a thickness ≥ 0.5 mm (breakthrough time ≥ 480 min) - fluorinated rubber with a thickness ≥ 0.4 mm (breakthrough time ≥ 480 min) - nitrile rubber with a thickness ≥ 0.35 mm (breakthrough time ≥ 480 min) 					

	Contaminated gloves should be disposed of.
Body protection	Body protection should be chosen based on activity and possible exposure, e.g. apron, protecting boots, chemical-protection suit.
Eye protection	Face protection/close-fitting protective goggles should be worn.

First aid measures

General	Contaminated clothing must be taken off immediately.
Skin contact	Remove any contaminated clothing immediately. Wipe or mechanically wash affected areas thoroughly with soap and water or with a cleanser based on polyethylene glycol for at least 15 minutes. Dispose of contaminated clothing or wash thoroughly before reuse. For severe exposures, the affected person should get under a safety shower, using the flushing action of the water to remove the bulk of the chemical, then remove contaminated clothing and wash skin with soap and water. Seek medical attention. For lesser exposures, the individual should seek medical attention if irritation develops or persists after the area is washed.
Inhalation	The person should move to an area free from risk of further exposure. Oxygen or artificial respiration should be administered as needed. Asthmatic-type symptoms may develop and may be immediate or delayed up to several hours. Treatment is essentially symptomatic. A physician should be consulted.
Eye contact	Flush with large amounts of lukewarm water for at least 15 minutes, holding eyelids open all the time. Refer the affected individual to an eye specialist or other physician for immediate follow-up.
Ingestion	Vomiting should not be induced and nothing should be given orally to an unconscious or convulsing person. A physician should be consulted.

Ecological information


Biodegradability	H12MDI is not readily biodegradable. It reacts with water forming solid insoluble polyurea, methylenedicyclohexyl diamine (H12MDA) and CO ₂ , thus the predominant removal mechanism is expected to be hydrolysis. Polyurea is more or less inert and – due to its molecular size – not bioavailable. H12MDA is not readily biodegradable.
Bioaccumulation	Due to hydrolysis in water bioaccumulation of H12MDI is not expected. Bioaccumulation of the hydrolysis product H12MDA is also not expected due to its high solubility in water and low logK _{ow} .
Acute toxicity to aquatic organisms	H12MDI offers a low level of aquatic toxicity. It is not toxic to aquatic organisms up to its limit of solubility in water: <ul style="list-style-type: none"> - LC0 (fish, <i>Brachydanio rerio</i>, 96h) > 8.1mg/l - EC50 (bacteria) = 191mg/l - EC0 (<i>Daphnia magna</i>, 48h) > 8.3mg/l - EC50 (algae, <i>Scenedesmus subspicatus</i>, 72h) > 5.0mg/l

EC Classification and labeling according to CLP Regulation 1272/2008, Annex VI, Table 3.1

1.) Classification

Hazard class	Category	Hazard phrase
Acute toxicity, inhalation	2	H330: Fatal if inhaled
Serious eye irritation/corrosion	2	H319: Causes serious eye irritation
Skin corrosion/irritation	2	H315: Causes skin irritation
Respiratory sensitization	1	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
Skin sensitisation	1	H317: May cause an allergic skin reaction
STO single exposure	3	H335: May cause respiratory irritation

2.) Labeling

Pictograms		
Signal word	Danger	
Hazard statement	H330: Fatal if inhaled (Category 2)	
	H319: Causes serious eye irritation	
	H315: Causes skin irritation	
	H335: May cause respiratory irritation	
	H317: May cause an allergic skin reaction	
	H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled	