

March 2005



Properties, Hazards and Safety Information for IPDI*

Product: : IPDI (Isophorone diisocyanate; CAS No. 4098-71-9)

Physical and chemical data

Physical state	liquid
Colour	colourless to yellowish
Odour	pungent
Melting point/range	approx. -60°C
Boiling point/range	approx. 158°C (13hPa)
Flash point	approx. 155°C
Ignition temperature	approx. 430°C
Lower/upper explosion limit	0.7/4.5% (Vol.)
Vapour pressure	approx. 0.02hPa (50°C) approx. 0.0012hPa (25°C) approx. 0.0009hPa (20°C)
Density	approx. 1.06 (20°C)
Water solubility	15 mg/l (23°C)
Viscosity	approx. 13-15mPas (23°C) approx. 10mPas (25°C)
Thermal decomposition	no decomposition below boiling point
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) ≥ 4,825 mg/kg Ingestion may irritate the gastro-intestinal tract.
Skin contact	Acute dermal toxicity is low: LD ₅₀ (rat) > 7,000 mg/kg IPDI is a skin irritant and a skin sensitizer.
Eye contact	IPDI is an eye irritant.
Inhalation	IPDI is very toxic by inhalation of aerosols (LC50, rat = 0.04 mg/l/4h). Vapour and aerosols are severely irritating to the respiratory tract. High exposure can result in inflammation of lung tissue and fluid in the lungs. In sensitized people very low concentrations may lead to asthmatic symptoms, the onset of which may be delayed for several hours.

Repeated exposure

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.
Carcinogenicity	No animal studies have been performed yet.
Reproductive toxicity	In a developmental toxicity study with exposure by inhalation, no developmental toxicity was observed in the absence of maternal 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 IPDI have been set up. These can be found under →OELs IPDI (see website under Links – Regulatory Information)
Respiratory protection	Respiratory protection is required in insufficiently ventilated work areas and during spraying. An air-fed mask, or for short periods of work, a combination of charcoal filter and particulate filter is recommended.
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) - polyvinyl chloride with a thickness ≥ 0.5 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 off mechanically and wash affected areas thoroughly with soap and water for at least 15 minutes. Dispose of contaminated clothing or was 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	IPDI is not readily biodegradable. It reacts with water forming solid insoluble polyurea, isophorone diamine (IPDA) 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. IPDA is not readily biodegradable. However, in a simulation test with activated, non-adapted sludge, a degradation of 42 % was measured after a contact time of 6 hrs.
Bioaccumulation	Due to hydrolysis in water bioaccumulation of IPDI is not expected. The bioaccumulation potential of the hydrolysis product IPDA is considered to be low (log K _{ow} = 0.99).
Acute toxicity to aquatic organisms	IPDI offers a moderate level of aquatic toxicity: <ul style="list-style-type: none"> - LC0 (fish, Brachydanio rerio, 96h) ≥ 72.3mg/l - EC50 (bacteria) = 263mg/l - EC0 (Daphnia magna, 48h) = 19mg/l EC100 (Daphnia magna, 48h) = 73 mg/l - EC50 (algae, Scenedesmus subspicatus, 72h) ≥ 70mg/l
Remark	These data are not reflected by the current EU classification and labeling.

EU Classification and Labeling

Symbols	T N	Toxic Dangerous for the environment
Risk phrases	R23 R36/37/38 R42/43 R51/53	Toxic by inhalation Irritating to eyes, respiratory system and skin May cause sensitization by inhalation and skin contact Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.
Safety phrases	S26 S28 S38 S45	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. After contact with skin, wash immediately with plenty of soap and water. In case of insufficient ventilation, wear suitable respiratory equipment. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).