

Chemical Emergency Medical Guideline

Information and recommendations for first responders and patients

Isocyanates

CAS No.: 26471-62-5; 584-84-9; 91-08-7; 144490-96-0; 5873-54-1;
101-68-8; 822-06-0

GHS symbols:



GHS06

Acute toxicity



GHS07

Acute toxicity



GHS08

Health hazard

Signal word: Danger

Hazard statements:

For detailed information on the H statements for the individual substances within this group, it is recommended to consult the relevant safety data sheets provided by the distributor or official databases (e.g. <https://echa.europa.eu/de/search-for-chemicals>).

Overview

- This guideline is based on information about the diisocyanates toluene diisocyanate (TDI), diphenylmethane diisocyanate (MDI) and hexamethylene diisocyanate (HDI). Recommendations for other isocyanates are similar in many respects. However, this guideline does not cover the special considerations that may apply to other isocyanates.
- Before the first aider approaches a patient, who has been or is exposed to diisocyanates, it must be ensured that there is no danger to the first aider from diisocyanates.
- There is no danger from contact with patients who have only been exposed to diisocyanate vapours. However, a patient who is wet with liquid diisocyanates or diisocyanate solutions, or whose clothing is wet with them, may endanger other people through direct contact or through outgassing diisocyanates.
- Diisocyanates have a strong irritant effect on all tissues, especially the respiratory tract. Exposure to diisocyanates can result in eye and skin irritation, coughing, chest pain and shortness of breath. Swelling of the larynx and signs of fluid accumulation in the lungs (shortness of breath, blue-red discoloration of the skin and mucous membranes, sputum, coughing) may occur.
- Asthma attacks (narrowing of the smaller airways with severe shortness of breath) can occur even after exposure to very low concentrations of diisocyanates.
- There is no known specific antidote. Treatment depends on the extent of exposure and the symptoms.

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1. Information about the substance

Diisocyanates: TDI - $\text{CH}_3\text{C}_6\text{H}_3[\text{NCO}]_2$, CAS: 26471-62-5 (mixture), CAS: 584-84-9 (2,4-isomer), CAS: 91-08-7 (2,6-isomer); MDI - $\text{CH}_2(\text{C}_6\text{H}_4[\text{NCO}])_2$, CAS: 144490-96-0 (mixture), CAS: 5873-54-1 (2,4'-isomer), CAS: 101-68-8 (4,4'-isomer); HDI - $\text{C}_6\text{H}_{12}(\text{NCO})_2$, CAS: 822-06-0

Synonyms:

TDI, diisocyanatotoluene, toluene diisocyanate

MDI, methylenediphenyl diisocyanate, methylene bis(phenyl isocyanate)

HDI, hexamethylene diisocyanate, diisocyanatohexane

This guideline is based on information about some of the most commonly used diisocyanates: toluene diisocyanate (TDI), diphenylmethane diisocyanate (MDI) and hexamethylene diisocyanate (HDI).

Recommendations for other isocyanates are similar in many respects. However, this guideline does not address any special considerations that may apply to other isocyanates.

TDI and HDI are colorless to straw-yellow liquids at room temperature, while the MDI monomer is a colorless solid. Diisocyanates have a fruity, pungent odor. They are highly reactive, including hydroxyl and amino groups in human body cells. When heated to decomposition, they release toxic nitrogen oxide vapors. An important application of diisocyanates is the manufacture of polyurethane foams, various plastics and elastomers. Diisocyanates are also used as hardeners for paints, coatings and adhesives.

2. Exposition

2.1. Inhalation

Inhalation is the most important route of exposure to diisocyanates. The odor of diisocyanates does not provide a clear warning of dangerous concentrations. Respiratory tract irritation and asthma attacks (constriction of the small airways with severe breathing difficulties) can occur even at very low concentrations.

2.2. Skin/eye contact

Direct contact with liquid diisocyanates or vapors can cause severe skin or eye irritation.

2.3. Ingestion

Accidental ingestion of diisocyanates is unlikely, but may cause chemical burns to the mouth, throat, esophagus and stomach.

3. Acute health effects

In most cases, exposure to diisocyanates occurs through inhalation of the vapors. Exposure to low concentration causes irritation of the eyes, nose, throat and lungs. This can cause coughing, chest tightness and shortness of breath. Higher concentrations can cause severe breathing difficulties, pneumonia and fluid accumulation in the lungs.

Exposure of the eyes or skin to liquid diisocyanates can cause permanent tissue damage.

A single, short-term exposure to low concentrations, from which the affected person recovers quickly, does not normally cause delayed or lasting damage to health.

However, some individuals have developed allergies even after a single exposure to diisocyanates. In these individuals, even very low concentrations of diisocyanates can then cause asthma attacks. Permanent respiratory disorders have been described following pronounced or repeated exposure to diisocyanates.

4. Measures

4.1. Self-protection of first aiders

If there is a suspicion that the area the helper must enter contains diisocyanates, a self-contained breathing apparatus and a chemical protection suit must be worn. Contaminated equipment should not be used.

There is no danger from contact with patients who have only been exposed to diisocyanate vapors. A patient who is wet with liquid diisocyanates or diisocyanate solutions, or whose clothing is wet with them, may endanger other people through direct contact or through outgassing diisocyanates.

4.2. Rescue

Patients should be removed from the danger zone immediately. If they are unable to walk unaided, they should be removed from the danger zone quickly using suitable means, taking care to protect themselves. The "A, B, C procedure" has absolute priority.

- A) Clear the airways** (check for blockages caused by the tongue or foreign objects).
- B) Ventilation** (check the patient's breathing, if necessary, begin ventilation with adequate self-protection, e.g. breathing mask)
- C) Circulation** (begin resuscitation for any person who does not respond to verbal commands and is not breathing normally)

4.3. Cleaning

Patients who have only been exposed to diisocyanate vapors and show no signs of skin or eye irritation do not require any special cleaning measures, unlike all others.

If possible, patients should assist with their own cleaning. If liquid diisocyanates or diisocyanate solutions have been exposed and clothing is contaminated, it must be removed and securely wrapped.

Rinse affected skin and hair with water for at least 15 minutes. Protect eyes while rinsing. Continue other important emergency measures in the meantime.

If the eyes have been exposed to diisocyanates or if eye irritation is present, rinse with water or neutral saline solution for 15 minutes. Remove any contact lenses, if possible, without additional risk to the eye. Continue other important first aid measures during this time.

4.4. Further measures

Anyone who may have been exposed to diisocyanates should seek medical attention immediately.

4.5. Instructions for further rules of conduct

Consult your family doctor or the emergency department of the nearest hospital if any abnormalities or symptoms occur within the next 24 hours, in particular:

- Coughing, wheezing or whistling breath
- Difficulty breathing or shortness of breath
- Increased pain or abnormalities in the affected skin areas or eyes (burning, tearing)
- Pain or tightness in the chest

5. References

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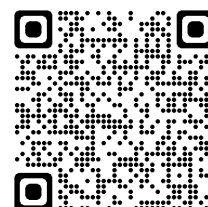
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