GPS Safety Summary

Hexamethylene diisocyanate

Chemical Identity

Name: Hexamethylene diisocyanate
CAS number: 822-06-0
Molecular formula: C₆H₁₂N₂O₂
Structure

IUPAC name: 1,6-diisocyanatohexane
BASF brand names: Basonat® H

Product Uses

Hexamethylene diisocyanate is predominantly used as raw-material for the production of Polysocyanates. These are mainly used as crosslinkers for binders containing hydroxyl groups in two-component Polyurethane coatings, and to a minor extent in 2K PU formulations for leather, textile, adhesive, ink and other applications.

Benefits

Hexamethylene diisocyanate can form a wide range of different types of oligomers (isocyanurate, biuret, allophanate, urethane, urea and uretdion), which can be adapted to the needs and requirements of the desired application in the coatings, leather, textile, adhesive and ink industry.
Health Information

Human Health Safety Assessment

*Note: The information contained in the table below may be useful to someone handling the concentrated substance such as a manufacturer or transporter. Consumers are not likely to come in contact with the concentrated substance. The data, while verifiable, are not intended to be comprehensive nor replace the data found in the (M)SDS.*

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Toxicity</td>
<td>Of moderate toxicity after single ingestion.</td>
</tr>
<tr>
<td></td>
<td>Virtually nontoxic after a single skin contact.</td>
</tr>
<tr>
<td></td>
<td>Of high toxicity after short-term inhalation.</td>
</tr>
<tr>
<td>Irritation</td>
<td>Irritating to eyes, respiratory system and skin.</td>
</tr>
<tr>
<td>Sensitization</td>
<td>Sensitization after skin contact possible.</td>
</tr>
<tr>
<td></td>
<td>The substance may cause sensitization of the respiratory tract.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>The substance was not mutagenic in bacteria, mammalian cell culture and in tests with mammals.</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>In long-term animal studies in which the substance was given by inhalation in high concentrations, a carcinogenic effect was not observed.</td>
</tr>
<tr>
<td>Toxicity after repeated exposure</td>
<td>After repeated exposure the prominent effect is local irritation. Based on the chemical structure a neurotoxic effect by repeated administration cannot be excluded.</td>
</tr>
<tr>
<td>Toxicity for reproduction</td>
<td>The results of animal studies gave no indication of a fertility impairing effect or a developmental toxic / teratogenic effect.</td>
</tr>
</tbody>
</table>

Environmental Information

Environment Safety Assessment

*Note: The information in this chapter is intended to provide brief and general information of this substance’s environmental impact. The results in the table below refer to testing performed with the concentrated substance. The data contained in this section explain the relative effect of the concentrated substance on the environment, as defined by certain tests.*
**Effect Assessment**

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Toxicity</td>
<td>With high probability acutely not harmful to aquatic life.</td>
</tr>
<tr>
<td>Persistence and degradability</td>
<td>Moderately biodegradable. In contact with water the substance will hydrolyze rapidly.</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
<td>Not bioaccumulative.</td>
</tr>
</tbody>
</table>

**Physical/Chemical Properties**

**Phys/Chem Safety Assessment**

- Hexamethylene diisocyanate is a clear colorless liquid with a pungent odor. The substance is not flammable und does not have explosive properties.

*Note: The results in the table below refer to testing performed with the concentrated substance. It is not intended to be comprehensive or to replace information found in the (M)SDS.*

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical state</td>
<td>Liquid</td>
</tr>
<tr>
<td>Melting / freezing point</td>
<td>-67°C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>255°C</td>
</tr>
<tr>
<td>Flash point</td>
<td>130°C</td>
</tr>
<tr>
<td>Flammability</td>
<td>Non flammable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Non explosive</td>
</tr>
<tr>
<td>Self-ignition temperature</td>
<td>454°C</td>
</tr>
</tbody>
</table>

**Exposure Potential**

- **Workplace exposure:** Exposures via inhalation and/or dermal contact are the primary routes of exposure to hexamethylene diisocyanate that are anticipated for the worker population. As the synthesis of hexamethylene diisocyanate takes place in closed continuous or batch processes as well as in batch processes dermal and inhalation exposure may solely arises at sampling and filling steps. Therefore, exposure is reduced through appropriate risk management measurements like the use of closed units, the avoidance of waste and waste water, the presence of ventilation and exhaustion as well
as equipped work places and personal protection equipment. The different uses identified for the substance have been assessed as safe. Workers should follow the recommended safety measures in the extended Safety Data Sheet (eSDS).

- **Consumer exposure:** There is no intended use of hexamethylene diisocyanate in consumer products. Therefore, a health hazard due to exposure for the consumer is negligible.

- **Environmental exposure:** Hexamethylene diisocyanate is not considered to be readily biodegradable but it will be quickly eliminated from the aquatic environment due to its rapid reaction in contact with water. Hexamethylene diisocyanate is with high probability not harmful to aquatic organisms and hence the substance is not considered to pose an unacceptable risk for the environment. The hydrolysis products of hexamethylene diisocyanate will not accumulate in the food chain. Conclusively, all identified uses are safe for the environment based on the scientific facts summarized above and when carried out in compliance with recommended risk management measures and applicable regulations.

**Recommended Handling Measures**

*The recommended safety measures generally apply in contact with the concentrated substance. It is NOT intended to replace the comprehensive guidance found in the (M)SDS, only supplement it. Please refer to the (M)SDS for specific safety and first aid measures.*

When using concentrated chemicals always make sure that there is adequate ventilation. Always use appropriate chemical resistant gloves to protect your hands and skin and always wear eye protection such as chemical goggles. Do not eat, drink, or smoke where chemicals are handled, processed, or stored. Wash hands and skin following contact. If the substance gets into your eyes, rinse eyes thoroughly for at least 15 minutes with tap water and seek medical attention. For specific advice please consult the corresponding (Material) Safety Data Sheet of the substance.

Exposure to water, alcohols, amines and thiols leads to reaction and generates heat. Exposure to water generates carbon dioxide, and such pressure within closed vessels.

All effluent releases that may include the substance must be directed to a (municipal) waste water treatment plant that removes the substance from the final releases to the receiving water.
Regulatory Information / Classification and Labeling

Under GHS substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via specific labels and the (M)SDS. GHS attempts to standardize hazard communication so that the intended audience (workers, consumers, transport workers, and emergency responders) can better understand the hazards of the chemicals in use.

*Note: The hazard statements and symbols presented here refer to the hazard properties of the concentrated substance and are meant to provide a brief overview of the substance’s labeling. It is not intended to be comprehensive or to replace information found in the (M)SDS.*

Labeling according to UN GHS
UN GHS is the basis for country specific GHS labeling

![Signal word: Danger](https://example.com/danger-signal.png)

**Hazard statements:**
- H302: Harmful if swallowed
- H315: Causes skin irritation
- H317: May cause an allergic skin reaction
- H319: Causes serious eye irritation
- H330: Fatal if inhaled
- H334: May cause allergy or asthma symptoms or breathing difficulties if inhaled
- H335: May cause respiratory irritation

Additional information

1. IFA GESTIS-database on hazardous substances
2. Information on registered substance (ECHA)

3. OECD SIDS

Most commonly used synonyms

» Hexane, 1,6-diisocyanato-
» Hexamethylene-1,6-diisocyanate
» 1,6-Hexamethylene-diisocyanate
» 1,6-Hexylendiisocyanate
» Hexylendiisocyanate
» HDI

Disclaimer

This Product Safety Summary is intended to provide a general overview of the chemical substance. It contains basic information and is not intended to provide emergency response information, medical information or treatment information. The summary cannot be relied on to provide in-depth safety and health information. In-depth safety and health information must be obtained from the Material Safety Data Sheet ((M)SDS) for the chemical substance.

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Contact

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