GPS Safety Summary
Toluene Diamine

Chemical Identity

Name: m-Toluene Diamine (TDA)
CAS number: 25376-45-8
Molecular formula: C₇H₁₀N₂

Structure

IUPAC name:
3-methylbenzene-1,2-diamine

BASF brand names:
Toluene Diamine

Product Uses

TDA is an intermediate for synthesis under strictly controlled conditions. A majority of TDA produced in the United States is used as an 80% 2,4- and 2,6-toluenediamine mixture to make toluene diisocyanate (TDI). A smaller amount is also made from a mixture of 65% 2,4- and 35% 2,6-toluenediamine. Some isolated 2,4-toluenediamine is used to produce pure 2,4-TDI. 2,4-TDI is also used to make about 60 dyes, of which 28 are believed to be commercially significant.

Benefits

Some benefits of TDA include enhancement of thermal stability in polyimides, fatigue resistance and dye ability in fibers, and the preparation of impact resistant resins, polyimides with superior wire coating properties, benzimidazolethiols (antioxidants), hydraulic fluids, urethane foams, fungicide stabilizers, and sensitizers for explosives.

Date of Issue: December 2011
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>Toxic if swallowed or in contact with skin.</td>
</tr>
<tr>
<td>Irritation</td>
<td>Eye contact causes serious irritation. Not irritating to skin.</td>
</tr>
<tr>
<td>Sensitization</td>
<td>May cause sensitization by skin contact.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>In <em>in vitro</em> assays and rodent assay indications for genotoxic potential were identified.</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>May cause cancer. The substance caused cancer in animal studies.</td>
</tr>
<tr>
<td>Toxicity after repeated exposure</td>
<td>The substance may cause damage to the liver, kidney and the testes after repeated exposure.</td>
</tr>
<tr>
<td>Toxicity for reproduction</td>
<td>The results of animal studies suggest a fertility impairing 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.

<table>
<thead>
<tr>
<th>Effect Assessment</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aquatic Toxicity</td>
<td>Acutely toxic for aquatic organisms.</td>
</tr>
<tr>
<td>Persistence and degradability</td>
<td>Poorly biodegradable.</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
<td>Not bioaccumulative.</td>
</tr>
</tbody>
</table>

Physical/Chemical Properties

Phys/Chem Safety Assessment
TDA is a pale brown solid. It has a weak amine like odor. It is not flammable and 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>Solid</td>
</tr>
<tr>
<td>Melting / freezing point</td>
<td>99°C</td>
</tr>
<tr>
<td>Boiling point</td>
<td>288°C – 289° C</td>
</tr>
<tr>
<td>Flash point</td>
<td>158°C- 160° 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>Between 490°C and 505°C</td>
</tr>
</tbody>
</table>

**Exposure Potential**

- **Workplace exposure:** TDA is used as an intermediate in industrial settings under strictly controlled and rigorously contained conditions. Therefore, releases and exposure to the workers are unlikely. TDA should only be handled by knowledgeable, well-trained personnel who thoroughly understand the hazards associated with the transportation, storage and use of the chemical. Workplace exposure should be limited by the use of engineering controls. Nevertheless, workers should follow the recommended safety measures in the Extended Safety Data Sheet (eSDS).

- **Consumer exposure:** TDA is not intended for the general use by the general public. Therefore, a health hazard due to exposure for the consumer is negligible.

- **Environmental exposure:** As described earlier, TDA is used as an intermediate in chemical syntheses. It is exclusively used in industrial settings and hence releases to the environment are strictly controlled. Though the substance is only poorly biodegradable and acutely toxic to aquatic life, a risk for the environment is considered to be negligible, since no significant releases into the environment are expected. 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.

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

Hazard statements:
H301: Toxic if swallowed
H311: Toxic in contact with skin
H317: May cause an allergic skin reaction
H319: Causes serious eye irritation
H340: May cause genetic defects
H350: May cause cancer
H361: Suspected of damaging fertility or the unborn child
H373: May cause damage to organs through prolonged or repeated exposure
H401: Toxic to aquatic life
H411: Toxic to aquatic life with long lasting effects

Additional information

1. IFA GESTIS-database on hazardous substances
   http://www.dguv.de/ifa/en/gestis/stoffdb/index.jsp
2. Information on registered substance (ECHA)

Most commonly used synonyms

» Diaminotoluene
» Toluenediamine isomers
» Methylphenylene diamine
» Toluenediamine
» 1,3-Benzenediamine, ar-methyl-

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

For further information on this substance or GPS safety summaries in general, please contact: info.gps@basf.com