GPS Safety Summary

Adipic acid

Chemical Identity

Name: Adipic acid
CAS number: 124-04-9
Molecular formula: C₆H₁₀O₄

IUPAC name: adipic acid

For synonyms see end of document

Product Uses

Adipic acid is used as an intermediate or monomer in the production of polyamide and polyester. Further uses of adipic acid are as tanning agent for pre-treatment of leather and as pH regulator in several processes such as flue gas desulphurization and the production of detergents and cleaning agents. Additionally, adipic acid is contained in dish washing machine tablets.

Benefits

By far the most important field of application of adipic acid is the manufacture of polyamide 66 (Ultramid® A) for fibers and engineering plastics. It is also an important intermediated for plasticizers, polyesters, and polyurethanes. Its use as an acid per se is valuable in various sectors of the chemical industry.
When adipic acid is treated with 1,6-hexanediamine (hexamethylenediamine), the salt hexamethylenediammonium adipate, usually known as AH salt of nylon salt, is formed. When this “monomer” is heated, it yields polyamide 66 (Ultramid® A) by a polycondensation reaction. This polymer can be converted into a wide range of textile and engineering products, including

- carpet floor covering
- industrial textiles (tire cord, sewing yarns, monofilament for zippers, towing lines, parachute silk, brush filament)
- clothing fabrics (particularly knitted goods such as stockings, sports clothes, and swim suits)
- mechanical engineering components (gear-wheels, bearings, automobile radiator covers)
- thin foils for food packaging.

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>Virtually nontoxic after a single ingestion, short-term inhalation, or single skin contact.</td>
</tr>
<tr>
<td>Irritation</td>
<td>Not irritating to the skin. Causes serious eye damage.</td>
</tr>
<tr>
<td>Sensitization</td>
<td>Skin sensitizing effects were not observed in animal studies. A sensitizing effect on particularly sensitive individuals cannot be excluded.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>No mutagenic effect was found in various tests with microorganisms, mammalian cell cultures, and mammals.</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>No indication for a carcinogenic potential was identified in a chronic feeding study in rat at high concentrations.</td>
</tr>
<tr>
<td>Toxicity after repeated exposure</td>
<td>Repeated oral uptake of the substance did not cause substance-related effects.</td>
</tr>
<tr>
<td>Toxicity for reproduction</td>
<td>No effects have been reported in reproductive organs in long term animal studies. No indications of a developmental toxic / teratogenic effect were seen in animal studies.</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>Harmful to aquatic life.</td>
</tr>
<tr>
<td>Persistence and degradability</td>
<td>Readily biodegradable.</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
<td>Not bioaccumulative.</td>
</tr>
</tbody>
</table>

Physical/Chemical Properties

Phys/Chem Safety Assessment

➢ Adipic acid is a white crystalline solid. It is partly soluble in water. The substance is non-flammable and non-explosive.

*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>150.85 °C at 1013 hPa</td>
</tr>
<tr>
<td>Boiling point</td>
<td>337.5 °C at 1013 hPa</td>
</tr>
<tr>
<td>Flash point</td>
<td>Not applicable</td>
</tr>
<tr>
<td>Flammability</td>
<td>Not highly flammable</td>
</tr>
<tr>
<td>Explosive properties</td>
<td>Not explosive</td>
</tr>
<tr>
<td>Self-ignition temperature</td>
<td>Not self-igniting</td>
</tr>
</tbody>
</table>
Exposure Potential

- **Workplace exposure:** Exposures via inhalation and/or dermal contact are the primary routes of exposure to adipic acid that are anticipated for the worker population. Exposure can occur either in an adipic acid manufacturing facility or in the various industrial facilities that use adipic acid. Each industrial facility should have a thorough training program for employees and appropriate work processes and safety equipment in place to limit exposure. Safety showers and eye-wash stations should be accessible nearby. Workers should follow the recommended safety measures in the extended Safety Data Sheet (eSDS).

- **Consumer exposure:** Consumer products containing adipic acid are dish washing machine tablets, laundry tablets and / or other type of cleaning tablets that contain only small amounts of adipic acid (maximally 13%). Hence, acute toxic hazards such as irritation caused by adipic acid are deemed to be negligible. However, consumer should always carefully read and follow the instructions given on product labels for proper use.

- **Environmental exposure:** Adipic acid is readily biodegradable and will therefore be degraded within the wastewater treatment process as well as in surface waters. Though the substance is classified as acutely harmful to aquatic organisms, a risk for the environment is not identified since exposure of surface waters is expected to be negligible due to the rapid degradation. Adipic acid does not accumulate in the food chain. Further, an exposure assessment was performed for the identified uses and resulted in releases that do not pose a risk to aquatic life. 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:
Corrosion

Hazard statements:
H318: Causes serious eye damage
H402: Harmful to aquatic life.

**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)

3. OECS SIDS

**Most commonly used synonyms**

» Hexanedioic acid
» 1,4-Butanedicarboxylic acid
» 1,6-Hexanedioic acid

**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