Product Safety Summary for Dimethyl Carbonate

SUBSTANCE NAME

Dimethyl carbonate
Carbonic acid, dimethyl ester
Dimethylcarbonate
DMC

GENERAL STATEMENT

Dimethyl carbonate is a colorless liquid with a pleasant odour. It is an organic compound with a wide range of uses and applications, both in industrial and consumer level. Its main use is as raw material for the production of plastics and as solvent for several different applications. Its use as solvent has considerably increased due to its low hazard properties for human health and environment in comparison to other solvent alternatives. Dimethyl carbonate is a flammable substance. Flammability is its main hazard property. Therefore, fire prevention needs to be carefully managed.

CHEMICAL IDENTITY

EC Name: dimethyl carbonate
EC-No.: 210-478-4
CAS-No.: 616-38-6
Molecular formula: C3H6O3
Structural formula: 

USES AND APPLICATIONS

Dimethyl carbonate is a colorless liquid used as monomer for the manufacturing of polycarbonate diols and as raw material for the production of certain plastics. It is also used in chemical, pharmaceutical and agricultural industry. Dimethyl carbonate can also be found in products such as pH-regulators, flocculants, precipitants and neutralization agents. Its main use is as cleaning agent and as solvent in paints, adhesives, sealants, inks and electrolyte solutions for batteries.

PHYSICAL CHEMICAL PROPERTIES

Dimethyl carbonate is a colorless liquid at room temperature and pressure. It has a pleasant odor.

Melting point/range: 4.65 °C at atmospheric pressure
Boiling point/boiling range: 90.35 °C at atmospheric pressure
Decomposition temperature: Not determined
Flashpoint: 16.7 °C (closed cup) at atmospheric pressure
Flammability (solid, gaseous): highly flammable
Ignition temperature: 458 °C at atmospheric pressure
HEALTH EFFECTS

Dimethyl carbonate is a small molecule which is highly water soluble and has an octanol/water partition coefficient of 0.354. It could be expected that it is likely to be absorbed into the body by the dermal route of exposure and, based on its moderate vapour pressure of 7.57 KPa at 25 °C and its boiling point of 90 °C, it could also be expected that absorption through inhalation might be likely. However, according to the toxicity studies, there was no indication of inhalatory or dermal absorption, metabolism, excretion or distribution. The acute rat oral, dermal and inhalation studies, together with the repeat dose inhalation study and the one generation reproductive toxicity study indicated no resultant adverse toxicity. Similarly, there was no evidence of significant skin or eye irritation or sensitization potential.

<table>
<thead>
<tr>
<th>EFFECT ASSESSMENT</th>
<th>RESULT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Toxicity (oral/dermal/inhalation)</td>
<td>Dimethyl carbonate is of low acute toxicity via oral, skin and inhalation routes of exposure.</td>
</tr>
<tr>
<td>Irritation/Corrosivity (skin/eye/respiratory tract)</td>
<td>Dimethyl carbonate is not irritating to the skin or to the eyes. Corrosivity was not tested on the basis of the absence of irritation properties.</td>
</tr>
<tr>
<td>Sensitization (skin/respiratory tract)</td>
<td>Based on the available data Dimethyl carbonate is not considered to have skin or respiratory sensitization properties.</td>
</tr>
<tr>
<td>Repeated Dose Exposure</td>
<td>Test results with oral exposure indicate that there is no marked repeated dose toxicity. Repeated dose toxicity via the inhalation and dermal exposure route have not been tested.</td>
</tr>
<tr>
<td>Mutagenicity</td>
<td>All available test data indicates that Dimethyl carbonate does not cause mutagenic effects.</td>
</tr>
<tr>
<td>Carcinogenicity</td>
<td>No carcinogenicity data is available.</td>
</tr>
<tr>
<td>Reproductive Toxicity</td>
<td>All available data suggest that Dimethyl carbonate has no adverse fertility or reproductive effects.</td>
</tr>
</tbody>
</table>
ENVIRONMENTAL EFFECTS

Dimethyl carbonate is partitioned into air and water with negligible amounts in soil, sediment and biota. In the aqueous environment it is considered to be readily biodegradable. Its low partition coefficient suggests that Dimethyl carbonate has low bioaccumulation potential. All available information indicates that Dimethyl carbonate is not environmentally hazardous.

<table>
<thead>
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<th>EFFECT ASSESSMENT</th>
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<tr>
<td>Aquatic Toxicity</td>
<td>Fish, daphnia, algae and plant studies indicate that the environmental toxicity of dimethyl carbonate is low.</td>
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</table>

FATE AND BEHAVIOR

<table>
<thead>
<tr>
<th>RESULT</th>
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<tbody>
<tr>
<td>Biodegradation</td>
</tr>
<tr>
<td>Bioaccumulation potential</td>
</tr>
<tr>
<td>PBT/vPvB conclusion</td>
</tr>
</tbody>
</table>

EXPOSURE

Human Health

Exposure to Dimethyl carbonate can occur to workers in industrial facilities where it is produced, stored, handled or processed. Professional users or consumers may come into contact with Dimethyl carbonate through commonly used formulated products, such as paints, sealants, adhesives, inks, cleaners and batteries. Based on the physical properties of Dimethyl carbonate, skin contact and inhalation are the most likely routes of exposure. The health effects of dimethyl carbonate are such that it does not pose a risk to any kind of user. The most relevant risk of Dimethyl carbonate is its flammability. Therefore, fire prevention is the most relevant measure to protect workers.

Environment

Dimethyl carbonate may be released to the environment in air and water from manufacturing and industrial use facilities. All identified uses of the substance have been assessed as safe for the environment. The physical properties of the substance are such that exposure to sediment is unlikely. Indirect release to sediment is also unlikely since the substance is readily biodegradable.

RISK MANAGEMENT RECOMMENDATIONS

Dimethyl carbonate poses very low human health and environmental risks. However, it is a good practice to train personnel that handle the substance and to protect workers who may be exposed to Dimethyl carbonate by taking the usual precautionary measures to protect against chemical exposure. Therefore, protective clothing, gloves and safety glasses should be worn when handling Dimethyl carbonate. Unless high concentrations are present, respiratory protection is not required, provided ventilation is good. Flammability is the main hazard property of Dimethyl carbonate, therefore risk management needs to focus on fire prevention. Containers and equipment containing Dimethyl carbonate should be correctly labeled clearly indicating its flammability. All electrical installations should be explosion proof. The creation and accumulation of static discharge during transfer of the substance should be controlled by precautionary measures such as grounding and bonding containers and equipment. Dimethyl carbonate should be stored in
Product Safety Summary for Dimethyl Carbonate

A special, ventilated, enclosure, grouped by risk category and adequately isolated from incompatible substances or substances that may give rise to hazardous reactions. In addition, Dimethyl carbonate should be stored in undamaged, secure packaging. Only those quantities necessary for immediate work should be kept in the work area. Open pouring should be avoided and operations involving the possible release of liquid, vapor, dust, etc. should be carried out using closed processes or, failing this, in well-ventilated areas or in installations with local extraction systems.

For environmental protection in case of accidental release: do not allow product to reach sewage system or any water course. Retain and dispose of contaminated wash water.

STATE AGENCY REVIEW

This substance has been registered under REACH (EC) No. 1907/2006. Dimethyl carbonate is included in the OECD list of High Production Volume (HPV) chemicals. Dimethyl carbonate is listed in the following Chemical Inventories: AICS, EINECS, IECSC, Canada DSL, KECI, ECNS, TSCA, PICCS, NZIoC.

REGULATORY INFORMATION/CLASSIFICATION AND LABELING

Classification of the substance according to REGULATION (EC) No 1272/2008:

- **Flammable liquid:** Flammable liquid Category 2; H225 Highly flammable liquid and vapor.

Labeling according to REGULATION (EC) No 1272/2008:

- **Pictogram:**

- **Signal word:** Danger

- **Hazard statements:** H225: Highly flammable liquid and vapor.

CONTACT INFORMATION WITHIN COMPANY

For further information on this substance or product safety summaries in general, please contact:

- **Company:** UBE Chemical Europe, S.A
- **Department:** Corporate Social Responsibility
- **Address:** Poligono Industrial El Serrallo, s/n
- **Town/Country:** Grao de Castellon (Castellon), Spain
- **Postal code:** 12100
- **E-mail:** sds.ube.eu@ube.es
Glossary

Acute toxicity: Harmful effect resulting from a single or short term exposure to a substance.

AICS: Australian Inventory of Chemical Substances.

Biodegradation: Decomposition or breakdown of a substance under natural conditions (actions of micro-organisms etc).

Bioaccumulation: Progressive accumulation in living organisms of a chemical substance present in the environment.

Canadian DSL: Domestic Substances List of Canada.

Carcinogenicity: Substance effects causing cancer.

CAS: Chemical Abstracts Service (division of the American Chemical Society).

Chronic toxicity: Harmful effect after repeated exposures or long term exposure to a substance.

EINECS: European Inventory of Existing Commercial Chemical Substances

ENCS: Existing Notified Chemical Substances (Japan).

Flash point: The lowest temperature at which vapor of the substance may form an ignitable mixture with air.

Genotoxicity: Substance effect that causes damage to genes, including mutagenicity and clastogenicity.

GHS: Globally Harmonized System of Classification and Labeling of Chemicals

HPV: High Production Volume Chemicals.

Hydrolyze: Undergo hydrolysis; decompose by reacting with water.

IECSC: Inventory of Existing Chemical Substances Produced or Imported in China.

Intermediate: Substance that is manufactured for and consumed in or used for chemical processing in order to be transformed into another substance.

KECI: Korean Existing Chemical Inventory.

Monomer: Means a substance which is capable of forming covalent bonds with a sequence of additional like or unlike molecules under the conditions of the relevant polymer-forming reaction used for the particular process.

Mutagenicity: Substance effect that cause mutation on genes.

NZIoC: New Zealand Inventory of Chemicals

PBT: Persistent, bioaccumulative, toxic chemical.

Persistence: Refers to the length of time a compound stays in the environment, once introduced.

PICCS: Philippine Inventory of Chemicals and Chemical Substances.
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<table>
<thead>
<tr>
<th>Term</th>
<th>Description</th>
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<tbody>
<tr>
<td>Risk Management Measures</td>
<td>Engineering controls, conditions and protective equipment needed to be implemented to ensure that the risks to human health and the environment are adequately controlled.</td>
</tr>
<tr>
<td>Reproductivity</td>
<td>Including teratogenicity, embryotoxicity and harmful effects on fertility.</td>
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<tr>
<td>Sensitizing</td>
<td>Allergenic.</td>
</tr>
<tr>
<td>Sediment</td>
<td>Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.</td>
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<tr>
<td>TSCA</td>
<td>Toxic Substance Control Act (USA).</td>
</tr>
<tr>
<td>Vapor pressure</td>
<td>A measure of a substance's property to evaporate.</td>
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<tr>
<td>vPvB</td>
<td>Very persistent, very bio-accumulative.</td>
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</tbody>
</table>

**DATE OF ISSUE**

April 2012

**REVISION**

Version 1.0

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