

Product Safety Summary for Dimethyl carbonate

SUBSTANCE NAME

Dimethyl carbonate
 Carbonic acid, dimethyl ester
 Dimethylcarbonat
 DMC

GENERAL STATEMENT

Dimethyl carbonate is a colorless liquid with a pleasant odor. 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

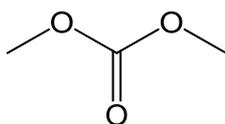
EC Name: dimethyl carbonate

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 polycarbonatediols 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

Selfignition temperature: 458 °C at atmospheric pressure

Explosion limits:

Lower: 4.22%

Upper: 12.87%

Explosive properties: Non explosive.

Molecular weight: 90.0779 g/mol

pH value: Not applicable

log Pow: 0.354 (at 20 °C)

Vapor pressure: 7570.4 Pa at 25 °C

Vapor density: Not determined

Relative density: 1.0633 at 25 °C

Dissociation constant: Not applicable

Solubility in/Miscibility with water: 114.7 g/l (at 20 °C)

Dynamic Viscosity: 0.585 mPa.s (at 20°C)

Oxidizing properties: Not applicable

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.

EFFECT ASSESSMENT	RESULT
Acute Toxicity (oral/dermal/inhalation)	Dimethyl carbonate is of low acute toxicity via oral, skin and inhalation routes of exposure.
Irritation/Corrosivity (skin/eye/respiratory tract)	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.
Sensitization (skin/respiratory tract)	Based on the available data Dimethyl carbonate is not considered to have skin or respiratory sensitization properties.

Mutagenicity	All available test data indicates that Dimethyl carbonate does not cause mutagenic effects.
Carcinogenicity	No carcinogenicity data is available.
Reproductive Toxicity	All available data suggest that Dimethyl carbonate has no adverse fertility or reproductive effects.
Repeated Dose Exposure	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.

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.

EFFECT ASSESSMENT	RESULT
Aquatic Toxicity	Fish, daphnia, algae and plant studies indicate that the environmental toxicity of dimethyl carbonate is low.

FATE AND BEHAVIOR	RESULT
Biodegradation	Dimethyl carbonate is readily biodegradable in water. Biodegradability in soil and sediment is not relevant.
Bioaccumulation potential	Based on the low partition coefficient it is concluded that the bioaccumulation potential of Dimethyl carbonate is very low and does not need to be studied further.
PBT/vPvB conclusion	Dimethyl carbonate is neither PBT nor vPvB based on biodegradation and bioaccumulation results and no hazard to aquatic species.

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 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 Industries, Ltd.

Department: Fine Chemicals Business Unit

Address: Seavans North Bldg., 1-2-1 Shibaura, Minato-ku, Tokyo

Town/Country: Japan

Postal code: 105-8449

E-mail: ube-fine@ube-ind.co.jp

Additional information can be found at:

<http://www.ube.co.jp>

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.
Risk Management Measures	Engineering controls, conditions and protective equipment needed to be implemented to ensure that the risks to human health and the environment are adequately controlled.
REACH (EC) No. 1907/2006	European Commission Regulation concerning the Registration, Evaluation, Authorization and Restriction of Chemicals.
REGULATION (EC) No 1272/2008	European Commission Regulation on Classification, Labeling and Packaging of Substances and Mixtures.
Reproductive toxicity	Including teratogenicity, embryotoxicity and harmful effects on fertility.
Sensitizing	Allergenic.
Sediment	Topsoil, sand and minerals washed from land into water forming in the end a layer at the bottom of rivers and sea.
TSCA	Toxic Substance Control Act (USA).



Vapor pressure	A measure of a substance's property to evaporate.
vPvB	Very persistent, very bio-accumulative.

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