

Product Stewardship Summary

Effective date: 1 September 2019

Supersedes: 12 December 2018

Dimethyl methylphosphonate

General Statement

Dimethyl methylphosphonate is a colorless liquid. This organophosphorus compound has several uses in commercial and organic syntheses. Dimethyl methylphosphonate is a low to moderate hazard material and the risk of adverse health effects associated with both occupational and consumer use of this chemical is anticipated to be low to moderate. When handled responsibly, the potential for toxicity can be minimized, allowing consumers and workers to use materials containing dimethyl methylphosphonate safely.

Chemical Identity

Name: Dimethyl methylphosphonate

Brand Names: Not applicable

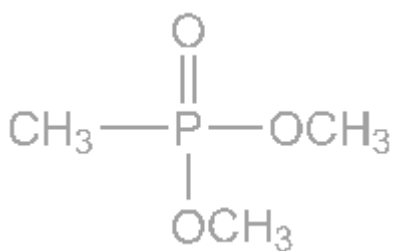
Chemical name (IUPAC): [methoxy(methyl)phosphoryl]oxymethane

CAS number(s): 756-79-6

EC number: 212-052-3

Molecular formula: C₃H₉O₃P

Structure:



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Uses and Applications

The primary commercial use of dimethyl methylphosphonate is as a flame retardant. Other commercial uses are as a preignition additive for gasoline, as an anti-foaming agent, as a plasticizer, as a stabilizer, as a textile conditioner, as an antistatic agent, and as an additive for solvents and low-temperature hydraulic fluids.

INEOS uses this substance in manufacturing multiple products in various product lines.

Physical/Chemical Properties

Phys/Chem Safety Assessment

Property	Value
Form	Colorless liquid
Physical state	Liquid
Color	Colorless
Odor	Characteristic
Density	1.16 g/cm ³ @ 20°C
Melting / boiling point	50°C / 181°C
Flammability	No data available
Explosive properties	No data available
Self-ignition temperature	No data available
Vapor pressure	1.28 hPa @ 25°C
Mol weight	124.08 g/mol
Water solubility	>100 g/L @ 21°C
Flash point	93.4°C
Octanol-water partition coefficient (Logk _{ow})	-0.61

Exposure, Hazard and Safety Assessment

The following section describes possible exposures scenarios and hazards associated with dimethyl methylphosphonate. The exposure assessment describes both the amount of and the frequency with which a chemical substance reaches a person, a population of people, or the environment. Hazard refers to the inherent properties of a substance that make it capable of causing harm to human health or the environment. The safety assessment reports the possibility of a harmful event arising from exposure to a chemical or physical agent under specific conditions. Just because a substance may possess potentially harmful properties does not mean that it automatically poses a risk. It is not possible to make that determination without understanding the exposure.

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Human Health Effects

Human Exposure Assessment

Consumer: Dimethyl methylphosphonate is used primarily as a flame retardant. Consumer exposure is most likely limited to extremely low levels of dimethyl methylphosphonate within consumer product formulations.

Worker: In industrial settings, dimethyl methylphosphonate is manufactured and handled in closed processes as much as possible, which ensures that worker exposure is minimized. When there is potential for exposure, such as during loading, unloading, sampling or during maintenance operations, exposure to dimethyl methylphosphonate is further minimized by the proper use of personal protective equipment.

Human Hazard Assessment:

Dimethyl methylphosphonate is moderately acutely toxic if inhaled and is not toxic if ingested or applied on skin. It does not cause dermal irritation. It can cause serious eye irritation. It is not classified for carcinogenicity; however, the weight of evidence from numerous genotoxicity/mutagenicity studies indicates that exposure may elicit genetic defects. Dimethyl methylphosphonate is a suspected human reproductive toxicant based on effects following oral and inhalation exposures in male rats. It is not associated with impacts to a developing fetus.

Effect Assessment	Result
Acute Toxicity Oral / inhalation / dermal	Moderate acute toxicity if inhaled. No acute toxicity if ingested or applied on skin.
Irritation / corrosion Skin / eye / respiratory test	Does not cause irritation if applied on skin. Causes serious eye irritation. Does not cause respiratory irritation.
Sensitization	Does not cause allergic reactions upon contact with skin
Toxicity after repeated exposure Oral / inhalation / dermal	Does not damage internal systems/organs upon prolonged or repeated exposure
Genotoxicity / Mutagenicity	May cause genetic defects
Carcinogenicity	Not considered as carcinogen
Reproductive/Developmental Toxicity	Suspected of damaging fertility. Dimethyl methylphosphonate does not affect unborn children.

Human Health Safety Assessment

Consumer: Dimethyl methylphosphonate is primarily used as a flame retardant within consumer products. Direct consumer exposure to the chemical is anticipated to be negligible and the subsequent risk is therefore low.

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Worker: In industrial settings, dimethyl methylphosphonate is manufactured and handled primarily in closed processes that limit exposure. Based on the implementation of good manufacturing processes and industrial hygiene practices, the occupational health risk associated with dimethyl methylphosphonate is anticipated to be low.

Environmental Effects

Environmental Exposures

Dimethyl methylphosphonate presents some potential for exposure to the environment from plants. Although it is handled in a closed, continuous process, occasional controlled exposure may cause it to be released into the environment. Dimethyl methylphosphonate is mostly used as an intermediate in strictly controlled conditions, and as a result the likelihood of environmental exposure are minimal.

Environmental Hazard Assessment

Dimethyl methylphosphonate is stable in the aqueous environment and has low potential for bioaccumulation. Dimethyl methylphosphonate is not expected to volatilize from dry soil surfaces based upon its vapor pressure, is expected to have very high mobility in soil and within the aquatic environment and is not expected to adsorb to suspended solids and sediment. Volatilization from water surfaces is expected.

Effect Assessment	Result
Aquatic Toxicity	Low acute toxicity in fish. Anticipated to have low acute and chronic toxicity based on estimation software (ECOSAR v1.1)

Fate and behavior	Result
Biodegradation	Not rapidly biodegradable
Bioaccumulation potential	No potentially for bioaccumulation (log Kow = -0.61)
PBT / vPvB conclusion	This substance is not considered to be persistent, bioaccumulating and toxic (PBT) or very persistent and very bioaccumulating (vPvB).

Environmental Safety Assessment

Based on the available data, dimethyl methylphosphonate is not considered to be toxic to, or have the ability to bioaccumulate within, aquatic organisms. Dimethyl methylphosphonate is not readily biodegradable, but it may persist if released into the environment. However, the likelihood of releases to the environment is minimal and the substance is not anticipated to be damaging to environment.

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Risk Management Recommendations

Sufficient ventilation, proper handling and storage techniques can control exposure to dimethyl methylphosphonate in the workplace, and the use of appropriate personal protective equipment is recommended, consistent with the SDS for this substance. The use of dimethyl methylphosphonate as an additive in consumer products, is not anticipated to result in appreciable exposure or substantive risk.

National and local governments regulate dimethyl methylphosphonate emissions from facilities. The regulatory emission limits for each facility are established to protect the health and environment of the community surrounding the facility and are written into the facility's operating permit.

A selection of occupational exposure limits is provided below.

- Belarus. Sanitary norms, rules and hygienic standards, List of regulated air pollutants of the working zone, Table 3 Maximum Permissible Concentration - one-time (vapor and/or gas): 5 mg/m³.
- Russia. Hygienic standards GN 2.2.5.1313-03 Permissible concentration (MAC) of harmful substances in the air of the working area: Maximum Permissible Concentration - Short Term Exposure (vapor and/or gas): 5 mg/m³.

Regulatory Agency Review

Dimethyl methylphosphonate is on the following lists:

- Taiwan Chemical Substance Inventory (TCSI)
- Australia Inventory of Chemical Substances (AICS)
- Canadian Domestic Substances List (DSL)
- China. Inventory of Existing Chemical Substances in China (IECSC)
- ECHA List of Publishable Substances Registered
- European Inventory of Existing Commercial Chemical Substances (EINECS)
- Japan. ENCS - Existing and New Chemical Substances Inventory
- Korea. Korean Existing Chemicals Inventory (KECI)
- New Zealand. Inventory of Chemical Substances
- Philippines Inventory of Chemicals and Chemical Substances (PICCS)
- United States TSCA Inventory
- Japan. ISHL - Inventory of Chemical Substances Thailand. Hazardous Substance List
- Indonesia. Regulation of the Minister of Trade No. 44 of 2009 on Procurement, Distribution and Supervision of Hazardous Material
- Thailand. Hazardous Substance List
- Vietnam. List of declarable chemicals

Regulatory Information / Classification and Labeling

Under the Globally Harmonized System for classification and labeling (GHS), substances are classified according to their physical, health, and environmental hazards. The hazards are communicated via

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specific labels and the (Extended) 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.

GHS Classification:

Acute toxicity (Inhalation) - Category 4
Serious eye damage/eye irritation - Category 2A
Germ cell mutagenicity - Category 1B
Reproductive toxicity - Category 2

Hazard Statements:

H319: Causes serious eye irritation.
H332: Harmful if inhaled.
H340: May cause genetic defects.
H361f: Suspected of damaging fertility.

Signal Word: Danger

Precautionary Statements:

P201: Obtain special instructions before use.
P202: Do not handle until all safety precautions have been read and understood.
P261: Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264: Wash skin thoroughly after handling.
P271: Use only outdoors or in a well-ventilated area.
P280: Wear protective gloves/ protective clothing/ eye protection/ face protection.

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Hazard Pictograms:



Conclusion

Dimethyl methylphosphonate is used as a flame retardant, a preignition additive for gasoline, as an anti-foaming agent, as a plasticizer, as a stabilizer, as a textile conditioner, as an antistatic agent, and as an additive for solvents and low temperature hydraulic fluids. When handled responsibly, the potential for serious eye irritation, genotoxicity/mutagenicity and reproductive toxicity can be minimized, allowing consumers and workers to use materials containing dimethyl methylphosphonate safely.

Contact Information

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Additional Information

For more information on Product Stewardship at INEOS Composites, visit our website's Safety, Health and Environment (SHE) page: www.ineos.com/composites-she

For more information on GHS, visit <http://www.osha.gov/dsg/hazcom/ghsguideoct05.pdf> or http://live.unece.org/trans/danger/publi/ghs/ghs_welcome_e.html.

Disclaimer

All statements, information and data presented herein are believed to be accurate and reliable, but are not to be taken as a guarantee, an express warranty, or an implied warranty of merchantability or fitness for a particular purpose, or representation, express or implied, for which INEOS Composites and its affiliates assume legal responsibility.

REACH registration is specific to Importers/Manufacturers that place the chemical on the EU market and is specific to registered uses. Inclusion on the list of REACH Registered Substances does not automatically imply registration by INEOS Composites.

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Inclusion on the New Zealand Inventory of Chemicals applies only to the pure substance listed. The importer of record must determine whether their substances comply.