Ethyl methylphosphonate

sc-228072

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
Ethyl methylphosphonate

STATEMENT OF HAZARDOUS NATURE
CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA

SUPPLIER
Santa Cruz Biotechnology, Inc.
2145 Delaware Avenue
Santa Cruz, California 95060
800.457.3801 or 831.457.3800
EMERGENCY:
ChemWatch
Within the US & Canada: 877-715-9305
Outside the US & Canada: +800 2436 2255
(1-800-CHEMCALL) or call +613 9573 3112

SYNONYMS
C3-H9-O3-P, CH3P(=O)(OH)OC2H5, "phosphonate, ethyl methyl-"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	1		
Toxicity:	3		
Body Contact:	2		
Reactivity:	1		
Chronic:	2		

Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Toxic if swallowed.
Irritating to eyes, respiratory system and skin.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Toxic effects may result from the accidental ingestion of the material; animal experiments indicate that ingestion of less than 40 gram may be fatal or may produce serious damage to the health of the individual.

EYE

■ This material can cause eye irritation and damage in some persons.

SKIN

■ This material can cause inflammation of the skin oncontact in some persons.
■ The material may accentuate any pre-existing dermatitis condition.
■ Open cuts, abraded or irritated skin should not be exposed to this material.
■ Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects.
Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.

INHALED

■ The material can cause respiratory irritation in some persons.
The body's response to such irritation can cause further lung damage.
■ Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
■ Inhalation hazard is increased at higher temperatures.
■ Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary edema.
■ Aliphatic, aromatic and substituted phosphonates exhibit moderate to high toxicity, and toxicity is increased when there are benzene rings and halogen or nitro group substitution.

CHRONIC HEALTH EFFECTS

■ Long-term exposure to respiratory irritants may result in disease of the airways involving difficult breathing and related systemic problems.
Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
ethyl methylphosphonate	1832-53-7	>98

Section 4 - FIRST AID MEASURES

SWALLOWED

· IF SWALLOWED, REFER FOR MEDICAL ATTENTION, WHERE POSSIBLE, WITHOUT DELAY. · Where Medical attention is not immediately available or where the patient is more than 15 minutes from a hospital or unless instructed otherwise:

EYE

■ If this product comes in contact with the eyes: · Immediately hold eyelids apart and flush the eye continuously with running water. · Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.

SKIN

■ If skin contact occurs: · Immediately remove all contaminated clothing, including footwear · Flush skin and hair with running water (and soap if available).

INHALED

· If fumes or combustion products are inhaled remove from contaminated area. · Lay patient down. Keep warm and rested.

NOTES TO PHYSICIAN

■ All persons handling organic phosphorus ester materials regularly should undergo regular medical examination with special stress on the central nervous systems. Whilst atropine or pyridine-2-aldoxime methiodide (PAM) are beneficial antidotes for acute phosphate ester poisonings, they are of little value in reversing acute or chronic neurological damage due to phosphites and some types of aryl phosphate.

Section 5 - FIRE FIGHTING MEASURES

Vapour Pressure (mmHG):	Not available
Upper Explosive Limit (%):	Not available
Specific Gravity (water=1):	1.172
Lower Explosive Limit (%):	Not available

EXTINGUISHING MEDIA
· Foam.
· Dry chemical powder.

FIRE FIGHTING
· Alert Emergency Responders and tell them location and nature of hazard.
· Wear full body protective clothing with breathing apparatus.
When any large container (including road and rail tankers) is involved in a fire,
consider evacuation by 800 metres in all directions.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS
· Combustible.
· Slight fire hazard when exposed to heat or flame.
Combustion products include: carbon dioxide (CO_2), phosphorus oxides (POx), other pyrolysis products typical of burning organic material.
May emit poisonous fumes.

FIRE INCOMPATIBILITY
■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION
Glasses:
Chemical goggles.
Gloves:
Respirator:
Type A Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
· Remove all ignition sources.
· Clean up all spills immediately.
MAJOR SPILLS
· Clear area of personnel and move upwind.
· Alert Emergency Responders and tell them location and nature of hazard.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
· DO NOT allow clothing wet with material to stay in contact with skin.
· Avoid all personal contact, including inhalation.
· Wear protective clothing when risk of exposure occurs.

RECOMMENDED STORAGE METHODS
· Lined metal can, Lined metal pail/drum
· Plastic pail.
For low viscosity materials
· Drums and jerricans must be of the non-removable head type.
· Where a can is to be used as an inner package, the can must have a screwed enclosure.

STORAGE REQUIREMENTS
· Store in original containers.
· Keep containers securely sealed.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

The following materials had no OELs on our records

• ethyl methylphosphonate: CAS:1832-53-7

PERSONAL PROTECTION

RESPIRATOR

•Type A Filter of sufficient capacity. (AS/NZS 1716 & 1715, EN 143:2000 & 149:2001, ANSI Z88 or national equivalent)

EYE

· Safety glasses with side shields.
· Chemical goggles.

HANDS/FEET

■ Wear chemical protective gloves, eg. PVC.
Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:
· frequency and duration of contact,
· chemical resistance of glove material,
· glove thickness and
· dexterity
Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739, AS/NZS 2161.1 or national equivalent).
· When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
· When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374, AS/NZS 2161.10.1 or national equivalent) is recommended.
· Contaminated gloves should be replaced.
Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.
· Neoprene gloves.

OTHER

· Overalls.
· Eyewash unit.

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Does not mix with water.
Sinks in water.

State	Liquid	Molecular Weight	124.08
Melting Range (°F)	Not available	Viscosity	Not Available
Boiling Range (°F)	Not available	Solubility in water (g/L)	Partly miscible
Flash Point (°F)	>230	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not available.	pH (as supplied)	Not applicable
Autoignition Temp (°F)	Not available	Vapour Pressure (mmHG)	Not available
Upper Explosive Limit (%)	Not available	Specific Gravity (water=1)	1.172
Lower Explosive Limit (%)	Not available	Relative Vapor Density (air=1)	>1
Volatile Component (%vol)	Not available	Evaporation Rate	Not available

APPEARANCE

Colourless liquid; does not mix well with water.

According to the Mackay Fugacity Model Level I, the main target compartments (environmental equilibrium distribution) for DMP are water (95 %) and air (5 %). The degradation product MMP will partition nearly exclusively to the water compartment based on a water solubility of 1000 mg/l, a vapor pressure of 25 Pa and a log Kow of -1.19. The calculated Henry's law constants of 0.33 Pa.m3.mol-1 for DMP and of 0.002 Pa.m3.mol-1 for MMP indicate a low to moderate potential for volatilisation from surface waters. The calculated log Kow values (log Kow = -1.2 for DMP, log Kow = -1.19 for MMP) indicate no bioaccumulation potential. The calculated Koc values (Koc = 2.62 for DMP and 1.36 for MMP) suggest that both substances have a very low geoaccumulation potential.

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

· Presence of incompatible materials.
· Product is considered stable.

STORAGE INCOMPATIBILITY

■ Avoid reaction with oxidizing agents.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

ethyl methylphosphonate

TOXICITY AND IRRITATION

ETHYL METHYLPHOSPHONATE:

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.
Dimethyl phosphite (dimethyl phosphonate) (DMP) is rapidly absorbed via the oral and dermal routes. The main metabolic pathway in rodents is demethylation to monomethyl hydrogen phosphite (MMP) and further oxidation to CO2. DMP was mainly eliminated via urine and expired air. Over the studied dose range between 10 and 200 mg/kg bw and 5 x 200 mg/kg bw, respectively, only little evidence of bioaccumulation or saturation of absorption and elimination was observed. The only difference in studied toxicokinetics between rats and mice was the more rapid metabolism and elimination in mice.
An inhalation LC50 value is not available, but an exposure of 7100 mg/m³ (concentration estimated based on air flow and net loss of material) over 6 hours was not lethal for rats, mice and guinea pigs. Clinical signs were observed in mice only, and included occasionally laboured respiration after approximately 2 hours of exposure and ptosis after 5 hours. The acute dermal LD50 was 681 mg/kg bw (rabbits). Signs of intoxication were depression, ptosis, labored respiration, ataxia and placidity. The acute oral LD50 values were: 3283 mg/kg bw for male rats, 3040 mg/kg bw for female rats, 2815 mg/kg bw for male mice, and between 2150 and 3160 mg/kg bw for female mice. Clinical signs were inactivity, weakness, prostration and shallow breathing at doses near to or exceeding the LD50 values. White opaque eyes were seen in male mice.
DMP is irritating to the skin and eyes of rabbits. After prolonged or repeated exposures moderate to severe irritation of skin and mucosa was observed in rats. No sensitisation studies are available.
In a repeat dose inhalation study on rats over 4 weeks, no NOAEL could be derived as increased kidney weights and keratitis were found in both sexes down to the lowest tested concentration (LOAEL: 49 mg/m³, corresponding to about 10 mg/kg bw/d). In the same study, DMP caused eye cataracts at concentrations equal to or greater 142 mg/m³, and an increase in mortality at concentrations equal to or greater 483 mg/m³.
In 13-week gavage studies on rats, decreased body weight gains were noted in females at 200 mg/kg bw/d, and for males at 400 mg/kg bw/d. At 400 mg/kg bw/d, eye changes (cataracts), and lung toxicity (inflammation, congestion, histiocytosis) occurred (NOAEL, male: 200 mg/kg bw, NOAEL, female: 100 mg/kg bw). At 375 mg/kg bw/d mortality was increased, and there were no surviving animals at 750 mg/kg bw/d. For mice the NOAEL (13 week, gavage), was 95 mg/kg bw/d, with histopathological changes in heart and liver appearing at 190 mg/kg bw/d.
In a 2-year gavage study on rats, lung effects were seen in both sexes at 100 mg/kg bw/d. At 200 mg/kg bw/d, males had cataracts and focal mineralization in the cerebellum (NOAEL, females: 50 mg/kg bw/d; LOAEL, males: 100 mg/kg bw/d, lowest tested dose in males). For female mice the NOAEL (2-yr, gavage) was 200 mg/kg bw/d (highest tested dose), whilst a NOAEL for male mice could not be derived as calcification of testis was still found at the lowest tested concentration of 100 mg/kg bw/d. An increased mortality was seen in male mice at 200 mg/kg bw/d.
In vitro data indicate that DMP has mutagenic and clastogenic potential. The available in vivo data are limited to the bone marrow and the results are conflicting with one study indicating clastogenicity. DMP should be regarded as having genotoxic potential in vivo.
DMP showed clear evidence of carcinogenicity in male F344 rats and equivocal evidence in female F344 rats. Target organs were lungs and forestomach. No evidence of carcinogenicity was observed in male and female B6C3F1 mice.

In a screening study on rats according to OECD TG 421 (gavage study), effects on fertility were seen in females at 270 mg/kg bw/d in the presence of severe general toxicity (decrease in number of females with corpora lutea and implantation sites) (NOAEL reproduction toxicity: 90 mg/kg bw/d; NOAEL general toxicity: 90 mg/kg bw/d). Focal testicular calcification was seen in mice treated orally with 100 mg/kg bw/d for 2-years, and hypospermatogenesis in rats after inhalation of 483 mg/m³ (corresponding to about 100 mg/kg bw/d) for 4 weeks.
No developmental toxicity was found in rats at doses of 30 and 90 mg/kg bw/d (NOAEL developmental toxicity: 90 mg/kg bw/d).
No significant acute toxicological data identified in literature search.

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
ethyl methylphosphonate	HIGH	No Data Available	LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions
All waste must be handled in accordance with local, state and federal regulations.
¦ Puncture containers to prevent re-use and bury at an authorized landfill.
Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:
· Reduction
· Reuse
· Recycling
· Disposal (if all else fails)
This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.
· Recycle wherever possible or consult manufacturer for recycling options.
· Consult Waste Management Authority for disposal.

Section 14 - TRANSPORTATION INFORMATION

DOT:
Symbols: None Hazard class or Division: 6.1
Identification Numbers: UN2810 PG: III
Label Codes: 6.1 Special provisions: IB3, T7,
TP1, TP28
Packaging: Exceptions: 153 Packaging: Non- bulk: 203
Packaging: Exceptions: 153 Quantity limitations: 60 L
Passenger aircraft/rail:
Quantity Limitations: Cargo 220 L Vessel stowage: Location: A
aircraft only:
Vessel stowage: Other: 40
Hazardous materials descriptions and proper shipping names:
Toxic, liquids, organic, n.o.s.

Air Transport IATA:
UN/ID Number: 2810 Packing Group: III
Special provisions: A3
Cargo Only
Packing Instructions: 663 Maximum Qty/Pack: 220 L
Passenger and Cargo Passenger and Cargo
Packing Instructions: Y642 Maximum Qty/Pack: 60 L
Passenger and Cargo Limited Quantity Passenger and Cargo Limited Quantity
Packing Instructions: 655 Maximum Qty/Pack: 2 L
Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S. *(CONTAINS
ETHYL METHYLPHOSPHONATE)

Maritime Transport IMDG:
IMDG Class: 6.1 IMDG Subrisk: None
UN Number: 2810 Packing Group: III
EMS Number: F-A,S-A Special provisions: 223 274
Limited Quantities: 5 L
Shipping Name: TOXIC LIQUID, ORGANIC, N.O.S.(contains ethyl methylphosphonate)

Section 15 - REGULATORY INFORMATION

ethyl methylphosphonate (CAS: 1832-53-7) is found on the following regulatory lists;
"US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE
■ Inhalation may produce health damage*.
■ Cumulative effects may result following exposure*.
* (limited evidence).

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■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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