

MATERIAL SAFETY DATA SHEET

Methyl Bromide, 100%

1. Identification of the substance & the company

Chemical name: Methyl bromide
Synonym(s): Bromomethane, MBr
Chemical formula: CH₃Br
Chemical family: Halogenated alkane
Molecular weight: 94.94
Type of product and use: A broad-spectrum pesticide widely used as a powerful fumigant. For industrial use.
Company Information: Penglai Chemical, Inc., Tel: 0086 535 569 3889 Fax: 0086 535 565 3426

2. Composition / information on ingredients

Components: METHYL BROMIDE, 74-83-9
Weight %: 100
Annex No.: 602-002-00-2
EINECS No.: 200-813-2
Classification: Muta. Cat.3; R68 N; R50 N; R59 T; R23/25 Xi; R36/37/38 Xn; R48/20

3. Hazards identification

Important hazards: Toxic and Irritant
Adverse human health effects: Methyl bromide may be fatal if inhaled and harmful if swallowed or absorbed through the skin. It is a neurotoxin and a severe irritant to the upper and lower respiratory tract, skin and eyes.
NFPA Ratings (Scale 0-4): Health = 3, Fire = 1, Reactivity = 0.

4. First-aid measures

A 24-HOUR MEDICAL SURVEILLANCE PERIOD IS MANDATORY IN ALL CASES OF EXPOSURE TO METHYL BROMIDE, EVEN IN THE ABSENCE OF ANY IMMEDIATE SIGNS OF POISONING.

Eye contact: Holding the eyelids apart, flush eyes promptly with copious flowing water for at least 20 minutes. Get medical attention immediately.

Skin contact: Wash skin thoroughly with mild soap and plenty of water for at least 15 minutes. Get medical attention immediately. All leather items should be discarded. Other contaminated clothing must either be discarded or thoroughly ventilated and washed before re-use.

Inhalation: In case of inhalation, remove person to fresh air. Keep him quiet and warm. Apply artificial respiration if necessary and get medical attention immediately.

Ingestion: If swallowed, wash mouth thoroughly with plenty of water. Get medical attention immediately.

NOTE: Never give an unconscious person anything to drink.

Notes to the physician:

Intense vesicant.

Signs and symptoms of toxicity are primarily referable to the CNS, respiratory tract and the cardiovascular system.

No specific antidote.

5. Fire - fighting measures

Flash point: None

Flammable/Explosion limits:

- Lower (% vol) 10

- Upper (% vol) 16

Auto-ignition temperature: 537°C

Suitable extinguishing media: Carbon dioxide, dry chemicals, foam, water spray (fog).

Fire fighting procedure: Wear self-contained breathing apparatus in positive pressure mode and appropriate protective clothing. If possible stop material flow immediately. Do not extinguish burning gas unless flow can be shut off immediately. Use water spray, fog nozzle or CO₂ to keep cylinder cool. If there is no risk, move cylinder away from fire.

Unusual fire and explosion hazards:

Although it is considered practically nonflammable, methyl bromide can be ignited with a high energy source of ignition. Containers may rupture violently if exposed to fire or excessive heat for sufficient time. In confined spaces such as buildings or sewers, there is a danger of vapour accumulation, which may result in explosion in the presence of an ignition source. Will decompose from ca. 400°C releasing poisonous and corrosive fumes of carbon monoxide and hydrogen bromide.

6. Accidental release measures

Personal precautions: Evacuate area and keep personnel upwind. Wear self-contained breathing apparatus in positive pressure mode.

Methods for cleaning up: If practicable, stop flow of vapour. Ventilate and/or allow to evaporate, keeping people away from the area until safe re-entry levels are shown by halide detector.

7. Handling and storage

Handling: Avoid bodily contact. Use an appropriate monitoring instrument for methyl bromide in any area where it

is being stored or handled. Move and transport containers with requisite care. Do not use hooks, rope sling, etc. to unload. Use hand or fork trucks to firmly cradle cylinders. Do not bump or drag them. Do not dent cans.

Storage: Store containers upright, in a secure manner, either outdoors under ambient conditions, or indoors in a well ventilated area, away from seeds, foods/feed-stuffs and human and animal habitation. Post as a pesticide storage area. Test periodically for leaks by halide leak detector.

8. Exposure controls / personal protection

Exposure Limits:

Components: METHYL BROMIDE, 74-83-9

ACGIH-TLV Data: 1 ppm (3.9 mg/m³), skin , A4

OSHA (PEL) Data: C 20 ppm (C 80 mg/m³), skin

Ventilation requirements: Ventilation must be sufficient to maintain atmospheric concentration below TLV. Mechanical ventilation is recommended. Use local exhaust at source of vapour.

Personal protective equipment:

- Respiratory protection: For escape - Gas mask with a new organic vapour canister. For any detectable concentration - Self-contained breathing apparatus or supplied-air respirator with a full face-piece.

- Hand protection: DO NOT WEAR GLOVES when working with MBr because of the danger that liquid or concentrated vapour may be trapped inside them.

- Eye protection: Splash-proof safety glasses CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THIS CHEMICAL.

- Skin and body protection: No specially designed protective clothing is available. Do not wear gloves, impervious boots, finger rings or adhesive bandages on hands when handling this material.

Hygiene measures: When using this material, do not eat, drink or smoke. Safety shower and eye bath should be provided. Do not eat, drink or smoke until after-work showering and changing clothes.

9. Physical and chemical properties

Appearance: Colourless gas, odourless at low concentrations; sweetish odour at very high concentrations. Clear, colourless to straw-coloured liquid under pressure or below 3.5°C.

Melting point/range: -94°C
Boiling point/range: 3.5-4°C
Vapour pressure: 1420 mm Hg at 20°C
Vapor density: 3.3 at 20°C
Evaporation rate (ether=1): >1
Solubility:
- Solubility in water 0.132 gr/100ml at 25°C (partial pressure CH₃Br - 73 torr) 0.138 gr/100ml at 25°C (partial pressure CH₃Br - 108 torr)
- Solubility in other solvents Infinitely soluble in most organic solvents
Partition coefficient (n-octanol/water): Log₁₀ Kow - approximately 1.92
Decomposition temperature: From ca. 400°C

10. Stability and reactivity

Stability: Stable in sealed containers and under normal conditions
Materials to avoid: Strong oxidizers, aluminum and magnesium metals and their alloys, natural rubber and certain types of plastics.
Conditions to avoid: Keep away from ignition sources. Avoid contamination by water
Hazardous decomposition products: CO, HBr
Hazardous polymerization: Will not occur

11. Toxicological information

Acute toxicity:

- Rat oral LD₅₀: liquid MBr in corn oil - 104 mg/kg microencapsulated MBr in corn oil - 133 mg/kg
- Rat inhalation LC₅₀: 1175 mg/m³/8 hour
- Mouse inhalation LC₅₀: 1540 mg/m³/2 hour

Effects of overexposure :

- Ocular Severe irritant: Contact with liquid or high concentrations of gas with the eyes may cause severe but usually reversible injury involving temporary blindness.
- Dermal Liquid splashed on clothing or leather or high gas concentrations held in contact with skin may cause skin burns with large blisters appearing after several hours. Less severe exposures may cause itching skin rash even after several days. May be absorbed through the skin in sufficient amount to cause systemic toxicity.
- Inhalation Acute poisoning from methyl bromide is characterized by marked irritation to the respiratory tract which may lead, in severe cases, to pulmonary edema. High concentrations may damage the liver, kidneys and central nervous system. Symptoms of poisoning include headache, dizziness, somnolence, vertigo, blurred vision, slurred speech, nausea and vomiting and possibly convulsions and coma. ONSET OF TOXIC SYMPTOMS MAY BE DELAYED FROM 30 MINUTES TO SEVERAL DAYS.
- Ingestion Severe irritant to mucous membranes and toxic poison if ingested, although ingestion is highly unlikely.

Chronic toxicity: Chronic exposure to low concentrations of methyl bromide may produce central nervous system effects. Signs include mental confusion, lethargy, inability to focus one's eye, incoordination and muscle weakness.

Repeated skin contact may cause dermatitis.

Mutagenicity: Mutagenic by the Ames Test MBr induced DNA damage in rat testis following inhalation exposure at 250 ppm (6 hours/day for 5 consecutive days). In vivo, MBr induced sister chromatid exchanges in bone marrow cells and micronuclei in peripheral erythrocytes of female mice exposed by inhalation for 14 days.

Carcinogenicity Studies conducted with MBr, exposing animals both by inhalation (rats & mice) and by oral route (fumigated feed, rats), showed that THERE WAS NO EVIDENCE OF CARCINOGENIC ACTIVITY. Not included in NTP 9th Report on Carcinogens. IARC Group 3 (animal inadequate evidence, human no data available).

Other: Single exposure vapour inhalation neurotoxicity study in rats:

---NOEL - 100 ppm

Acute oral toxicity (single dose) study in Beagle dogs:

---Lethal dose - 500 mg/kg

---No clinical signs were observed at 1 mg/kg

12. Ecological information

Information on ecological effects:

Methyl bromide is listed in the Montreal Protocol as a controlled substance with an ODP (Ozone Depleting Potential) of 0.4.

Aquatic toxicity :

- 96 Hour-LC50, Fish: 3.9 mg/l (Rainbow Trout) 56.28 mg/l (Zebrafish)
- 48 Hour-EC50, Daphnia magna: 2.6 mg/l
- 72 Hour-EC50, Freshwater algae: 5 mg/l (Selenastrum capricornutum)-(MBr)

Avian toxicity:

- Oral LD50: approximately 73 mg/kg (Northern Bobwhite)

Persistence and degradability:

- Hydrolysis: Under laboratory conditions (MBr)
 - Half-life at pH 5 - 256.7 hours
 - Half-life at pH 7 - 253.9 hours
 - Half-life at pH 9 - 357.3 hours

13. Disposal considerations

Waste disposal The recommended method is incineration. If a suitable designated combustion chamber is not available, return MARKED containers to supplier. Contact local and/or state environmental authorities to insure proper compliance. Observe all federal, state and local environmental regulations when disposing of this material.

14. Transportation information

UN No.: 1062

IMO:

Proper shipping name: Methyl bromide
Class: 2.3 Toxic Gases
Label: TOXIC GAS (2)

ADR/RID:

Hazard identification No. 26
Class 2 : Gases
Classification Code: T2
Label No.: 2.3+13(RID)

ICAO/IATA:

Class: 2.3
Cargo aircraft - Forbidden
Passenger aircraft - Forbidden

DOT:

Proper shipping name: Methyl bromide
Hazard Class 2.3: Poison gas
Shipping description: Inhalation Hazard; Hazard zone C
Label: POISON GAS (2)
---RQ - 1000 lbs.

15. Regulatory information

EEC: Reported in EINECS (No. 2008132)

- Indication of danger:

Toxic, symbol required (T); Dangerous for the environment, symbol required (N); Mutagenic Cat. 3

- Risk Phrases:

R 23/25 :Toxic by inhalation and if swallowed.

R 36/37/38 :Irritating to eyes, respiratory system and skin.

R 48/20: Harmful: danger of serious damage to health by prolonged exposure through inhalation

R 50 : Very toxic to aquatic organisms.

R59 :Dangerous to the ozone layer

R 68: Possible risk of irreversible effects

- Safety Phrases:

S 1/2: Keep locked up and out of reach of children.

S 15: Keep away from heat.

S 27: Take off immediately all contaminated clothing.
S 36/39: Wear suitable protective clothing and eye/face protection.
S 38: In case of insufficient ventilation, wear suitable respiratory equipment.
S45 - In case of accident or if you feel unwell, seek medical advice immediately (show label where possible).
S 59: Refer to manufacturer/supplier for information on recovery/recycling.
S 61: Avoid release to the environment. Refer to special instructions/Safety data sheets.

Australia: Listed in AICS
USA: Reported in the EPA TSCA Inventory. This product is subject to registration under FIFRA
Canada: Listed in DSL
Japan: Listed in MITI (ENCS No.2-39)
China: inventory Listed
South Korea: Listed in ECL (KE-03676)
Philippines: Listed in PICCS
Switzerland: Listed in Giftliste 1 (G-2062)

16. Other information

WITHIN THIS FRAMEWORK WE ARE COMMITTED TO:

- * Comply with national and international regulatory requirements
- * Conform to the ISO 14001 and OHSAS 18001 requirements for environmental and occupational health & safety management systems and periodically evaluate performance as part of the company's existing quality audits system.
- * Design products and processes which prevent risk to health and the environment at production sites and along the supply chain.
- * Improve efficiency in use of energy & natural resources, promote recycling and waste management through safe & environmentally sound end of life programs.
- * Work for continual improvement in HSE performance
- * Regularly assess and responsibly manage health, safety and environmental risks associated with products and processes.
- * Distribute updated information concerning its policy and products to its workers, customers and other interested parties through Material Safety Data Sheet (MSDS), workers' safety sheets and through our Internet site.
- * Develop business relationships with responsible suppliers, transporters and distributors and provide them with HSE support, information and training.