SAFETY DATA SHEET

Product name: Methyl Bromide
Product id: 8326
Revision date: 07/09/2014
Revision: 12
Supersedes: 02/01/2012

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: For industrial use
A broad-spectrum pesticide widely used as a powerful fumigant.

Company: Bromine Compounds Ltd.
P.O.B 180, Beer Sheva 84101, Israel
Tel +972-8-6297835
Emergency telephone number:
- For Europe ( +31) 115 689000
- For UK and Ireland +44 (0) 1270 502891 (24 Hours)
- For USA Chemtrec (800) 424-9300
- For Asia - Pacific ALERT-SGS
  24 hr Toll Free Number : +800 ALERTSGS (+800-2537-8747)
  24 hr Singapore Exchange Number : +65 6542-9595
- For Japan +81-3-6801-8430

2. Hazards identification

GHS classification
Press. Gas
Muta 2, H341 Suspected of causing genetic defects
Acute Tox. 3 H331 Toxic if inhaled
Acute Tox. 3, H301 Toxic if swallowed
STOT RE 2, H373 May cause damage to organs through prolonged or repeated exposure by inhalation.
Eye Irrit. 2, H319 Causes serious eye irritation
STOT SE 3, H335 May cause respiratory irritation
Skin Irrit. 2, H315 Causes skin irritation
Aquatic Acute 1, H400 - Very toxic to aquatic life
Ozone 1: H420 Harms public health and the environment by destroying ozone in the upper atmosphere

Label elements

Symbol(s)
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Signal Word DANGER

Hazard statements
H341 - Suspected of causing genetic defects
H331 - Toxic if inhaled
H301 - Toxic if swallowed
H373 - May cause damage to organs through prolonged or repeated exposure by inhalation.
H319 - Causes serious eye irritation
H335 - May cause respiratory irritation
H315 - Causes skin irritation
H400 - Very toxic to aquatic life
H420 - Harms public health and the environment by destroying ozone in the upper atmosphere

Precautionary statements
P202 - Do not handle until all safety precautions have been read and understood
P260 - Do not breathe dust/fume/gas/mist/vapors/spray
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P304 + P340 - IF INHALED: Remove person to fresh air and keep comfortable for breathing
P311 - Call a POISON CENTER or doctor/physician.
P301 + P310 - IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician
P330 - Rinse mouth
P305 + P351 + P338 - IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P302 + P352 - IF ON SKIN: Wash with plenty of soap and water
P502 - Refer to manufacturer/supplier for information on recovery/recycling

NFPA Ratings (Scale 0-4) Health = 3, Fire = 1, Reactivity = 0
3. Composition / information on ingredients

<table>
<thead>
<tr>
<th>Components</th>
<th>Weight %</th>
<th>Index No.</th>
<th>EC No.</th>
<th>EU Classification</th>
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</thead>
<tbody>
<tr>
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<td># 602-002-00-2</td>
<td>200-813-2</td>
<td>Press. Gas</td>
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<td>Acute Tox. 3 H301</td>
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<td>Acute Tox. 3 H331</td>
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<td>STOT RE 2 H373</td>
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<td>Eye Irrit. 2 H319</td>
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<td>STOT SE H335</td>
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<td>Skin Irrit 2 H315</td>
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<td>Aquatic Acute 1 H400</td>
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<td>Ozone 1 H420</td>
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<td>(In accordance with CLP 1272/2008)</td>
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<td>Muta. Cat.3; R68</td>
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<td></td>
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<td>Xi; R36/37/38</td>
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<td>Xn; R48/20 (In accordance with DSD 67/548/EEC)</td>
</tr>
</tbody>
</table>

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
Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

Inhalation
In case of dust inhalation or breathing fumes released from heated material, 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
-----------------------------------------------------------------------------------------------------
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Most important symptoms and effects, acute or delayed

- **Ocular**
  Causes serious eye irritation
  Contact with liquid or high concentrations of gas with the eyes may cause severe but usually reversible injury involving temporary blindness.

- **Dermal**
  Causes skin irritation
  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**
  Toxic by inhalation.
  May cause respiratory irritation
  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**
  Toxic if swallowed. Severe irritant to mucous membranes and toxic poison if ingested, although ingestion is highly unlikely.

**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**

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

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.

Environmental precautions: Avoid access to streams, lakes or ponds.

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.

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:

<table>
<thead>
<tr>
<th>Components</th>
<th>ACGIH-TLV Data</th>
<th>OSHA (PEL) Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>METHYL BROMIDE 74-83-9</td>
<td>1 ppm skin, A4</td>
<td>C 20 ppm (C 80 mg/m³), skin</td>
</tr>
</tbody>
</table>

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

Personal protective equipment:
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- 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.
  DO NOT WEAR GOGGLES

- 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
Do not eat, smoke or drink where material is handled, processed or stored. Wash hands thoroughly after handling and before eating or smoking. Safety shower and eye bath should be provided.

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.

pH
Not available

Melting point/range
-94°C

Boiling point/range
3.5 - 4°C

Flash point
None

Evaporation rate (ether=1)
>1

- Lower (% vol)
10

- Upper (% vol)
16

Vapor pressure
1420 mmHg (20°C)

Vapor density
3.3 (20°C)

- 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)
Log Kow - ~ 1.92

Auto-ignition temperature
537°C

Decomposition temperature
~ 400°C

Viscosity
Not applicable

Explosive properties
Not available

Oxidising properties
Not available

10. Stability and reactivity

Reactivity
No data available.
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<tr>
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<tbody>
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</tr>
</tbody>
</table>

## Stability
- Stable in sealed containers and under normal conditions
- Possibility of hazardous reactions: No data available
- Conditions to avoid: Avoid contamination by water. Keep away from ignition sources.
- Materials to avoid: Strong oxidizers, aluminum, tin, zinc and magnesium metals and their alloys, natural rubber and certain types of plastics.
- Hazardous decomposition products: CO, HBr

## 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
- **Dermal irritation (rabbit)**
  - Irritant
- **Eye irritation (rabbit)**
  - Severe irritant
- **Dermal sensitization**
  - Exposure in human resulted in redness, congestion, dermatitis, itching, swollen areas and blistering.

### 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 12th Report on Carcinogens
- IARC Group 3 (animal inadequate evidence, human no data available)

### Reproductive toxicity
- In a two generation reproductive study via inhalation in albino rats, the NOEL was 90 ppm.

### 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

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  ~ 73 mg/kg (Northern Bobwhite)
- 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

Germany, water endangering classes (WGK)  3

Note:  Methyl bromide is listed in the Montreal Protocol as a controlled substance with an ODP (Ozone Depleting Potential) of 0.6.

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
IMDG
Proper shipping name: Methyl bromide
Class: 2.3 Toxic Gases
Label: TOXIC GAS (2)
Mark: MARINE POLLUTANT
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ADR/RID
Proper shipping name: Methyl bromide
Hazard identification No. 26
Class 2: Gases
Classification Code: 2T
Label No.: 2.3+13(RID)
Marking: Environmentally hazardous substance

ICAO/IATA
Proper shipping name: Methyl bromide
Class: 2.3
Cargo aircraft - Forbidden
Passenger aircraft - Forbidden
Marking: Environmentally hazardous substance

DOT
Proper shipping name: Methyl bromide
Hazard Class 2.3: Poisonous gas
Shipping description: Inhalation Hazard; Hazard Zone C
Label: POISON GAS (2.3)
---RQ - 1000 lbs (MBr)
Emergency Guide No.123
Marking: Marine Pollutant

Not regulated as a marine pollutant for surface and air transport in non-bulk (<119 gallons) packagings.

15. Regulatory information

EU
Regulated under Article 22 of EC Regulation No. 2037/2000 on substances that deplete the ozone layer.

- Indication of danger
Toxic, symbol required (T)
Dangerous for the environment, symbol required (N)
Mutagenic Cat. 3

- R 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
R50: Very toxic to aquatic organisms
R 59: Dangerous to the ozone layer
R 68: Possible risk of irreversible effects
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- S 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.
S 45 - 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.

USA
Reported in the EPA TSCA Inventory.
This product is subject to registration under FIFRA

Australia
Listed in AICS

Canada
Listed in DSL This substance is listed under Part 1, Group 1 Substances in the National Pollutant Release Inventory (NPRI) for 2008. Information about this substance must be reported to the Minister of the Environment in accordance with subsection 46(1) of the Canadian Environmental Protection Act, 1999. This chemical is included on the current phase-out schedule of ozone-depleting substances under the Canadian Environmental Protection Act, 1999.

China
- China inventory
Listed in IECSC

- Hazardous Chemicals List
The substance is included

- Toxic Chemicals List
The substance is not included

Japan
ENCS no. 2-39
ISHL no. 2-39

Hong Kong
Dangerous Goods - Category 2 - Compressed Gases (MBr) Ozone Depleting Substances - Part 6 scheduled substance (MBr)

Korea
Listed in ECL (KE-03676)
Toxic chemical No.97-1-113, 1% or more in mixtures (MBr)

Mexico
Listed in the National Inventory of Chemical Substances (INSQ).

New Zealand Inventory
Listed in NZIoC

Philippines
Listed in PICCS

Taiwan
Harmful substances
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16. Other information

This data sheet contains changes from the previous version in section(s) 1(REACH), 2(ANSI), 4, 8, 10, 15

Health, Safety & Environment Policy

We will strive to ensure that our operations and products meet the needs of the present global community without compromising the ability of future generations to meet their needs. We accept that the success of our business is dependent on the supply of products and services that will benefit society whilst ensuring human safety and protection of the environment and natural resources. Within the framework of our commitment to the Responsible Care program, we will provide a healthy and safe work environment for employees and will responsibly manage our products at all stages of their life cycle in order to protect human health and the environment whilst maintaining high production standards of operation.

TO MEET THIS COMMITMENT WE WILL:
- Comply with or exceed applicable national and international regulatory requirements and other requirements to which we subscribe.
- Communicate openly and actively encourage dialogue with employees, customers and community concerning our products and operations.
- Implement documented management systems consistent with and for promotion of the Responsible Care ethics.
- Develop and supply products that can be manufactured, transported, used and disposed of safely whilst best meeting the needs of our customers. Regularly assess, continually improve and responsibly manage health, safety and environmental risks associated with products and processes throughout their life-cycles.
- Share knowledge and expertise with others and seek to learn from and incorporate improved practices into our own operations.
- Educate and train employees, contractors and customers to improve their HSE performance. Communicate up-to-date information to enable our workers, customers and other interested parties to handle our products in a safe and environmentally responsible manner.
- Endeavor to work with customers, suppliers, distributors and transporters to foster the safe use, transport and disposal of our chemicals. Support Product Stewardship programs in cooperation with customers, distributors and transporters.

Although the information and recommendations set forth herein (hereinafter "information") are presented in good faith and believed to be correct as of the date hereof, Bromine Compounds Ltd. makes no representations as to the completeness or accuracy thereof. Information is supplied upon the condition that the persons receiving same will make their own determination as to its safety and suitability for their purposes prior to use. In no event will Bromine Compounds Ltd. be responsible for damages of any nature whatsoever resulting from the use of or reliance upon information. NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESSED OR IMPLIED, OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE OR OF ANY OTHER NATURE, ARE MADE HEREUNDER WITH RESPECT TO INFORMATION OR THE PRODUCT TO WHICH THE INFORMATION REFERS.

In an event of discrepancy between the contents of this SDS and the English version of it, the English version shall prevail.

Prepared by
HERA Division in ISRAEL
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End of safety data sheet