

Methyl Iodide (Iodomethane)

74-88-4

Hazard Summary

Methyl iodide is used as an intermediate in the manufacture of some pharmaceuticals and pesticides, in methylation processes, and in the field of microscopy. In humans, acute (short-term) exposure to methyl iodide by inhalation may depress the central nervous system (CNS), irritate the lungs and skin, and affect the kidneys. Massive acute inhalation exposure to methyl iodide has led to pulmonary edema. Acute inhalation exposure of humans to methyl iodide has resulted in nausea, vomiting, vertigo, ataxia, slurred speech, drowsiness, skin blistering, and eye irritation. Chronic (long-term) exposure of humans to methyl iodide by inhalation may affect the CNS and cause skin burns. EPA has not classified methyl iodide for potential carcinogenicity.

Please Note: The main sources of information for this fact sheet are the International Agency for Research on Cancer (IARC) monographs on chemicals carcinogenic to humans (2) and the Hazardous Substances Data Bank (HSDB) (3), a database of summaries of peer-reviewed literature.

Uses

- Methyl iodide is used as an intermediate in the manufacture of some pharmaceuticals and pesticides. It is also used in methylation processes and in the field of microscopy. (1,2,4)
- Proposed uses of methyl iodide are as a fire extinguisher and as an insecticidal fumigant. (5)

Sources and Potential Exposure

- Individuals are most likely to be exposed to methyl iodide in the workplace. (1)
- Methyl iodide occurs naturally in the ocean as a product of marine algae. (2)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to methyl iodide.

Health Hazard Information

Acute Effects:

- Massive acute inhalation exposure to methyl iodide has led to pulmonary edema. Depression of the CNS, irritation of the lungs and skin, and effects on the kidneys may result in acutely exposed humans. (3-5)
- Acute inhalation exposure of humans to methyl iodide has resulted in nausea, vomiting, vertigo, ataxia, slurred speech, drowsiness, skin blistering, and eye irritation. (2,3,5,6)
- Tests involving acute exposure of rats and mice have shown methyl iodide to have moderate to high acute toxicity by inhalation, and high acute toxicity by ingestion. (6)

Chronic Effects (Noncancer):

- Chronic inhalation exposure to methyl iodide may affect the CNS in humans. (4)
- Prolonged dermal contact with methyl iodide may cause skin burns in humans and animals. (1,4)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for methyl iodide.

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of methyl iodide in humans or animals.

Cancer Risk:

- No information is available on the carcinogenic effects of methyl iodide in humans.
- There is limited evidence that methyl iodide is carcinogenic in animals, with lung tumors observed in studies of mice and rats. In rats that received subcutaneous injections, subcutaneous sarcomas and pulmonary metastases were reported. An increased incidence of lung tumors was reported in mice exposed to high levels of methyl iodide by intraperitoneal injection. (2,3)
- EPA has not classified methyl iodide for potential carcinogenicity.

Physical Properties

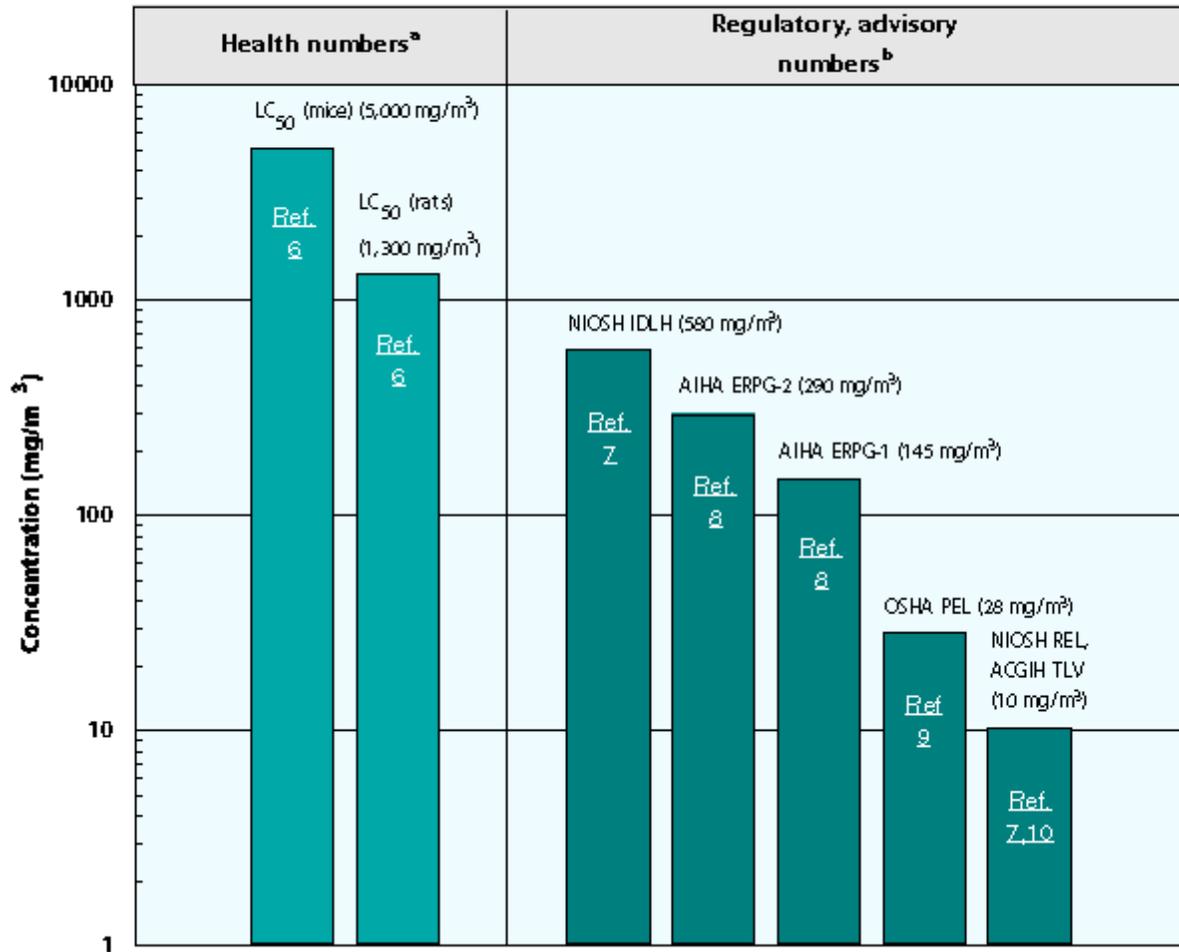
- The chemical formula for methyl iodide is CH₃I, and its molecular weight is 141.95 g/mol. (2,4)
 - Methyl iodide occurs as a colorless nonflammable liquid that turns brown on exposure to light and is slightly soluble in water. (2,4)
 - Methyl iodide has a pungent odor, but its odor threshold has not been established. (2)
 - The vapor pressure for methyl iodide is 400 mm Hg at 25 °C, and its log octanol/water partition coefficient ($\log K_{ow}$) is 1.51. (2,3)
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m³: $\text{mg/m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For methyl iodide: 1 ppm = 5.81 mg/m³. To convert concentrations in air from µg/m³ to mg/m³: $\text{mg/m}^3 = (\mu\text{g/m}^3) \times (1 \text{ mg} / 1,000 \mu\text{g})$.

Health Data from Inhalation Exposure

Methyliodide



ACGIH TLV --American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

AIHA ERPG --American Industrial Hygiene Association's emergency response planning guidelines. ERPG 1 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed up to one hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor; ERPG 2 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed up to one hour without experiencing or developing irreversible or other serious health effects that could impair their abilities to take protective action.

LC₅₀ (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH REL --National Institute of Occupational Safety and Health recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h time-weighted-average exposure and/or ceiling.

NIOSH IDLH -- NIOSH's immediately dangerous to life or health concentration; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment.

OSHA PEL --Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

^a Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

^b

^b Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory, whereas NIOSH, ACGIH, and AIHA numbers are advisory.

References

Summary created in April 1992, updated January 2000

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