

METHYL ISOBUTYL KETONE

Methyl isobutyl ketone is a federal hazardous air pollutant and was identified as a toxic air contaminant in April 1993 under AB 2728.

CAS Registry Number: 108-10-1



Molecular Formula: $\text{C}_6\text{H}_{12}\text{O}$

Methyl isobutyl ketone is a colorless, flammable liquid with a faint, ketonic, and camphor odor. It is moderately soluble in water, miscible with alcohol, benzene, and ether (HSDB, 1991).

Physical Properties of Methyl Isobutyl Ketone

Synonyms: isopropylacetone; 4-methyl-2-pentanone; hexone

Molecular Weight:	100.16
Boiling Point:	116.8 °C at 760 mm Hg
Melting Point:	-84.7 °C
Vapor Pressure:	15.7 mm Hg at 20 °C
Vapor Density:	3.5 (air = 1)
Density/Specific Gravity:	0.7978 at 20 °C (water = 1)
Log/Octanol Water Partition Coefficient:	1.19
Water Solubility:	20,400 mg/L at 20 °C
Henry's Law Constant:	9.4×10^{-5} atm-m ³ /mole
Conversion Factor:	1 ppm = 4.10 mg/m ³

(HSDB, 1991; U.S. EPA, 1994a)

SOURCES AND EMISSIONS

A. Sources

Methyl isobutyl ketone is used as a solvent, a denaturant, in dry cleaning operations, in the synthesis of methyl isobutyl carbinol, and as a synthetic flavoring adjuvant (HSDB, 1991). Methyl isobutyl ketone is also used by rare metal extractors, and manufacturers of lacquers, varnishes, paints, pharmaceutical, pesticides, rubber processing chemicals, and adhesives.

The primary stationary sources that have reported emissions of methyl isobutyl ketone in

California are manufacturers of millwork, veneer, and plywood, manufacturers of electrical lighting and wiring equipment, and manufacturers of office furniture (ARB, 1997b).

Methyl isobutyl ketone was registered for use as a pesticide; however as of December 3, 1986, it is no longer registered for pesticidal use in California (DPR, 1997).

B. Emissions

The total emissions of methyl isobutyl ketone from stationary sources in California are estimated to be at least 100,000 pounds per year, based on data reported under the Air Toxics “Hot Spots” Program (AB 2588) (ARB, 1997b).

C. Natural Occurrence

Methyl isobutyl ketone is found naturally in oranges, grapes, and in vinegar (HSDB, 1991).

AMBIENT CONCENTRATIONS

No Air Resources Board data exist for ambient measurements for methyl isobutyl ketone.

INDOOR SOURCES AND CONCENTRATIONS

No information about the indoor sources and concentrations of methyl isobutyl ketone was found in the readily-available literature.

ATMOSPHERIC PERSISTENCE

The dominant tropospheric loss process of methyl isobutyl ketone is by reaction with the hydroxyl (OH) radical. The calculated half-life and lifetime of methyl isobutyl ketone due to reaction with the OH radical are 0.7 days and 1.0 days, respectively (Atkinson, 1995). The products of the OH radical reaction are acetone, formaldehyde, 2-methylpropanal (isobutyraldehyde) and, in the presence of nitrogen dioxide (NO₂), peroxyacetyl nitrate (PAN) (Atkinson and Aschmann, 1995).

AB 2588 RISK ASSESSMENT INFORMATION

Methyl isobutyl ketone emissions are not reported from stationary sources in California under the AB 2588 program. It is also not listed in the California Air Pollution Control Officers Association Air Toxics “Hot Spots” Program Revised 1992 Risk Assessment Guidelines as having health values (cancer or non-cancer) for use in risk assessments (CAPCOA, 1993).

HEALTH EFFECTS

Probable routes of human exposure to methyl isobutyl ketone are inhalation and dermal contact (HSDB, 1991).

Non-Cancer: Exposure to methyl isobutyl ketone may cause eye, nose, throat, and respiratory tract irritation. Methyl isobutyl ketone is a central nervous system depressant. Symptoms include weakness, headache, nausea, light headedness, vomiting, dizziness, loss of coordination, and narcosis (U.S. EPA, 1994a).

The United States Environmental Protection Agency (U.S. EPA) has the oral Reference Dose (RfD) for methyl isobutyl ketone under review. However, they have calculated a provisional RfD of 0.05 milligrams per kilogram per day. The U.S. EPA estimates that consumption of this dose or less, over a lifetime, would not likely result in the occurrence of chronic, non-cancer effects. The Reference Concentration (RfC) is under review by the U.S. EPA (U.S. EPA, 1994a).

No information is available on adverse developmental or reproductive effects of methyl isobutyl ketone in humans. Rats and mice exposed to methyl isobutyl ketone by inhalation showed maternal toxicity, neurological effects, and increased liver and kidney weights in fetuses (U.S. EPA, 1994a).

Cancer: No information is available on the carcinogenic effects of methyl isobutyl ketone in humans. The U.S. EPA has placed methyl isobutyl ketone in Group D: Not classifiable as a carcinogen (U.S. EPA, 1994a). The International Agency for Research on Cancer has not classified methyl isobutyl ketone for carcinogenicity (IARC, 1987a).

