
Product Safety Assessment

DOW™ Methyl Isobutyl Ketone

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Names

- CAS No. 108-10-1
- Methyl isobutyl ketone
- 2-Pentanone, 4-methyl
- 4-Methyl-2-pentanone
- EC No. 203-550-1
- DOW™ methyl isobutyl ketone
- MIBK
- Hexanone

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Product Overview

- DOW™ methyl isobutyl ketone (MIBK) is a stable, colorless liquid with a pleasant odor. Methyl isobutyl ketone is currently listed as a hazardous air pollutant (HAP) by the United States Environmental Protection Agency, and users are subject to significant restrictions.¹ See [Product Description](#).
- The largest single solvent application for DOW methyl isobutyl ketone is in the application of surface coatings.² See [Product Uses](#).
- DOW methyl isobutyl ketone is not sold for direct consumer use, but it can be used as a solvent in coatings that could be used by consumers.³ See [Exposure Potential](#).
- Excessive exposure to this material may cause eye, skin and respiratory tract irritation, gastrointestinal distress, anesthesia effects, or long-term kidney and liver effects.⁴ See [Health Information](#).
- DOW methyl isobutyl ketone is stable at recommended storage conditions. Both the liquid and vapor are flammable. Stored material must be tested for peroxide levels to minimize the potential for explosive situations.⁴ See [Physical Hazard Information](#).
- DOW methyl isobutyl ketone is readily biodegradable, unlikely to accumulate in the food chain, and practically non-toxic to fish and aquatic organisms.

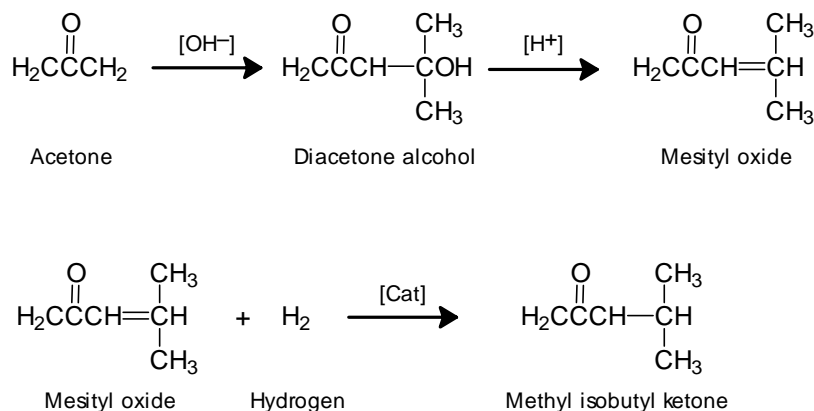
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Manufacture of Product

- **Capacity**⁵ – Dow produces methyl isobutyl ketone at facilities in Institute, West Virginia (USA).
- **Process**⁶ – DOW™ methyl isobutyl ketone is produced⁶ by first dehydrogenating isopropyl alcohol to acetone and then, through a series of condensations and hydrogenations,

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diisobutyl ketone, methyl isobutyl ketone (MIBK, CAS No. 108-10-1), and acetone (CAS No. 67-64-1) are produced in a mixed ketones process. The products are then separated and purified.



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Product Description^{1,2}

DOW™ methyl isobutyl ketone is a stable, colorless liquid with a pleasant odor. It is both a medium-boiling and medium-evaporating solvent. It is partly soluble in water and is miscible with most organic solvents. Methyl isobutyl ketone is currently listed as a hazardous air pollutant (HAP) by the United States Environmental Protection Agency, and its use is subject to restrictions. Methyl isobutyl ketone is an aggressive, polar solvent with a moderate evaporation rate.

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Product Uses^{7,8}

Methyl isobutyl ketone is primarily used in solvent applications for the following:

- **Paints & coatings** – primarily in nitrocellulose lacquers and solvent-borne coatings
- **High-solids coatings** – which require stronger solvents
- **Replacement for ester-based solvents** – to reduce volatile organic compound (VOC) levels and achieve lower solvent levels
- **Pesticide solvent**
- **Extraction operations** – to refine mining distillates, dewax mineral oils, purify fatty acids, and manufacture penicillin and other antibiotics
- **Other solvent applications** – as a purge solvent in the cleanup of paint equipment in automotive plants, in the formulation of inks and adhesives
- **Rubber additive** – for rubber anti-ozonants
- **Acetylenic surfactants**

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Exposure Potential

DOW™ methyl isobutyl ketone can be used in the production of industrial and consumer products. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a methyl isobutyl ketone manufacturing facility or in the various industrial or manufacturing facilities that use this material. Those

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working with this material in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each manufacturing facility should have a thorough training program for employees and appropriate work processes, ventilation, and safety equipment in place to limit unnecessary exposure. See [Health Information](#).

- **Consumer exposure to products containing methyl isobutyl ketone** – DOW™ methyl isobutyl ketone is not sold for direct consumer use, but it can be used as a solvent in operations in which final products may be in contact with consumers. Manufacturers must adhere to strict regulations regarding residual solvent levels in the product; therefore the potential for consumer exposure should be low. See [Health Information](#).
- **Environmental releases**⁴ – Methyl isobutyl ketone may be released to air by evaporation from coatings and other products containing it. However, because it is partly soluble, once methyl isobutyl ketone is introduced to water, a portion of the compound will remain dissolved in water. Because the substance is readily biodegradable, the compound will be removed by sewage treatment plants. In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Respiratory protection is necessary for cleaning up spills and leaks. Eliminate all sources of ignition immediately. For small spills, methyl isobutyl ketone should be absorbed with materials such as sand or vermiculite. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).
- **Large release**⁴ – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Positive-pressure, self-contained breathing apparatus (SCBA) with an approved full-face mask is recommended for emergency work. Eliminate all sources of ignition immediately. Use only explosion-proof equipment. Ground and bond all containers and handling equipment. See [Environmental](#) and [Physical Hazard Information](#).
- **In case of fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use of a direct water stream may spread the fire. Alcohol-resistant foams (ATC type) are preferred for fighting the fire. The public should be warned of down-wind vapor explosion hazards. Vapors are heavier than air and may travel long distances and accumulate in low-lying areas. Keep vapors out of sewers. Flammable concentrations of vapor can accumulate at temperatures above the flash point. Follow emergency procedures carefully. See [Environmental](#), [Health](#), and [Physical Hazard Information](#).

For more information, see the relevant [Safety Data Sheet](#).

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Health Information⁴

Eye and Skin Contact – May cause moderate eye irritation or slight corneal injury. Vapor may cause eye irritation experienced as mild discomfort and redness. Short, single skin exposures to methyl isobutyl ketone are not likely to cause significant skin irritation. Repeated or prolonged contact may cause drying or flaking of the skin. A single prolonged exposure is unlikely to result in the material being absorbed in harmful amounts.

Ingestion – Methyl isobutyl ketone has low toxicity if swallowed. Small amounts swallowed incidental to normal handling operations are not likely to cause injury. However, swallowing larger amounts may cause serious injury. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia. The decision of whether to induce vomiting or not should be made by a physician.

Inhalation – Vapor concentrations are attainable which could be hazardous on single exposure. Excessive exposure may cause irritation to the upper respiratory tract (nose and throat) and lungs. Symptoms of excessive exposure may be anesthetic or narcotic effects. Dizziness and

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drowsiness may be observed along with nausea and vomiting. Signs and symptoms of excessive exposure may include gastrointestinal irritation.

Other – Excessive exposure to methyl isobutyl ketone may cause respiratory irritation, gastrointestinal distress, anesthesia effects, and long-term kidney and liver effects. Methyl isobutyl ketone has caused cancer in some laboratory animals. These effects are believed to be species-specific and unlikely to occur in humans. Methyl isobutyl ketone has been toxic to the fetus in laboratory animals at doses toxic to the mother. MIBK did not cause birth defects in laboratory animals. In vitro genetic toxicity studies on methyl isobutyl ketone were predominantly negative and in vivo animal genetic toxicity studies were negative.

For more information, see the relevant [Safety Data Sheet](#).

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Environmental Information⁴

DOW™ methyl isobutyl ketone is moderately volatile and may evaporate from products in which it is a component. However, because it is partly soluble, once introduced to water, a portion of the compound will remain in water. It will have minimal tendency to bind to soil or sediment (highly mobile).

DOW methyl isobutyl ketone is unlikely to persist in the environment. In the air, rapid photodegradation is expected to occur. In addition, it is readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological wastewater treatment plants.

DOW methyl isobutyl ketone is not likely to accumulate in the food chain (bioconcentration potential is low) and is practically not toxic to aquatic organisms on an acute basis (*i.e.*, practically nontoxic).

The International Programme on Chemical Safety (IPCS), a joint venture of the United Nations Environment Programme, the International Labour Organisation, and the World Health Organization, has critically evaluated the environmental safety of methyl isobutyl ketone. The IPCS report on methyl isobutyl ketone concludes that there is no risk for the environment provided that adequate controls to minimize emissions are in place. ([IPCS report: http://www.inchem.org/documents/ehc/ehc/ehc117.htm](#))

For more information, see the relevant [Safety Data Sheet](#).

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Physical Hazard Information⁴

DOW™ methyl isobutyl ketone is stable under recommended storage and use conditions. However, it can decompose at elevated temperatures. Both liquid and vapor are flammable. Keep heat, sparks, and flame away from storage areas.

Prolonged exposure to air can cause formation of explosive peroxides. Annual testing of stored material for elevated peroxide levels is recommended.

Violent steam generation or eruption may occur upon application of a direct water stream to hot liquids.

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For more information, see the relevant [Safety Data Sheet](#).

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Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of DOW™ methyl isobutyl ketone. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant [Safety Data Sheet](#), [Technical Data Sheet](#), or [Contact Us](#).

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Additional Information

- Safety Data Sheet (<http://www.dow.com/webapps/msds/msdssearch.aspx>)
- Contact Us (<http://www.dow.com/oxysolvents/contact/index.htm>)
- *Methyl Isobutyl Ketone Technical Data Sheet*, The Dow Chemical Company, Form No. 327-00032-0812 (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_08ac/0901b803808aca80.pdf?filepath=oxysolvents/pdfs/noreg/327-00032.pdf&fromPage=GetDoc)
- Greiner, Elvira O., and Funada, Chiyo, "Methyl Isobutyl Ketone (MIBK) and Methyl Isobutyl Carbinol (MIBC)," *CEH Product Review: Chemical Economics Handbook*, SRI International, February 2012.

For more business information about DOW™ methyl isobutyl ketone and other acetone derivatives, visit the Dow Oxygenated Solvents web site at www.dowsolvents.com.

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References

- ¹ *Methyl Isobutyl Ketone Technical Data Sheet*, The Dow Chemical Company, Form No. 327-00032-0812
- ² Greiner, Elvira O., and Funada, Chiyo, "Methyl Isobutyl Ketone (MIBK) and Methyl Isobutyl Carbinol (MIBC)," *CEH Product Review: Chemical Economics Handbook*, SRI International, February 2012, page 9.
- ³ Greiner, Elvira O., and Funada, Chiyo, "Methyl Isobutyl Ketone (MIBK) and Methyl Isobutyl Carbinol (MIBC)," *CEH Product Review: Chemical Economics Handbook*, SRI International, February 2012, page 4.
- ⁴ *Methyl Isobutyl Ketone Safety Data Sheet for the US*, The Dow Chemical Company
- ⁵ Estimate by The Dow Chemical Company.
- ⁶ Greiner, Elvira O., and Funada, Chiyo, "Methyl Isobutyl Ketone (MIBK) and Methyl Isobutyl Carbinol (MIBC)," *CEH Product Review: Chemical Economics Handbook*, SRI International, February 2012, page 5.
- ⁷ Greiner, Elvira O., and Funada, Chiyo, "Methyl Isobutyl Ketone (MIBK) and Methyl Isobutyl Carbinol (MIBC)," *CEH Product Review: Chemical Economics Handbook*, SRI International, February 2012, pages 4 and 9–10.
- ⁸ Linak, Eric, *Global Solvent Report: The Green Impact*, SRI Consulting (Division of Access Intelligence, LLC), 2006, page 214.

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