Product Safety Assessment

*DOW™ Isobutanol*

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**Names**

- CAS No. 78-83-1
- Isobutanol
- Isobutylic alcohol
- 2-Methyl-1-propanol
- DOW™ isobutanol
- EC No. 201-148-0
- 1-Hydroxymethylpropane
- Fermentation butyl alcohol
- Isopropylcarbinol

**Product Overview**

- *DOW™* isobutanol is a colorless liquid with a sweet musty odor. It is miscible with all common organic solvents but only partly soluble in water. *DOW* isobutanol is not listed as a hazardous air pollutant (HAP) by the United States Environmental Protection Agency. For further details, see **Product Description**.

- *DOW* isobutanol is a versatile chemical with broad-ranging applications, including use as a solvent (coatings and adhesives); chemical intermediate (glycol ethers, esters, isobutyliamines); additive (paints and lacquers, lube oil, deicers, gasoline); and extractant (pharmaceutical and pesticide production). For further details, see **Product Uses**.

- *DOW* isobutanol is not sold for direct consumer use. Worker exposure can occur either in an isobutanol manufacturing facility or in the various industrial or manufacturing facilities that use this material. Workplace exposure is minimized through engineering controls and personal protective equipment. Some household aerosol primers, spray lacquers, and liquid hobby paints may contain low concentrations of isobutanol (2% or less). For further details, see **Exposure Potential**.

- Eye contact with this material may cause severe irritation with moderate corneal injury. Brief skin contact may cause moderate irritation with local redness and drying or flaking of the skin. Prolonged skin contact is unlikely to result in absorption of harmful amounts. Prolonged excessive inhalation may cause adverse effects. This material can result in damage if aspirated into the lungs. For further details, see **Health Information**.

- Isobutanol liquid and vapors are flammable. Vapors are heavier than air and can travel long distances, creating an explosion hazard. Eliminate sources of ignition. Avoid contact with oxidizing materials. For further details, see **Physical Hazard Information**.

- Isobutanol is readily biodegradable, unlikely to accumulate in the food chain, and is considered practically non-toxic to fish and aquatic organisms.

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Manufacture of Product

- **Capacity** – DOW™ isobutanol is manufactured at facilities in Taft, Louisiana (USA).
- **Process** – DOW™ isobutanol is made by the hydrogenation of isobutyraldehyde, which in turn is made from the reaction of **propylene** with synthesis gas using a catalyst. The reaction sequence is shown below.

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CH₃
HC=CH₂ + CO/H₂ → H₂CCH₂C=O + H₂ → H₃CCHCH₂-OH

Propylene   Synthesis gas   Isobutyraldehyde   Hydrogen   Isobutanol
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Product Description

DOW™ isobutanol is a colorless liquid with a sweet musty odor. It is miscible with organic solvents such as glycols, ketones, alcohols, aldehydes, ethers, and aromatic and aliphatic hydrocarbons. Isobutanol has limited miscibility with water and will float on water. DOW isobutanol is not listed as a hazardous air pollutant (HAP) solvent by the U.S. Environmental Protection Agency. It does not contribute to lower-level smog formation.

Product Uses

- **Direct solvent** – for surface coatings and adhesives
- **Chemical intermediate** – chemicals manufactured from isobutanol include zinc diisobutylidithiophosphate (isobutyl ZDDP, an anti-corrosion and anti-wear inhibitor in engine lubricating oils, greases, and hydraulic fluids); isobutyl acetate (a solvent for furniture varnishes and architectural coatings); glycol ethers; esters (acrylate and methacrylate); amino resins (isobutanol is an alkylation agent that improves stability and solvent solubility); isobutyl amines (mainly diisobutylamine for thiocarbamate herbicides); textile chemicals
- **Dispersing agent** – cleaning preparations and floor polishes
- **Processing (extraction) solvent** – pharmaceutical, pesticide, and flavor and fragrance manufacture
- **Additive** – in gasoline and deicing fluids
- **Flotation agent**

Exposure Potential

DOW™ isobutanol is an industrial solvent and chemical intermediate. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Isobutanol is manufactured in a closed system using engineering controls that prevent the escape of liquid or vapors and minimize release to the environment. Worker exposure could occur in a facility that manufactures or uses isobutanol. Facilities that manufacture or use this material should have a thorough training program for employees and

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Revised: December 23, 2014    The Dow Chemical Company

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appropriate work processes, ventilation, and safety equipment in place to limit unnecessary exposure. See Health Information.

- **Consumer exposure to products containing isobutanol** – DOW isobutanol is not sold for direct consumer use; however, it may be present in low concentrations (2% or less) in certain household aerosol primers, lacquers, and liquid hobby paints. See Health Information.

- **Environmental releases** – Isobutanol may be released to air from paints, coatings, or other products containing it. However, isobutanol is partly soluble in water and once it is introduced to water, the compound will tend to remain dissolved in it. Because isobutanol 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. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, contain the spill if possible. Isolate the area, keeping upwind of spill. Warn the public of any downwind explosion hazard. Eliminate all sources of ignition. Check the area with a flammable-gas detector prior to reentry. Ground and bond all containers and handling equipment. If available, use foam to smother or suppress fumes. Pump recovered material with explosion-proof equipment into suitable and properly labeled containers. Use appropriate safety equipment and follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Keep people away. Deny any unnecessary entry into the area. Use water fog or fine spray, dry-chemical or carbon-dioxide fire extinguishers, or foam. Alcohol-resistant foams are preferred. Do not use a direct water stream. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Vapors are heavier than air and can travel long distances, accumulating in low-lying areas. Ignition or flashback may occur. 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 Information**

**Eye and Skin Contact** – Eye contact with isobutanol may cause severe irritation and moderate corneal injury. Brief skin contact may cause moderate irritation with local redness and drying and flaking. The response may be more severe if the material is confined under clothing or gloves. Prolonged skin contact is not likely to result in absorption of harmful amounts. In animals, prolonged excessive skin contact caused central nervous system effects.

**Inhalation** – Prolonged excessive inhalation of isobutanol may result in adverse effects. Symptoms of excessive exposure may be anesthetic or narcotic effects and dizziness or drowsiness. May cause central nervous system effects.

**Ingestion** – This material has low toxicity if swallowed. Swallowing small amounts incidental to normal handling operations is not likely to cause injury; however, swallowing larger amounts may cause injury. Aspiration into the lungs could occur during ingestion or vomiting causing lung damage or death due to chemical pneumonia.

**Other** – Animal studies have shown that prolonged or repeated exposure to high concentrations of isobutanol can affect the liver and central nervous system. Observations in animals include anesthetic or narcotic effects. This material does not cause birth defects in animals. In vitro genetic toxicity studies on isobutanol were predominantly negative and in vivo animal genetic toxicity studies were negative.

For more information, see the relevant Safety Data Sheet.
Environmental Information

Isobutanol is volatile and will evaporate from products containing it. However, because it is partly soluble in water, once introduced, it will have a tendency to remain in water. It has minimal tendency to bind to soil or sediment.

Isobutanol is unlikely to persist in the environment. It is considered readily biodegradable, which suggests the chemical will be rapidly and completely removed from water and soil environments, including biological wastewater treatment plants.

Isobutanol is not likely to accumulate in the food chain (bioconcentration potential is low) and is practically nontoxic to fish and other aquatic organisms on an acute basis.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

Isobutanol liquid and vapors are flammable. It is a vapor explosion hazard. Vapors are heavier than air and may travel long distances, collecting in low-lying areas. Ignition or flashback could occur. Keep material away from sources of ignition, including static discharge. DOW isobutanol is thermally stable under typical conditions of use. Exposure to elevated temperatures can cause the product to decompose.

Isobutanol is incompatible with oxidizing materials. Contact should be avoided.

For more information, see the relevant Safety Data Sheet.

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of DOW™ Isobutanol. 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.

Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
Product Safety Assessment: DOW™ Isobutanol

- United States Department of Labor OSHA website – Occupational Safety and Health Guideline for Isobutyl Alcohol
- U.S. Department of Health & Human Services Household Products Database website:


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References

1 Isobutanol, Technical Data Sheet, The Dow Chemical Company, Form No. 327-00015-0812
2 Isobutanol, 99.5% Safety Data Sheet for the US, The Dow Chemical Company
5 U.S. Department of Health & Human Services Household Products Database website:
  Ingredients – Isobutyl alcohol.
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