Product Safety Assessment

*DOW™* Isopropanol


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Names
- CAS No. 67-63-0
- *DOW™* isopropanol
- Isopropanol
- Isopropyl alcohol
- 2-Propanol
- Propyl alcohol
- 2-Propyl alcohol
- Propan-2-ol
- Dimethyl carbinol
- 1-Methylethyl alcohol
- 1-Methylethanol
- 2-Hydroxypropane

**Product Overview**
- *DOW™* isopropanol is a colorless, flammable liquid with a characteristic alcoholic odor.\(^1\)\(^2\) For further details, see **Product Description**.
- Isopropanol is one of the most widely used solvents in the world. It is also commonly used as a chemical intermediate and in certain household and cosmetic products.\(^3\)\(^4\)\(^5\) For further details, see **Product Uses**.
- Exposure is possible in both industrial and consumer applications. Occupational exposure limits have been established for workplace settings. Consumer exposure is generally infrequent and short in duration.\(^6\)\(^7\) For further details, see **Exposure Potential**.
- Eye contact may cause moderate irritation or moderate corneal injury and may result in pain disproportionate to the level of irritation to eye tissues. Prolonged skin contact is unlikely to result in absorption of harmful amounts, but may cause drying and flaking of the skin. With good ventilation, a single inhalation exposure is not likely to be hazardous. In poorly ventilated areas, vapors or mists can cause respiratory irritation. Prolonged excessive exposure may cause lack of coordination, confusion, hypotension, hypothermia, circulatory collapse, respiratory arrest, and death. In animals, effects have been reported on the liver and kidneys.\(^8\)\(^9\) For further details, see **Health Information**.
- *DOW* isopropanol is considered readily biodegradable and not likely to accumulate or persist in aquatic or terrestrial environments.\(^10\)\(^11\)\(^12\) Isopropanol is practically non-toxic to aquatic organisms and microorganisms. For further details, see **Environmental Information**.
- *DOW* isopropanol is a flammable liquid and evaporates readily to form flammable vapors. Vapors can travel long distances and are an explosion hazard.\(^13\) For further details, see **Physical Hazard Information**.

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Manufacture of Product\(^\text{14}\)
- **Capacity** – Total world capacity as of April 2009 was estimated to be more than 2,200 thousand metric tonnes (4.9 billion pounds). Dow’s capacity is estimated to be about 450 thousand metric tonnes (1.0 billion pounds) at production facilities in Texas City, Texas, USA.
- **Process** – DOW™ isopropanol is produced using a two-step process. In the first step propylene reacts with sulfuric acid to form mono- and di-isopropyl hydrogen sulfates. The sulfates are then hydrolyzed with water with an acidic catalyst to form isopropanol. The process is shown below.

\[
\begin{align*}
\text{Propylene} & \quad + \quad \text{Sulfuric acid} & \quad \xrightarrow{\text{[H}_2\text{O, cat]}} & \quad \text{Isopropanol} \\
H_2C=CHCH_3 & \quad + \quad H_2SO_4 & \quad \rightarrow & \quad H_3C\text{CHCH}_3 \quad \text{Isopropyl hydrogen sulfate} \\
H_2C\text{CHCH}_3 & \quad + \quad H_2SO_4 & \quad \rightarrow & \quad H_2C\text{CHCH}_3 \quad \text{Isopropanol}
\end{align*}
\]

Product Description\(^\text{15}\)
DOW™ isopropanol is a colorless, flammable liquid with a characteristic alcoholic odor. It is completely miscible (mixes completely) with most solvents, including water. It is not considered a hazardous air polluting (HAP) solvent. Several grades are produced by Dow.

Product Uses\(^\text{16,17,18}\)
Isopropanol can be formulated into many everyday products and has many applications, such as:
- **Solvent applications** – acrylic and epoxy resins, ethyl cellulose, natural resins, gums, polyvinyl butyral, alkaloids, and some paints, inks, and essential oils
- **Chemical intermediate** for production of other chemicals – acetone, isopropylamines, isopropylacetates, methyl isobutyl ketone (MIBK), etc.
- **Household, cosmetic, and personal-care products** – general-purpose cleaners, disinfectants, room sprays, and windshield deicing agents
- **Pharmaceuticals**
- **Agrochemicals**

Most DOW™ isopropanol is used internally as an intermediate.

Exposure Potential\(^\text{19,20}\)
DOW™ isopropanol is 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 facilities that manufacture isopropanol or in the various industrial or manufacturing facilities that use it. It is generally produced, distributed, stored, and consumed in closed systems. Those working with isopropanol in manufacturing operations could be exposed during maintenance, sampling, testing, or other

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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 DOW™ isopropanol** – A small proportion of DOW isopropanol may be sold for direct consumer use in cosmetics and personal-care products. The potential for exposure is brief and infrequent. Always read product information before use and follow the label/use instructions. See Health Information.

- **Environmental releases** – Isopropanol is readily biodegradable, which suggests it will be removed from water and soil environments, including biological wastewater-treatment facilities. It is unlikely to persist in the environment. Isopropanol has a low bioconcentration potential (tendency to accumulate in the food chain) and is practically nontoxic to fish and other aquatic organisms on an acute basis. Small quantities may be released into the environment if products that contain them are discarded. In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Absorb small spills with inert absorbents such as sand, sawdust, or cat litter. Collect recovered material in properly labeled containers and dispose of it according to applicable government requirements. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. Spilled material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Respiratory protection is necessary for cleaning up spills and leaks. Only properly trained and equipped personnel should attempt to isolate or contain the spill. Isopropanol is a flammable liquid and can be a vapor explosion hazard. Eliminate all sources of ignition immediately. Use nonsparking tools in cleanup operations. Use only explosion-proof equipment and ground and bond all containers and handling equipment. Keep material out of sewers, and check the area with a combustible-gas detector before reentering. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Keep people away and deny any unnecessary entry into the area. Consider the use of unmanned hose holders. Stay upwind and out of low areas where fumes can accumulate. Use water fog or fine spray, carbon-dioxide or dry-chemical extinguishers, or foam. Alcohol-resistant foams (ATC type) are preferred. Water is not recommended but may be applied as a fine spray when other extinguishing agents are not available. A direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) with an approved full-face mask with full chemical-resistant firefighting clothing. Contain fire-water run-off to minimize the potential for environmental damage. Keep vapors out of sewers. The public should be warned of downwind vapor explosion hazards. Immediately withdraw all personnel from the area in case of rising sounds from venting safety devices or discolorations of the container. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

- **Unusual fire and explosion hazards** – Flammable mixtures may exist within the vapor space of containers even at room temperature. These mixtures can be ignited by static discharge or other ignition sources. Vapors are heavier than air and may travel a long distance and accumulate in low-lying areas. Combustion products may include carbon monoxide and carbon dioxide. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**

**Eye contact** – Contact may cause moderate irritation or moderate corneal injury resulting in pain disproportionate to the level of irritation.

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Skin contact – Prolonged contact is unlikely to result in absorption of harmful amounts, but may cause drying and flaking of the skin.

Inhalation – With good ventilation, a single exposure is not likely to be hazardous. Excessive inhalation may cause severe irritation to the upper respiratory tract (nose and throat) and lungs. In confined or poorly ventilated areas, vapor can readily accumulate and cause unconsciousness, lack of coordination, confusion, hypotension, hypothermia, circulatory collapse, respiratory arrest, and death.

Ingestion – Low toxicity if ingested in small amounts. Swallowing may cause gastrointestinal irritation or ulceration, central nervous system effects, or nausea. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia.

Repeated exposure – In animals, this material has been reported to adversely affect the kidneys and liver following repeated, excessive exposures.

Chronic information – Animal studies under exaggerated conditions have demonstrated that this material can be toxic to the fetus, but only at doses that are toxic to the mother. If handled in accordance with proper industrial procedures, exposure should not pose a significant risk.

For more information, see the relevant Safety Data Sheet.

Environmental Information

DOW™ isopropanol is completely miscible in water and evaporates quickly from water and soil. Isopropanol is readily biodegradable, which suggests it will be removed from water and soil environments, including biological wastewater-treatment facilities. It is unlikely to persist in the environment. Isopropanol has a low bioconcentration potential (tendency to accumulate in the food chain) and is practically nontoxic to fish and other aquatic organisms on an acute basis.

DOW isopropanol is not considered a hazardous air polluting (HAP) solvent.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

DOW™ isopropanol is a flammable liquid. Vapors are flammable and can be an explosion hazard. Vapors may travel long distances and accumulate in low areas. Ignition and flashback may occur.

DOW isopropanol is stable at normal storage and use temperatures, but can decompose at elevated temperatures. Avoid contact with aldehydes, halogenated organics, halogens, strong acids, and strong oxidizers.

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™ isopropanol. 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 (www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (www.dow.com/oxysolvents/contact/index.htm)
- “2-Propanol, CAS No. 67-63-0,” Screening Information Data Set (SIDS), Initial Assessment Profile for SIAM 6, June 9–11, 1997, Short summary (http://webnet.oecd.org/Hpv/UI/handler.axd?id=4e335f97-748f-4ab9-a59a-e1abf41ee00b)
- Greiner, Elvira O.C., and Inoguchi, Yoshio, “CEH Product Review: Isopropyl Alcohol (IPA),” Chemical Economics Handbook, SRI Consulting, June 2009,

For more business information about DOW™ isopropanol, visit the Dow Oxygenated Solvents web site at www.dow.com/oxysolvents/index.htm.

References


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