Product Safety Assessment

**DOW™ Butyraldehyde**

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### Names

- CAS No. 123-72-8
- Butyraldehyde
- n-Butyraldehyde
- Butal
- Butyl aldehyde
- EC No. 204-646-6
- DOW™ butyraldehyde
- Butaldehyde
- Butyric aldehyde
- Butanal

### Product Overview

- **DOW™ butyraldehyde** is a colorless liquid with a pungent, unpleasant odor. It mixes readily with most common solvents, but is only slightly soluble in water.\(^1\)\(^2\) For further details, see Product Description.
- Almost all DOW butyraldehyde is used as a building block in downstream processes to produce other products, especially n-butanol and its derivatives, and 2-ethylhexanol and its derivatives.\(^3\) For further details, see Product Uses.
- Butyraldehyde may cause severe eye irritation with corneal injury, which may result in permanent impairment of vision, even blindness. For covered skin, prolonged contact may cause severe skin irritation with local redness and discomfort. Repeated skin contact may cause pain, severe local redness, swelling, and tissue damage. Prolonged and widespread skin contact may result in absorption of potentially harmful amounts. Vapor inhalation may cause irritation of the upper respiratory tract as well as dizziness or drowsiness. Swallowing may result in burns to the mouth, throat, and gastrointestinal tract. Aspiration into the lungs may cause tissue damage or lung injury. This material contains components that have been reported to cause effects on the respiratory tract, and gastrointestinal tract in animal testing.\(^1\) For further details, see Health Information.
- DOW butyraldehyde is produced, distributed, stored, and consumed in closed systems, limiting the potential for workplace exposure. DOW butyraldehyde is not sold for any direct consumer use applications, nor is it intended to be present in consumer products.\(^4\) For further details, see Exposure Potential.
- Butyraldehyde is extremely flammable. Avoid potential sources of ignition. Vapors pose a risk for explosion or flash fire and can travel long distances and accumulate in low-lying areas. This material is stable at recommended storage and use temperatures, but can decompose...
or undergo hazardous polymerization at elevated temperatures.¹ For further details, see Physical Hazard Information.

- Butyraldehyde is readily biodegradable, unlikely to accumulate in the food chain, and is considered slightly toxic to fish and aquatic organisms.

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**Manufacture of Product**⁵

- **Manufacturing** – DOW™ butyraldehyde is produced at facilities in the United States (Taft, Louisiana, and Texas City, Texas) and Malaysia.
- **Process** – DOW butyraldehyde is produced by reacting synthesis gas with propylene over a catalyst in a low-pressure variation of the oxo process. The reaction is shown below.

\[
\text{Propylene} + \text{Synthesis Gas} \rightarrow \text{Butyraldehyde}
\]

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**Product Description**¹,²

DOW™ butyraldehyde is a colorless liquid with a pungent, unpleasant odor. It mixes readily with most common solvents, but is only slightly soluble in water. DOW butyraldehyde ranges from 85 to 99% pure, with 2-methyl-1-propanal (CAS No. 78-84-2) as the major impurity.

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**Product Uses**²,⁴,⁶

Almost all DOW™ butyraldehyde is used as a building block in downstream processes to produce other products, especially n-butanol and its derivatives, and 2-ethylhexanol and its derivatives. These products are in turn used to produce:

- Rubber accelerators
- Synthetic resins
- Perfumes
- Pesticides
- Crop-protection chemicals
- Pharmaceuticals

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**Exposure Potential**¹

DOW™ butyraldehyde is used in the production of industrial products. Based on the uses for this material, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a butyraldehyde manufacturing facility or in the various industrial or manufacturing facilities that use this material. It is produced, distributed, stored, and consumed in closed systems. Those 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 butyraldehyde** – DOW™ butyraldehyde is not sold for any direct consumer use applications, nor is it intended to be present in consumer products. See Health Information.

• **Environmental releases** – DOW butyraldehyde is produced, distributed, stored, and consumed in closed systems. Thus, the potential for release to the environment is minimal. However, if introduced to water or soil, it is expected to either evaporate, making it susceptible to breakdown by sunlight, or rapidly biodegrade in water or moist soil. Because butyraldehyde 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. Only trained and properly protected personnel must be involved in clean-up operations. Ground and bond all containers and handling equipment. Eliminate all sources of ignition immediately. If available, use foam to smother or suppress vapors. See Environmental, Health, and Physical Hazard Information.

• **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, evacuate the area. Only trained and properly protected personnel must be involved in clean-up operations. Eliminate all sources of ignition immediately. Use only explosion-proof equipment; ground and bond all containers and handling equipment. 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. See Environmental, Health, and Physical Hazard Information.

• **In case of fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use water fog or spray, dry-chemical or carbon-dioxide extinguishers, or foam. Alcohol-resistant foams are preferred. Use of a direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) with an approved full-face mask and protective firefighting clothing. The public should be warned of downwind vapor explosion hazards. Vapors are heavier than air and may travel a long distance and accumulate in low-lying areas. Keep vapors out of sewers. Follow emergency procedures carefully. See Health and Physical Hazard Information.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

### Health Information¹

**Eye contact** – Butyraldehyde may cause severe irritation with corneal injury, which may result in permanent impairment of vision, even blindness. Chemical burns may occur.

**Skin contact** – For uncovered skin, brief contact with butyraldehyde is essentially nonirritating. For covered skin, prolonged contact may cause severe skin irritation with local redness and discomfort. Repeated contact may cause skin burns, including pain, severe local redness, swelling, and tissue damage. Prolonged and widespread skin contact may result in absorption of potentially harmful amounts.

**Inhalation** – Vapor concentrations of butyraldehyde are attainable that could be hazardous on single exposure. Vapor may cause irritation of the upper respiratory tract. Symptoms of excessive exposure may be anesthetic or narcotic effects, dizziness, or drowsiness.

**Ingestion** – Butyraldehyde has low toxicity if swallowed. Swallowing may result in burns of the mouth, throat, and gastrointestinal tract. Aspiration into the lungs during ingestion or vomiting may cause tissue damage or lung injury.

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Repeated exposure – Crude butyraldehyde contains components that in animal testing have been reported to cause effects on the respiratory tract and gastrointestinal tract.

Other – In high-dose animal tests, similar materials have caused birth defects and have been toxic to the fetus at doses not toxic to the mother. In genetic toxicity studies, contains component(s) which were negative in some in vitro genetic toxicity studies and positive in others and were negative in some animal genetic toxicity studies and positive in others.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Environmental Information
Butyraldehyde is volatile but also slightly soluble in water. If introduced to water, volatilization and biodegradation will be important fate processes. It has minimal tendency to bind to soil or sediment.

Butyraldehyde 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.

Butyraldehyde is not likely to accumulate in the food chain (bioconcentration potential is low) and is considered slightly toxic to fish and aquatic organisms.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information
Both butyraldehyde liquid and vapors are extremely flammable. Avoid static discharge or other potential sources of ignition. Vapors pose a risk for explosion or flash fire and can travel long distances and accumulate in low-lying areas.

This material is stable at recommended storage and use temperatures but can decompose or undergo hazardous polymerization at elevated temperatures. Avoid contact with strong acids, strong bases, strong oxidizers, and strong reducing agents.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Regulatory Information
Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of butyraldehyde. 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 (request from the Dow Customer Information Group or http://www.dow.com/webapps/msds/msdssearch.aspx)
Contact Us (http://www.dow.com/oxysolvents/contact/index.htm)


References

1. Butyraldehyde, Mixed Isomers, Crude, Safety Data Sheet for the US. The Dow Chemical Company.
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