Product Safety Assessment

Propionaldehyde

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Names
- CAS No. 123-38-6
- Propionaldehyde
- Methylacetaldehyde
- n-Propanal
- Propionic aldehyde
- Propaldehyde

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Product Overview

- Propionaldehyde is a colorless liquid with a pungent, unpleasant odor. It is soluble in ethanol and diethyl ether. Propionaldehyde is a highly reactive chemical that is readily oxidized or reduced. For further details, see Product Description.
- Propionaldehyde is manufactured almost exclusively for use as a chemical intermediate in the production of n-propanol, propionic acid and minimally, trimethylolethane and dimethylpropionic acid. For further details, see Product Uses.
- Eye contact with propionaldehyde causes severe irritation with moderate corneal injury. Brief skin contact may cause moderate skin irritation and prolonged contact may cause skin burns. Prolonged skin contact is unlikely to result in absorption of harmful amounts. Excessive inhalation exposure may result in adverse effects including severe irritation to the respiratory tract (nose, throat and lungs) and may cause pulmonary edema (fluid in the lungs). For further details, see Health Information.
- Worker exposure to propionaldehyde is possible during manufacturing. Engineering controls and personal protection equipment greatly reduce occupational exposure potential. Consumer exposure to propionaldehyde is unlikely because it is an industrial chemical intermediate. For further details, see Exposure Potential.
- Propionaldehyde liquid and vapors are flammable. The vapor is heavier than air and can travel long distances and accumulate in low-lying areas, creating an explosion or flashback hazard. Avoid static discharge. Keep material away from heat, sparks, or flame. Avoid contact with air (oxygen), amines, alcohols, alkalis, ammonia, strong mineral acids, caustics, iron oxides (rust), and halogen compounds. Polymerization is possible, leading to pressure build-up in closed systems. For further details, see Physical Hazard Information.
- Propionaldehyde is readily biodegradable, unlikely to accumulate in the food chain, and is considered slightly toxic to fish and other aquatic organisms on an acute basis. For further details, see Environmental Information.
Manufacture of Product

- **Capacity** – DOW propionaldehyde is manufactured at the Texas City, Texas (USA), facility.
- **Process** – DOW propionaldehyde is manufactured in a closed, continuous process by the reaction of ethylene with synthesis gas (carbon monoxide and hydrogen) in the presence of a catalyst. This type of reaction is called hydroformylation or the Oxo process. The chemistry is shown below:

\[
\text{CH}_2\equiv\text{CH}_2 + \text{COH}_2 \rightarrow \text{CH}_3\text{CH}_2\text{CHO}
\]

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Product Description

Propionaldehyde is the common name for n-propanal. Propionaldehyde is a colorless liquid with a pungent, unpleasant odor. It is soluble in ethanol and diethyl ether and highly soluble in water. Propionaldehyde is a highly volatile (quick to evaporate), highly reactive chemical that is readily oxidized or reduced.

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Product Uses

Propionaldehyde is mainly used as a chemical building block in the production of n-propanol and propionic acid. It is also used to make trimethylolethane and dimethylopropionic acid. Propionaldehyde is solely used as a reactive chemical intermediate, meaning it is converted into other chemicals. Some examples are pharmaceuticals, pesticides, perfumes, plastics, and polyols or polyhydric alcohols.

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Exposure Potential

Propionaldehyde is used in the production of other chemicals. Based on the uses for propionaldehyde, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a propionaldehyde manufacturing facility or in the various industrial or manufacturing facilities that use propionaldehyde. It is produced, distributed, stored, and consumed in closed systems. Those working with propionaldehyde in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Each 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 propionaldehyde** – DOW propionaldehyde is not sold for direct consumer use. Propionaldehyde, being a reactive chemical intermediate, is not directly used in products reaching the consumer. Because of its reactive nature and volatility, the residual concentration of propionaldehyde in consumer products is very low. See Health Information.

- **Environmental releases** – Propionaldehyde is utilized entirely in closed systems during manufacture and use, and therefore releases to the environment are expected to be minimal. In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Eliminate all sources of ignition. Propionaldehyde is volatile but also highly soluble in water. Once introduced, the compound will have tendency to remain in water. Because propionaldehyde is readily biodegradable, the compound will be removed by sewage treatment plants. See Environmental, Health, and Physical Hazard Information.
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- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, dike the area to contain the spill. Avoid contact with liquid and vapors. Wear suitable protective equipment. Positive-pressure, self-contained breathing apparatus (SCBA) with a full-face mask approved by NIOSH is recommended for emergency work. Eliminate all sources of ignition immediately. This material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Evacuate personnel upwind, out of low areas. Vapors are heavier than air and can travel long distances. Ignition or flashback could occur. Eliminate ignition sources. Extinguish fires with water spray or apply alcohol-type or all-purpose-type foam according to the manufacturer’s recommended techniques for large fires. Use carbon-dioxide or dry-chemical extinguishers for small fires. Use of a direct water stream may spread the fire. Avoid accumulation of water. This material may be carried across water surface, spreading the fire or contacting an ignition source. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

**Health Information**

**Eye and skin contact** – Eye contact with propionaldehyde causes severe irritation and moderate corneal injury that may be slow to heal. Brief skin contact may cause moderate skin irritation and prolonged contact may cause skin burns. Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Inhalation** – Excessive inhalation exposure may result in adverse effects including severe irritation to the respiratory tract (nose, throat and lungs) and may cause pulmonary edema (fluid in the lungs).

**Ingestion** – Slightly toxic if swallowed. Swallowing may result in moderate to severe irritation of the mouth, throat, esophagus, and stomach, with accompanying discomfort or pain.

**Repeated exposure** – Repeated skin contact may cause dermatitis. Prolonged or repeated overexposure to vapor may result in damage to the tissues of the nose and respiratory tract. Propionaldehyde did not affect reproductive performance in laboratory animals, did not cause birth defects nor demonstrate significant genetic toxicity.

For more information, see the relevant Safety Data Sheet.

**Environmental Information**

Propionaldehyde is volatile but also highly soluble in water. Once introduced, the compound will have a tendency to remain in water. It has minimal tendency to bind to soil or sediment.

Propionaldehyde 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.

Propionaldehyde is not likely to accumulate in the food chain (bioconcentration potential is low) and is considered slightly toxic to fish and other aquatic organisms on an acute basis.

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

Propionaldehyde is a volatile, flammable liquid that must be stored in vapor-tight equipment under an inerted atmosphere (oxygen-free nitrogen). Propionaldehyde vapor is heavier than air and can travel long distances and accumulate in low-lying areas creating an explosion or flashback hazard. Avoid static discharge. Keep material away from heat, sparks, or flame. In air, propionaldehyde readily converts to propionic acid. Oxidation can also cause the formation of hazardous peroxides or peracids. Polymerization is possible leading to pressure build-up in closed systems.

Avoid contact with air (oxygen), amines, alcohols, alkalis, ammonia, strong mineral acids, caustics, iron oxides (rust), and halogen compounds. Contact with these materials can result in the rapid generation of heat.

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 propionaldehyde. 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)
- Contact Us (http://www.dow.com/oxysolvents/contact/index.htm)
- Propionaldehyde, Technical Data Sheet, The Dow Chemical Company

For more business information about DOW™ propionaldehyde, visit the Dow Oxygenated Solvents website at www.dow.com/oxysolvents/prod/ acids.htm.

References

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As part of its 2015 Sustainability Goals, Dow has committed to make publicly available safety assessments for its products globally. This product safety assessment is intended to give general information about the chemical (or categories of chemicals) addressed. It is not intended to provide an in-depth discussion of health and safety information. Additional information is available through the relevant Safety Data Sheet, which should be consulted before use of the chemical. This product safety assessment does not replace required communication documents such as the Safety Data Sheet.

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