Product Safety Assessment

*Propylene Dichloride*

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Names
- CAS No. 78-87-5
- Dichloropropane
- Propylene dichloride
- 1,2-Dichloropropane
- PDC
- DCP

Product Overview
- Propylene dichloride (PDC) is a colorless liquid with a chloroform-like odor. See Product Description.

- Most PDC produced by Dow and others is used internally as a building block to produce other products under strictly controlled conditions, such as chlorinated organic solvents, toluene diisocyanate, photographic film, and ion-exchange resins.\(^1\) See Product Uses.

- Since PDC is not sold directly to consumers by Dow, the greatest potential for exposure is occupational exposure via inhalation by workers in production facilities.\(^2\) See Exposure Potential.

- PDC may cause slight eye irritation, but corneal injury is unlikely. Prolonged or repeated contact may cause skin irritation. Prolonged excessive inhalation exposure may cause serious adverse effects, even death. Excessive inhalation exposure may cause irritation to the upper respiratory tract and lungs. Propylene dichloride has low toxicity if swallowed after single exposure. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems. Exposure to high concentrations of PDC has caused cancer in laboratory animals. Observations of increased incidences of cholangiocarcinoma in Japanese printing press workers with combined exposures to methylene chloride and PDC have been reported.\(^3\) See Health Information.

- PDC is not readily biodegradable. It does not accumulate in the aquatic food chain and is moderately toxic to aquatic organisms on an acute basis. See Environmental Information.

- PDC is a flammable explosion hazard and can decompose at elevated temperatures. Decomposition products can include toxic gases. Avoid contacting propylene dichloride with acids, bases, oxidizers, and metals such as zinc powders, aluminum, and aluminum alloys.\(^4\) See Physical Hazard Information.
Manufacture of Product

- **Capacity** – In 2013, worldwide production of propylene dichloride (PDC) was estimated at 180,000 to 230,000 metric tons (400 to 510 million pounds). PDC may be produced at manufacturing facilities of Dow in Texas (USA), Louisiana (USA), Germany, and Brazil.

Product Description

PDC is a colorless flammable liquid with a chloroform-like sweet odor. It mixes well with most common solvents, but has only very limited solubility in water.

Product Uses

Most of the PDC produced by Dow and other companies is used internally as a building block to produce other products, such as chlorinated solvents, toluene diisocyanate (a chemical important in polyurethane manufacture), photographic film, and ion-exchange resins.

Exposure Potential

Propylene dichloride is used in the production of industrial products. Based on the uses for PDC, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a PDC manufacturing facility or in the various industrial or manufacturing facilities that use PDC. Potential exposure to PDC in the workplace is limited since it is produced, distributed, stored, and consumed in closed systems. Those working with propylene dichloride 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 and safety equipment in place to limit unnecessary propylene dichloride exposure. See Health Information.

- **Consumer exposure to products containing propylene dichloride** – Since Dow does not sell PDC for direct consumer use, consumer exposure is unlikely. Traces of PDC have been detected occasionally in soil and well-water sampling, possibly as a result of either its past use as a soil fumigant or improper waste disposal. See Health Information.

- **Environmental releases** – 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 immediately. For small spills, PDC should be absorbed with materials such as sand. Respiratory protection is necessary for cleaning up spills and leaks. The high vapor pressure and insolubility in water indicate that the compound will have a tendency to rapidly volatilize (evaporate and become a gas/vapor) and remain in the atmosphere. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, eliminate all sources of ignition immediately. The spill should be contained by dikes, and recovered material should be disposed of according to applicable governmental requirements. Use foam to suppress vapors if necessary. Wash the affected area with lots of water and contain the wash water for disposal. Positive pressure, self-contained breathing apparatus (SCBA) with a full-face mask approved by NIOSH is recommended for emergency work. Use only explosion-proof equipment and ground and bond all containers and handling equipment. 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 to extinguish the fire. Use of a direct water stream may spread the fire. If appropriate, 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 relevant Safety Data Sheet from the Dow Customer Information Group.

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**Health Information**

**Eye and Skin Contact** – Propylene dichloride (PDC) may cause slight eye irritation, but corneal injury is unlikely. Exposure to PDC vapor may result in tear formation. Prolonged or repeated contact may cause skin irritation. Contact may cause drying and flaking of the skin. Prolonged skin contact is unlikely to result in absorption of harmful amounts.

**Inhalation** – Prolonged, excessive exposure to PDC may cause serious adverse affects, even death. Excessive inhalation exposure may cause irritation to the upper respiratory tract and lungs. In animals, effects have been reported within the respiratory tract, on the kidney, liver, and adrenal glands, as well as on hematologic and blood parameters.

**Ingestion** – PDC has low toxicity if swallowed after single exposure. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.

**Repeated Exposure** – In humans and animals, effects have been reported on the blood, kidney, and liver. In animals, effects have been reported on the testes. Anesthetic or narcotic effects have also been observed in animals. Repeated inhalation exposure caused respiratory tissue toxicity followed by tumor development in animals.

**Cancer** – Inhalation exposures to high concentrations of PDC has caused cancer in laboratory animals whereas results from oral cancer bioassays have been inconclusive. The evidence indicates tumor development followed tissue damage in the respiratory system. In 2014, the International Agency for Research on Cancer (IARC) listed PDC in Group 1, or “carcinogenic to humans,” based on observations of increased incidences of bile duct cancer in Japanese printing press workers with combined exposures to methylene chloride and PDC. The U.S. Environmental Protection Agency (EPA) has provisionally classified it in Group B2 as a “probable human carcinogen.”

**Birth and Reproductive Effects** – PDC did not cause birth defects in laboratory animals. PDC was toxic to the fetus at doses that were toxic to the mother. Likewise, effects on reproduction were only seen at doses that produced significant toxicity to the parent animals.

**Genetic Toxicology** - In vitro genetic toxicity studies were negative in some cases and positive in other cases. Animal genetic toxicity studies were negative.

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

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**Environmental Information**

Even though PDC is stored, processed and transported in closed systems, small amounts may escape into the air as fugitive emissions during manufacturing or use. Because it is poorly

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soluble and highly volatile, if introduced to surface water, the compound will quickly volatilize (evaporate) into the atmosphere where it will be removed by reaction with hydroxyl radicals. PDC does not contribute to the depletion of the stratospheric ozone layer.

PDC is expected to be highly mobile in soil, and has the potential to reach underground water supplies. Traces of PDC have been detected occasionally in soil and well-water, possibly as a result of either its past use as a soil fumigant or due to improper waste disposal. PDC that reaches groundwater may be difficult to remediate.

PDC is not readily biodegradable; however, this does not mean that the compound is not biodegradable in the environment. Biodegradation can occur under both aerobic and anaerobic conditions (in the presence and absence of oxygen). Propylene dichloride (PDC) is not likely to accumulate in the aquatic food chain (bioconcentration potential is low) and is moderately toxic to fish and aquatic organisms on an acute basis.

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

**Physical Hazard Information**

PDC and its vapors are highly flammable. PDC is stable at recommended storage and use temperatures. Exposure to higher temperatures (open flames, welding arcs, etc.) can cause decomposition. Decomposition products can include toxic gases such as hydrogen chloride or traces of phosgene.

Avoid contacting PDC with acids, bases, oxidizers, and metals such as zinc powders, aluminum, and aluminum alloys.

For more information, request the relevant 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 propylene dichloride. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet or Contact Us.

**Additional Information**

- PDC IUCLID file on ECHA dissemination webpage: [http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d92d0e7-441e-0b4f-e044-00144f67d249/DISS-9d92d0e7-441e-0b4f-e044-00144f67d249_DISS-9d92d0e7-441e-0b4f-e044-00144f67d249.html](http://apps.echa.europa.eu/registered/data/dossiers/DISS-9d92d0e7-441e-0b4f-e044-00144f67d249/DISS-9d92d0e7-441e-0b4f-e044-00144f67d249_DISS-9d92d0e7-441e-0b4f-e044-00144f67d249.html)
- Safety Data Sheet available upon request from the Dow Customer Information Group ([http://www.dow.com/assistance/dowcig.htm](http://www.dow.com/assistance/dowcig.htm))
- “1,2-Dichloropropane,” *SIDS Initial Assessment Profile*, November 2003 ([http://www.jetoc.or.jp/HP_SIDS/pdffiles/78-87-5.pdf](http://www.jetoc.or.jp/HP_SIDS/pdffiles/78-87-5.pdf))
References


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