Product Safety Assessment

*Diphenyl Oxide*

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Names
- CAS No. 101-84-8
- Diphenyl oxide
- Diphenyl ether
- Phenoxybenzene
- 1,1'-Oxybisbenzene
- Phenyl ether

Product Overview
- At temperatures of 80°F (27°C) and above, diphenyl oxide (DPO) is a colorless liquid with a floral odor. DPO is a white, crystalline solid at temperatures below 80°F (27°C).\(^1\)\(^2\) See *Product Description*.
- DPO is mainly used in the industrial setting as a heat transfer fluid. Dow sells DPO and DPO-blends under the trade name DOWTHERM\(^\text{TM}\) heat transfer fluid. DPO is also used as a chemical intermediate in the manufacture of surfactants and fire retardants.\(^2\) See *Product Uses*.
- Skin or eye contact with diphenyl oxide may cause irritation. DPO is unlikely to be absorbed through the skin. Inhalation of DPO vapor may cause upper respiratory irritation.\(^1\) See *Health Information* or *Physical Hazard Information*.
- Exposure to DPO could occur at a DPO manufacturing facility, or a facility which uses DPO or DPO-containing products.\(^2\) See *Exposure Potential*.
- Diphenyl oxide is stable at room temperature. Avoid contact with oxidizing materials.\(^1\) See *Physical Hazard Information*.

Manufacture of Product
- **Capacity** – Dow has been manufacturing diphenyl oxide since 1924. The global industry capacity is estimated to be 55,000 metric tons (122 million pounds).\(^3\)
- **Process** – Diphenyl oxide (DPO) is manufactured using the direct phenol method. The DPO produced is very high purity (greater than 99.99%).\(^2\) The reaction is shown below and a schematic of the process is shown on the next page.
Product Safety Assessment: Diphenyl Oxide

Diphenyl Oxide (DPO) is a colorless liquid with a floral odor. DPO is a white, crystalline solid at temperatures below 80ºF (27ºC). Liquid DPO is used primarily in industry. DPO has low volatility, low solubility in water, and is stable at high temperatures.

Product Uses
DPO can be used alone or as a mixture with other materials. Because of its reactivity, DPO can also be used as a raw material or chemical intermediate to produce commercial products. DPO is used in the production of:
- Heat transfer media – like DOWTHERM™ fluids used for heating industrial processes
- Alkylated diphenyl oxides – used to make surfactants, greases and lubricants
- Halogenated diphenyl oxides – used in insecticides, wood preservatives, and flame retardants for appliance casings in consumer electronic products
- High temperature solvents
- Coatings
- Textile dye labeling
- Plastics – like ethylene-propylene-diene monomer (EPDM) rubber that is used for membrane roofing materials
Exposure Potential
DPO is used in the production of industrial and consumer products. Based on the uses for DPO, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a DPO manufacturing facility, or in the various industrial or manufacturing facilities that use DPO or DPO-containing products, such as heat transfer fluids. Those working with DPO in manufacturing operations could be exposed during product transfer, maintenance, testing, or other procedures. Manufacturing operations that use DPO-containing products could be exposed during maintenance of heating systems. Each manufacturing facility should have a thorough training program for employees, appropriate work processes, and safety equipment in place to limit unnecessary exposure. See Health Information.
- **Consumer exposure to products containing diphenyl oxide** – Dow does not sell DPO for direct consumer use. Accidental industrial spills or releases would be the most likely source of consumer exposure. See Health Information.
- **Environmental releases**¹ – In the event of a spill, the focus is on containing the spill to prevent contamination of soil, surface or ground water. For small spills, DPO should be absorbed with a non-combustible material such as sand. See Environmental, Health and Physical Hazard Information.
- **Large release** – Industrial spills are infrequent and generally contained. If a large spill does occur, dike area. Prevent DPO from reaching sewers or water bodies. Eliminate all sources of ignition. Evacuate unnecessary personnel. Collect in suitable and properly-labeled containers. Follow emergency procedures carefully. In case of fire, deny unnecessary entry into the area. Use water fog or fine spray, or dry chemical fire extinguishers. Alcohol-resistant foams are preferred. Use of a direct water stream may spread fire or cause violent steam eruption. Wear protective fire fighting clothing and breathing apparatus. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet (SDS).

Health Information²,⁴
Skin contact with DPO might cause slight irritation. Prolonged or repeated skin exposure may cause moderate irritation with local redness. DPO is unlikely to be absorbed through the skin.

Eye contact with liquid DPO may cause slight irritation or slight corneal injury. Vapor may cause irritation or redness.

When handled at room temperature, vapor concentrations of DPO are low. Even at very low vapor concentrations, a distinct floral odor is noticed. Excessive inhalation of DPO vapor may cause irritation of the nose and throat and/or headache and nausea due to the odor.

For more information, see the relevant SDS.

Environmental Information²,⁴
DPO is not readily biodegradable. There is no evidence that harmful products are formed as a result of biodegradation. Potential for mobility in soil is low. DPO has low solubility in water. When mixed with water, DPO will likely solidify and settle.
DPO is moderately toxic to fish and other aquatic organisms. In experimental studies, DPO has been shown to accumulate in trout tissue, then rapidly disappear when trout are exposed to fresh water.

For more information, see the relevant SDS.

**Physical Hazard Information**

DPO is stable at recommended storage temperatures and pressures. However, because of its reactive nature, contact with oxidizing materials such as acids, halides and metal oxides should be avoided.

For more information, see the relevant Safety Data Sheet (SDS).

**Regulatory Information**

Regulations may exist that govern the manufacture, sale, transportation, use and/or disposal of DPO. These regulations may vary by city, state, country or geographic region. Information may be found by consulting the relevant SDS or Contact Us.

**Additional Information**

- Contact Us [http://www.dow.com/heattrans/contact/]
- Diphenyl Oxide (DPO) Purified, Product Technical Data Sheet, The Dow Chemical Company, Form No. 176-01553-300 AMS, March, 2000 (request at: [http://www.dow.com/heattrans/contact/]
- Diphenyl Ether IUCLID Data Set, Solutia Inc./Dow Chemical Co., July 18, 2003

For more business information about diphenyl oxide, visit Dow’s Thermal Fluids web site.

**References**

1 Diphenyl Oxide Purified Material Safety Data Sheet, The Dow Chemical Company, Identification Number 56264.
2 Diphenyl Oxide Purified DPO Product Technical Data Manual, The Dow Chemical Company, Form No. 176-01482-798AMS.
3 Estimates by The Dow Chemical Company.
NOTICES:

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