Product Safety Assessment

*DOW™ Pentanes Plus*


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Names
- DOW™ Pentanes Plus
- C5 stream
- Pyrolysis C5
- Pentanes
- C₅ aliphatic hydrocarbon solvents

Product Overview
- DOW™ Pentanes Plus is a complex mixture of C5 hydrocarbons rich in isopentane and pentane. This material is a colorless liquid with a gasoline-like odor. It is volatile (evaporates readily) and does not mix with water (negligible solubility). DOW Pentanes Plus is recovered during the manufacture of benzene from pyrolysis gasoline (pygas). For further details, see Product Description.
- DOW Pentanes Plus is used for blending into gasoline and related applications. For further details, see Product Uses.
- Worker exposure is possible during manufacturing. Occupational exposure is limited by engineering controls and personal protective equipment. Components of this material may be present in gasoline. Consumers may contact this material by inhalation while fueling motor vehicles. For further details, see Exposure Potential.
- Eye contact may cause slight, temporary irritation, with pain disproportionate to the level of irritation. Vapor may cause eye irritation experienced as mild discomfort or redness. Brief skin contact may cause slight irritation with local redness and drying and flaking of the skin. Prolonged contact may cause skin burns, but is unlikely to result in absorption of harmful amounts. In confined or poorly ventilated areas vapor can easily accumulate and cause unconsciousness or death due to displacement of oxygen. Excessive inhalation may cause irritation to the nose and throat along with anesthetic or narcotic effects such as dizziness or drowsiness. This material is an aspiration hazard. It may contain components that have been shown to cause cancer in animals and humans. For further details, see Health Information.
- The major components of DOW Pentanes Plus are biodegradable, have a low tendency to accumulate in the food chain, and are toxic to fish and other aquatic organisms on an acute basis. For further details, see Environmental Information.
- DOW Pentanes Plus is a vapor explosion hazard. Both liquid and vapor are extremely flammable. The vapor is heavier than air and can travel long distances; ignition or flashback

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could occur. This material is stable under recommended storage conditions, but can decompose at elevated temperatures. Avoid contact with strong acids, strong oxidizers, and strong reducing agents. For further details, see Physical Hazard Information.

**Manufacture of Product**

- **Capacity** – The total global production of pentane products is estimated to be between 50 and 100 metric kilotonnes (110 to 220 million pounds) per year. Dow produces Pentanes Plus at facilities in Plaquemine Louisiana, USA.
- **Process** – DOW™ Pentanes Plus originates from the high-temperature cracking of petroleum fractions and is separated from pyrolysis gasoline (pygas) by distillation during the production of benzene. “Cracking” is a process in which hydrocarbon molecules are broken down into smaller molecules at very high temperatures and then separated by distillation at a lower temperature.

**Product Description**

DOW™ Pentanes Plus is a complex mixture of mainly unsaturated C5 hydrocarbon compounds with similar boiling points 30–65°C (86–149°F). It is a co-product in the production of benzene from pyrolysis gasoline. It is a clear liquid with a strong, gasoline-like odor. It is highly volatile (evaporates quickly) and does not mix with water. DOW Pentanes Plus mainly consists of isopentane (20–40%) and pentane (20–35%). There are numerous minor components with concentrations ranging from about 7% to parts per million (ppm).

**Product Uses**

DOW™ Pentanes Plus is mainly used as a gasoline blendstock for motor fuels.

**Exposure Potential**

DOW™ Pentanes Plus is mainly used as a gasoline blending component. Based on this, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in a benzene production facility, during transport, or at a gasoline blending facility. It is produced, stored, and transported in closed systems, and therefore direct worker contact is minimal. Those working with DOW Pentanes Plus 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 exposure. See Health Information.
- **Consumer exposure to products containing DOW Pentanes Plus** – Dow does not sell this material for direct consumer use, but it is used as a gasoline blending component. Consumers could inhale traces of this material while fueling motor vehicles. See Health Information.
- **Environmental releases** – The vast majority of DOW Pentanes Plus is released to the environment through the manufacture, use, and disposal of many products associated with the petroleum industry and the combustion of gasoline. DOW Pentanes Plus released to air will degrade within days from exposure to photochemically produced hydroxyl radicals. The material has very low solubility in water, and when introduced, will have a tendency to
evaporate from water and degrade in the atmosphere. Because the components in DOW™ Pentanes Plus are biodegradable, they will be removed from water and soil environments, including 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. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, ventilate the area. Evacuate personnel upwind out of low-lying areas. This material is a vapor explosion hazard. Vapors are heavier than air and can travel long distances and accumulate in low-lying areas. Only trained and properly protected personnel must be involved in clean-up operations. Contain spilled material if possible. Use foam to smother or suppress vapors. Ground and bond all containers and handling equipment. Eliminate all sources of ignition in the vicinity of the spill or released vapor. Transfer recovered material with explosion-proof equipment and collect in suitable and properly labeled containers. Use appropriate safety equipment. Warn the public of any downwind explosion hazard. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Keep people away. Isolate the fire and deny unnecessary entry. Use water fog or fine spray, dry-chemical or carbon-dioxide (CO₂) extinguishers, or foam to fight the fire. Alcohol-resistant foams are preferred. A direct water stream may spread the fire. Firefighters must wear positive pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing. Avoid accumulation of water. Product may be carried across the water surface, spreading fire or contacting an ignition source. Contain fire-water run-off if possible to minimize the potential for environmental damage. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

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

**Health Information**

*Eye contact* – Contact may cause slight temporary irritation with a high degree of pain. Contact with vapor may cause irritation experienced as mild discomfort or redness.

*Skin contact* – Brief contact may cause slight irritation with local redness, along with drying and flaking of the skin. Prolonged contact may cause skin burns with pain, severe local redness, swelling, and tissue damage. A burning sensation, pain, or itching are possible. The response may be more severe if the material is confined under clothing or gloves. Contact may stain the skin. Prolonged contact is unlikely to result in absorption of harmful amounts.

*Inhalation* – Vapor concentrations are attainable that could be hazardous on single exposure. Symptoms of excessive exposure may be anesthetic or narcotic effects and dizziness or drowsiness. Excessive inhalation may cause upper respiratory tract irritation (nose and throat), increased sensitivity to epinephrine, and an increased possibility for irregular heartbeats (myocardial irritability). In confined or poorly ventilated areas, vapor can readily accumulate and cause unconsciousness and death due to displacement of oxygen.

*Ingestion* – This material has moderate toxicity if swallowed. Toxicity from swallowing may be greater in humans than in animals. Small amounts swallowed incidental to normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause serious injury, even death. Aspiration into the lungs may occur during ingestion or vomiting, causing lung damage or even death due to chemical pneumonia. Swallowing may cause gastrointestinal irritation, vomiting, and diarrhea.

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Repeated exposure – In humans, repeated exposure to components in this product have affected the blood, bone marrow, spleen, and central nervous system. In animal testing, repeated overexposure to components in this product have been reported to affect bone marrow, spleen, thymus, testes, immune system, central nervous system, kidneys, and liver.

Cancer information – Benzene, a minor component of DOW™ Pentanes Plus, has been shown to cause cancer in laboratory animals and humans. Ethylbenzene, a minor component of this product, has been shown to cause cancer in laboratory animals.

Reproductive Toxicity – There are components of DOW Pentanes Plus that carry formal classification as reproduction Category 3 in Europe (substances which cause concern for humans owing to possible developmental toxic effects).

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

Environmental Information

The components of DOW™ Pentanes Plus are volatile and will evaporate if released. The components are nearly insoluble in water and if released to water, will float to the surface and evaporate rapidly. In the atmosphere, the components will degrade within days by reaction with photochemically produced hydroxyl radicals. Both of the major components of DOW Pentanes Plus, isopentane and pentane, are readily biodegradable, which suggests they will be removed from water and soil environments, including biological wastewater-treatment facilities. The components of DOW Pentanes Plus are unlikely to persist in the environment.

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The major components in DOW Pentanes Plus have a low potential to accumulate in the food chain, and are toxic to fish and other aquatic organisms on an acute basis.

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

Physical Hazard Information

DOW™ Pentanes Plus is a vapor explosion hazard. Both liquid and vapor are extremely flammable. The vapor is heavier than air and can travel long distances. Ignition or flashback could occur. Avoid static discharge. This material is thermally stable under recommended storage conditions, but can decompose at elevated temperatures.

Avoid contact with strong acids, strong oxidizers, and strong reducing agents. Electrically bond and ground all containers and equipment before transfer or use of this material.

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 DOW™ Pentanes Plus. 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
- Safety Data Sheet (www.dow.com/assistance/dowcig.htm)
- Contact Us (www.dow.com/assistance/thoughts.htm)


References
NOTICES:

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