Product Safety Assessment

*DOW™* Butane


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Names

- CAS No. 106-97-8
- Butane
- CAS No. 75-28-5
- CAS No. 87741-01-3
- Butanes
- Butane CK

- DOW™ butane
- n-Butane
- Isobutane (methylpropane)
- Hydrocarbons, C4; petroleum gas
- Liquefied petroleum gas (LPG, LP Gas)

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**Product Overview**

- Butane is a colorless, odorless, flammable gas. It is a mixture of the isomers n-butane and isobutane. Butane occurs naturally mixed with natural gas and oil deep in the earth. Butane is recovered from natural gas at natural-gas processing facilities and from crude oil at refineries. It is transported and stored as a liquid under pressure.¹² For further details, see Product Description.
- The major end use for butane in the U.S. is for the production of gasoline. n-Butane and isobutane are used as chemical feedstock in the solvent and plastics industries. Butane is an industrial and household fuel source (a component of bottled liquefied petroleum gas, i.e. LPG), refrigerant, and propellant in aerosol products. DOW™ butane is used as a raw material in the production of propylene oxide, ethylene, and other chemicals, as a fuel source, and as an industrial gas.³⁴ For further details, see Product Uses.
- Occupational exposure to butane is possible during extraction, transfer, or use. In chemical manufacturing, butane is consumed in closed systems with engineering controls to prevent fugitive emissions. Consumer exposure is possible while fueling a vehicle and for those who use bottled LP gas or aerosols containing it.⁶ For further details, see Exposure Potential.
- Eye contact with butane vapor may result in mild discomfort and redness. Skin contact with butane vapor is essentially nonirritating. Eye or skin contact with butane liquid may cause a frostbite-type injury due to rapid cooling. Swallowing butane liquid may cause frostbite of the lips and mouth. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems. Vapor concentrations are attainable that could be hazardous on single exposure. Excessive inhalation may cause headache,
dizziness, anesthesia, drowsiness, unconsciousness, and other central nervous system effects, including death. For further details, see Health Information.

- **n-Butane** is widely present in the atmosphere. Butane must remain under pressure to stay in liquid form. When pressure is released, butane would quickly disperse into the atmosphere and will photodegrade (breakdown by sunlight). Because butane would partition into the atmosphere, even if released to water, biodegradation is not a significant environmental fate pathway. Butane has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that this material is moderately toxic to fish and other aquatic organisms. For further details, see Environmental Information.

- Butane liquid and vapor are extremely flammable. Butane vapors are heavier than air and displace oxygen available for breathing. Vapors can travel long distances and accumulate in low-lying areas. Ignition and/or flashback may occur. Liquid butane is stored under pressure. It is stable under normal storage and use conditions. Exposure to elevated temperatures can cause butane to decompose. Avoid static discharge. Avoid open flames, welding arcs, or other high-temperature sources that induce thermal decomposition. Avoid contact with oxidizing materials such as chlorine, halogens, oxygen, and ozone. For further details, see Physical Hazard Information.

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**Manufacture of Product**

- **Production** – In 2008, world liquefied petroleum gas (LP gas) production was estimated to be 234 metric kilotonnes (516 million pounds). This estimate combines propane and butanes, which are extracted together.

- **Process** – Naturally occurring butane is recovered from natural gas at natural-gas processing facilities and from crude oil at refineries. Because butane is such an important raw material, it is also produced by other refinery processes such as catalytic cracking, thermal operations, catalytic reforming, and hydrocracking. These processes use catalysts and high temperatures (often steam) to break down larger hydrocarbons into butane. The resulting butane stream is often further processed into gasoline blending additives (alkylates). In 2008, petroleum-refining operations accounted for nearly 80% of the butanes produced in the U.S.

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**Product Description**

Butane is a mixture of the structural isomers n-butane and isobutane (methylpropane). Butane is a colorless, odorless gas at atmospheric pressure. It is normally transported and stored as a liquid under pressure.

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**Product Uses**

DOW™ butane is used as a raw material in the production of chemicals, a fuel source, and as an industrial gas. The butanes are used for the following applications:

- **Gasoline blending** – Either added directly or following conversion into gasoline alkylates (C7–C9 saturated hydrocarbons)

- **Chemical manufacturing** – Raw material for the production of propylene oxide, ethylene, tert-butyl alcohol, maleic anhydride, acetic acid, methyl ethyl ketone, and others

![U.S. Consumption of Butane (2008)](image)

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Created: July 24, 2010

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- **Fuel source** – Component of portable bottled LP gas (mixture of propane and butane) used as an industrial energy source, also residential and commercial cooking and heating, especially in warmer climates
- **Polymer processing**
- **Aerosol propellant** – Replacement for ozone-depleting fluorocarbons
- **Refrigerant** – High-purity isobutane and n-butane used in household refrigerators and freezers

*Please be advised that butane, butylenes, butadiene or crude butadiene products may not be suitable for use in cosmetics.*

**Exposure Potential**

Butane is mainly used for gasoline blending, as an industrial fuel, and as a raw material in the chemical industry. Based on these uses, the public could be exposed through:

- **Workplace exposure** – Occupational exposure to butane is possible during extraction, transfer, or use. It is manufactured and consumed in closed systems with engineering controls to prevent fugitive emissions. Those working with butane in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. The highest potential for workplace exposure is for those who work at gasoline blending and handling facilities. Each 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 butane** – DOW™ butane is not sold for consumer use. Because butane is a component of gasoline, consumer exposure is possible while fueling a vehicle and for those who use bottled LP gas as a fuel or aerosols containing it as a propellant. Extensive monitoring data indicates n-butane is widely present in the atmosphere from the combustion of gasoline. See Health Information.

- **Environmental releases** – n-Butane can be released into the environment from hazardous-waste disposal sites, landfills, waste incinerators, and from gasoline-fueled engines. It is also a highly volatile component of crude oil and natural gas. Butane released to air will degrade from exposure to sunlight (photodegradation) within days to weeks. Because of its volatility, biodegradation is not a significant environmental fate pathway for butane in surface environments. See Environmental, Health, and Physical Hazard Information.

- **Large release** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. Evacuate personnel upwind of the spill. Ground and bond all containers and handling equipment. Eliminate all sources of ignition. Use fine water spray or foam to smother or suppress vapors. Stop the flow of gas. Pump with explosion-proof equipment. Only trained personnel must be involved in clean-up operations. 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** – Do not attempt to extinguish the fire. Keep people away and isolate the fire area. If flames are accidentally extinguished, explosive reignition may occur. Stop the flow of gas if possible and allow the fire to burn out. Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Eliminate ignition sources. Once product flow has stopped, small fires may be extinguished with a water fog or fine spray, dry-chemical or carbon-dioxide extinguishers, or foam. Do not use water to extinguish liquefied butane; apply appropriate foam or vapor suppressing agent. **Warning!** Contact of water with liquefied butane can result in boiling, frothing, and rapid generation of vapor. 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.
Health Information\textsuperscript{19,20}

**Eye contact** – Contact with butane vapor may cause irritation experienced as mild discomfort and redness. Contact with butane liquid may cause a frostbite-type injury due to rapid cooling.

**Skin contact** – Brief contact with butane vapor is essentially nonirritating. Contact with butane liquid may cause frostbite. The effects may be delayed. No adverse effects are anticipated by skin absorption.

**Inhalation** – Vapor concentrations are attainable that could be hazardous on single exposure. In confined or poorly ventilated areas, butane vapor can easily accumulate and cause unconsciousness or death due to displacement of oxygen. Excessive exposure may cause headache, dizziness, anesthesia, drowsiness, and other central nervous system effects, including death. Excessive inhalation may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats).

**Ingestion** – Swallowing butane gas is unlikely. Butane in liquid form may cause frostbite of the lips and mouth. Aspiration into the lungs may occur during ingestion or vomiting, resulting in rapid absorption and injury to other body systems.

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

Environmental Information\textsuperscript{21,22,23}

Extensive monitoring data indicate n-butane is widely present in the atmosphere, primarily from the use of gasoline. It is also released to the environment from hazardous-waste disposal sites, landfills, waste incinerators, and crude-oil and natural-gas processing.

Butane has a very low boiling point, a very high vapor pressure, and is insoluble in water. It is a gas under almost all environmental conditions. If released to surface water it would rapidly evaporate and disperse into the atmosphere. Butane will then degrade by photodegradation (exposure to sunlight). Because of its volatility, biodegradation is not a significant environmental fate pathway for butane in surface environments.

Butane has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that it is moderately toxic to fish and other aquatic organisms.

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

Physical Hazard Information\textsuperscript{24}

Butane liquid and vapors are extremely flammable. Keep away from heat, sparks, and flame. Vapors are heavier than air and can travel long distances and accumulate in low-lying areas. Ignition and/or flashback may occur. Use with adequate ventilation. Liquid butane is stored under pressure. It is stable under normal storage and use conditions. Exposure to elevated
temperatures can cause butane to decompose. Avoid static discharge, open flames, welding arcs, or high-temperature sources that could induce thermal decomposition. Avoid contact with oxidizing materials such as chlorine, halogens, oxygen, and ozone.

Electrically bond and ground all containers and equipment before transferring or using butane. 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 butane. 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/dowcig.htm)
- “Butane,” Hazardous Substances Databank (HSDB), National Library of Medicine, TOXNET system (http://toxnet.nlm.nih.gov/cgi-bin/sis/search/r?dbs+hsdb:@term+@na+BUTANE)
- U.S. Energy Information Administration website (http://www.eia.doe.gov/)

For more business information about DOW™ butane, contact the Dow Customer Information Group at www.dow.com/assistance/dowcig.htm.

References

4 “Butane,” Hazardous Substances Databank (HSDB), National Library of Medicine, TOXNET system, Manufacturing/Use Information section, page 1.
9 “Butane,” Hazardous Substances Databank (HSDB), National Library of Medicine, TOXNET system, Environmental Fate/Exposure section, pages 2 and 7.
15 “Butane,” Hazardous Substances Databank (HSDB), National Library of Medicine, TOXNET system, Manufacturing/Use Information section, page 1.
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