Product Safety Assessment

Acetylene

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Names
• CAS No. 74-86-2
• Ethyne
• Acetylene

Product Overview
• Acetylene is a colorless gas with a pungent odor. Acetylene is manufactured as a co-product in the production of ethylene. Rohm and Haas, a wholly owned subsidiary of The Dow Chemical Company, manufactures acetylene from natural gas.\textsuperscript{1,2} For further details, see Product Description.
• Acetylene is mainly used as a raw material for the production of other chemicals. It is also in the metalworking industry for cutting and welding.\textsuperscript{3} For further details, see Product Uses.
• Acetylene is an industrial chemical. Workplace exposure could occur during manufacturing or by welders using acetylene torches in the metalworking industry. Acetylene is manufactured in closed systems with engineering controls that minimize the chance for exposure. No uses of acetylene in consumer products are known. Since the majority of acetylene is used in closed systems as an industrial intermediate and as a fuel for oxyacetylene torches, the potential for occupational exposure is minimal and no consumer exposure is expected.\textsuperscript{3} For further details, see Exposure Potential.
• Acetylene has no known health hazards other than being an asphyxiant – at high concentrations it could cause suffocation by displacement of oxygen.\textsuperscript{1,4} For further details, see Health Information.
• Acetylene gas released to the environment would undergo photodegradation in the atmosphere. Because acetylene is a gas and 99.9% would partition into the atmosphere, even if released to water, biodegradation is not a significant environmental fate pathway. Acetylene gas has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that this material is practically nontoxic to fish and other aquatic organisms.\textsuperscript{5} For further details, see Environmental Information.
• Acetylene is stable under recommended storage conditions. At concentrations above its lower flammable limit (greater than 2.5%) it becomes a fire and explosion hazard. Avoid contact with oxidizing materials, copper compounds, halogen compounds, silver, strong acids, and strong inorganic bases. Elevated temperatures or molecular 13X sieves can cause acetylene to undergo hazardous polymerization; a rapid uncontrolled chemical reaction that releases large amounts of heat.\textsuperscript{1,6} For further details, see Physical Hazard Information.
Manufacture of Product

- **Capacity** – The estimated U.S. annual capacity for acetylene in 2008 was 119 metric kilotonnes (265 million pounds). Dow manufactures acetylene at its facilities in Taft, Louisiana and in Deer Park, Texas.
- **Process** – Acetylene is manufactured as a co-product in the production of ethylene. Acetylene is produced during cracking of natural gas liquids, naphtha, or gas oil for ethylene manufacture. The concentrations of acetylene produced by this method are small (from 1.0 to 2.5 weight percent). Dow uses a partial oxidation technique. In this method, methane in natural gas is converted to acetylene in the presence of oxygen. This process yields about 25% conversion from methane to acetylene with the remainder of the feed fueling the reaction.

Product Description

Acetylene is a colorless gas with a pungent odor.

Product Uses

Acetylene is mainly used as a raw material in the production of other chemicals. It is manufactured in closed systems and is most often converted to other chemicals on site. Chemicals derived from acetylene include:

- 1,4-Butanediol
- Acetylenic alcohols
- Acetylene black
- Vinyl fluoride
- Ethyl and methyl vinyl ethers
- N-Vinyl-2-pyrrolidone

Acetylene is also used in oxyacetylene torches for welding and metal cutting.

Exposure Potential

Acetylene is used as an industrial raw material and for metal processing. Based on the uses for acetylene, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in an ethylene or acetylene manufacturing facility. Almost all acetylene for chemical synthesis is manufactured and consumed in closed systems at or near the production site. Those working with acetylene in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Metalworkers using acetylene gas for welding and cutting could also be exposed. Due to its physical properties, inhalation is the only likely route of acetylene exposure. 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 acetylene** – There are no known uses for acetylene in consumer products. Since the majority of acetylene is used as a closed-system industrial intermediate and as a fuel for oxyacetylene torches, the potential for occupational exposure is minimal and no consumer exposure would be expected. See **Health Information**.

• **Environmental releases** – Because acetylene is a gas, any acetylene released to the environment would rapidly disperse into the atmosphere. Although acetylene can mix with water, it would quickly partition into the air and would then slowly degrade in the air via photodegradation (exposure to sunlight). See **Environmental**, **Health**, and **Physical Hazard Information**.

• **Large release** – If possible, stop the flow of gas. Evacuate personnel and extinguish all ignition sources. Acetylene is a fire and explosion hazard. Ventilate the area. Use fine water spray to knock down and dilute vapors. Keep upwind of the spill. 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. Use only explosion-proof equipment; ground and bond all containers and handling equipment. The public should be warned of downwind vapor-explosion hazards. 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. Do not extinguish. Stop flow of product and allow the fire to burn out. 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. 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 contact** – Acetylene gas is essentially nonirritating to the eyes.

**Skin contact** – Because acetylene is a gas, skin contact is not likely.

**Inhalation** – Symptoms of excessive acetylene inhalation may be anesthetic or narcotic effects. Dizziness and drowsiness may also be observed. In confined or poorly ventilated areas, acetylene can easily accumulate and cause unconsciousness or death due to displacement of oxygen.

**Ingestion** – Swallowing this material is unlikely because it is a gas.

**Other** – There are no established links between any reproductive, developmental, or chromosomal effects and acetylene exposure.

For more information, see the relevant **Safety Data Sheet**.

**Environmental Information**

Acetylene has a very low boiling point and is a gas under almost all environmental conditions. This material has a very high vapor pressure and is slightly soluble in water. If released to surface water it would have a tendency to rapidly evaporate and disperse in the atmosphere. Once in the atmosphere, acetylene will slowly degrade by photodegradation (exposure to sunlight).
Because of its volatility (tendency to evaporate into the atmosphere), biodegradation is not a significant environmental fate pathway for acetylene gas in surface environments. This material has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that acetylene gas is practically nontoxic to fish and other aquatic organisms.

For more information, see the relevant Safety Data Sheet.

Physical Hazard Information

Acetylene is stable under recommended storage conditions. At concentrations above its lower flammable limit (greater than 2.5%) it becomes a fire and explosion hazard. Store this material away from heat, sparks, or flame. Avoid contact with oxidizing materials, copper compounds, halogens, silver, strong acids, and strong inorganic bases. Elevated temperatures or molecular 13X sieves can cause acetylene to undergo hazardous polymerization; a rapid uncontrolled chemical reaction that can release large amounts of heat.

Electrically bond and ground all containers and equipment before transfer or use of this material.

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 acetylene. 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

- Contact Us ([www.dow.com/assistance/dowcig.htm](http://www.dow.com/assistance/dowcig.htm))

For more business information about acetylene, contact the Dow Customer Information Group at [www.dow.com/assistance/dowcig.htm](http://www.dow.com/assistance/dowcig.htm).
References

1. Acetylene, Safety Data Sheet, The Dow Chemical Company

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