Product Safety Assessment

Ethane

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Names
• CAS No. 74-84-0
• Ethane
• Ethane CK raw
• Ethane CK treated
• Ethane-PM
• Ethane purity

Product Overview
• Ethane is a colorless, odorless, flammable gas. It occurs naturally deep in the earth, mixed with natural gas and in very low amounts in crude oil. Next to methane, ethane is the second-largest component of natural gas. Ethane is usually transported and stored as a liquid under pressure. For further details, see Product Description.
• Over 98% of the ethane produced in the U.S. is used to manufacture ethylene, an important raw material in the chemical industry. North America and the Middle East are the largest consumers of ethane in the world. For further details, see Product Uses.
• Occupational exposure to ethane is possible during extraction, transfer, or use. In chemical manufacturing, ethane is consumed in closed systems with engineering controls to prevent fugitive emissions. Ethane is present in trace amounts in the atmosphere. For further details, see Exposure Potential.
• Eye or skin contact with ethane in the vapor state is essentially nonirritating. Contact with liquid ethane may cause a frostbite-type injury due to rapid cooling. Ethane in vapor form is an asphyxiant. In confined or poorly ventilated areas vapor can accumulate and cause unconsciousness and death by displacing oxygen (suffocation). For further details, see Health Information.
• Ethane must remain under pressure to stay in liquid form. When pressure is released, ethane would quickly disperse into the atmosphere and slowly photo degrade (breakdown by sunlight). Because ethane is a gas and would partition into the atmosphere, even if released to water, biodegradation is not a significant environmental fate pathway. Ethane has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that this material is slightly to moderately toxic to fish and other aquatic organisms. For further details, see Environmental Information.
• Ethane liquid and vapors are extremely flammable. Vapors are heavier than air and can displace the oxygen available for breathing. Vapors can travel long distances and accumulate in low-lying areas. Ignition and/or flashback may occur. Liquid ethane is stored under
pressure. It is stable under normal storage and use conditions. Exposure to elevated temperatures can cause ethane to decompose. Avoid static discharge. Avoid contact with oxidizing materials such as chlorine, halogens, oxygen, and ozone.¹ For further details, see Physical Hazard Information.

Manufacture of Product¹

- **Production** – In 2009, world ethane consumption was estimated at 45 million metric tonnes (100 billion pounds).
- **Process** – Ethane is separated from natural gas by cooling it to very low temperatures. Cryogenic turbo-expansion (–73°C to 101°C) and refrigerated absorption at –34°C (–29°F) are the most used ethane recovery methods. The structure of ethane is shown below.

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H_3C—CH_3
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Product Description¹

Ethane is a colorless, odorless, flammable gas at atmospheric pressure. It is normally stored and transported as a liquid under pressure.

Product Uses⁵

Ethane is used as a chemical feedstock to produce ethylene, one of the major chemical building blocks in the chemical industry. Likewise, most ethane is used in the production of ethylene.

Exposure Potential¹,⁶

Based on the uses for ethane, the public could be exposed through:

- **Workplace exposure** – Occupational exposure to ethane 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 ethane in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. 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 ethane** – Ethane is not present in consumer products. The most likely pathway by which the general public is exposed to ethane is by inhalation due to its release from natural gas and crude oil. See Health Information.
- **Environmental releases** – Ethane released to the environment would quickly disperse into the atmosphere and photo degrade (breakdown by sunlight) within days or weeks. Ethane released to water or soil would quickly partition into the air. Liquid ethane released to water results in boiling, frothing, and rapid generation of vapor. Liquid ethane released to soil could result in the formation of ice, which would evaporate (volatilize) as it warms. See Environmental, Health, and Physical Hazard Information.
- **Large release** – Isolate the area until any gas has dispersed. Stop the flow of gas. If available, use foam to smother or suppress vapors. Ethane liquid and vapors are fire and explosion hazards. Vapors may travel long distances and accumulate in low-lying areas.
Ignition or flashback may occur. Spills of liquefied ethane may form ice, which can plug drains and make valves inoperable. Use non-sparking tools in cleanup operations. Ground and bond all containers and handling equipment. Eliminate ignition sources. 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. The public should be warned of any downwind explosion hazard. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Do not attempt to extinguish the fire. Stop the flow of product and allow the fire to burn out. Keep people away and isolate the fire area. If flames are accidentally extinguished, explosive re-ignition may occur. 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. **Warning!** Contact of water with liquefied ethane 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.

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

**Health Information**

**Eye or skin contact** – Ethane vapor is essentially nonirritating to the eyes or skin. Eye or skin contact with liquefied ethane may cause a frostbite-type injury due to rapid cooling.

**Inhalation** – In confined or poorly ventilated areas, vapor can easily accumulate and cause unconsciousness or death due to displacement of oxygen (suffocation). Excessive exposure may cause headache, dizziness, anesthesia, drowsiness, and other central nervous system effects. Excessive inhalation may increase sensitivity to epinephrine and increase myocardial irritability (irregular heartbeats).

**Ingestion** – Swallowing ethane gas is unlikely. Liquid may cause frostbite of the lips and mouth.

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

**Environmental Information**

Ethane 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. Ethane will then slowly degrade by photodegradation (exposure to sunlight). Because of its volatility, biodegradation is not a significant environmental fate pathway for ethane in surface environments. Ethane has a low bioconcentration potential (tendency to accumulate in the food chain), and estimated toxicity data indicate that it is slightly to 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
Ethane liquid and vapors are extremely flammable. Keep away from heat, sparks, and flame. Vapors are heavier than air and can displace the oxygen available for breathing. Use with adequate ventilation. Vapors can travel long distances and accumulate in low-lying areas. Ignition and/or flashback may occur. Liquid ethane is stored under pressure. It is stable under normal storage and use conditions. Exposure to elevated temperatures can cause ethane to decompose. Avoid contact with oxidizing materials such as chlorine, halogens, oxygen, and ozone.

Electrically bond and ground all containers and equipment before transferring or using ethane.

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 ethane. 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 (request from the Dow Customer Information Group at http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (www.dow.com/assistance/dowcig.htm)
- ESPERE website: Environmental Science Published for Everybody Round the Earth – Distribution & concentration (2) (http://www.atmosphere.mpg.de/enid/3tg.html)
- “Ethane,” Hazardous Substances Data Bank (HSDB), National Library of Medicine, TOXNET system (http://toxnet.nlm.nih.gov/cgi-bin/sis/search/r?dbs+hsdb:@term+@na+ETHANE)

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

1. Ethane Purity Material Safety Data Sheet, The Dow Chemical Company
3. “Ethane,” Hazardous Substances Data Bank (HSDB), National Library of Medicine, TOXNET system, Environmental Fate and Exposure section, page 2.
6. “Ethane,” Hazardous Substances Data Bank (HSDB), National Library of Medicine, TOXNET system, Environmental Fate and Exposure section, page 1.
7. “Ethane,” Hazardous Substances Data Bank (HSDB), National Library of Medicine, TOXNET system, Environmental Fate and Exposure section, pages 1–9.

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