Product Safety Assessment
Acetone

Select a Topic:

Names

CAS No. 67-64-1	2-Propanone	Dimethylketal
Acetone	Dimethylketone	

Product Overview

- Acetone is one of the most widely used industrial solvents and is increasingly used as a chemical intermediate. See Product Uses.
- Acetone is low in toxicity. It is a natural product of our body's metabolism. See Health Information.
- Acetone does not cause adverse health or environmental effects at levels typically found in the workplace or environment.
- Acetone is extremely flammable with a high vapor pressure; use only with good ventilation and avoid all ignition sources. See Physical Hazard Information.

Manufacture of Product

- **Capacity** – U.S. production capacity for acetone reached 1,839 thousand metric tons (4,055 million pounds) in 2002. Demand for acetone in the U.S. was 1,189 thousand metric tons (2,621 million pounds), and included some imports.[1] Dow annually produces about 186 thousand metric tons (410 million pounds) or roughly 10% of the U.S. acetone, at its Texas Operations and Institute, West Virginia facilities.
- **Process** – More than 90% of the U.S. acetone is produced as a co-product with phenol via the hydrolysis of cumene hydroperoxide. About 0.62 pound of acetone is produced per pound of phenol.[2] Although acetone is not a hazardous air pollutant or volatile organic compound (VOC), considerable measures are taken to prevent its release to the atmosphere. Processes and equipment for manufacture, transfer and storage are continuous and enclosed. When loading the product in tank trucks or rail cars, Dow uses vapor recovery systems to prevent releases to the atmosphere.

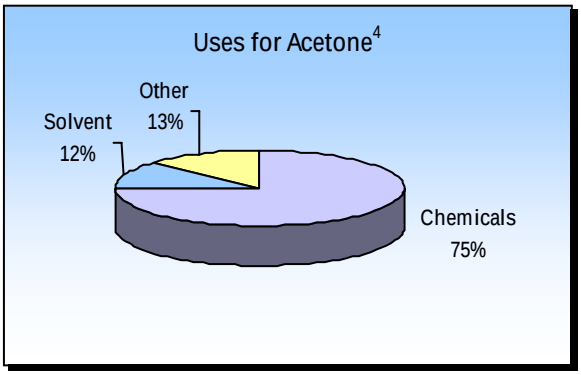
Product Description

Acetone is a clear, colorless, low-boiling, flammable and volatile liquid characterized by rapid evaporation and a faintly aromatic, sweetish odor. It readily mixes with most organic solvents and mixes completely with water. However, compatibility should be checked prior to mixing with other solvents or materials.[3]

Product Uses

Roughly 75% of the available acetone is used to produce other chemicals,[4] and 12% is used as a solvent. Applications range from surface coatings, films and adhesives to cleaning fluids and pharmaceutical applications. Other consumer and commercial applications include:

- Lacquers for automotive/furniture finishes
- Cellulose acetate films and fibers
- Photographic films and plates casting
- Coatings and inks
- Resin thinners and clean-up operations
- General purpose cements
- Degreasing and degumming agents
- Paint, varnish, lacquer strippers
- Nail polish removers
- Various cosmetic products



Exposure Potential

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

- **Workplace exposure** – This refers to potential exposure to acetone in an acetone/phenol manufacturing facility or through evaporation in various industrial and consumer product applications. Generally, exposure to acetone of personnel in acetone manufacturing facilities is relatively low because the process, storage and handling operations are enclosed. The US Occupational Safety and Health Administration (OSHA) permissible exposure limit (PEL) is 1,000 parts per million (ppm) per an 8-hour time-weighted average (TWA). The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs®) are 500 ppm 8-hour TWA, and 750 ppm for short-term exposure limit (STEL – 15 minutes).[6]
- **Consumer use of products containing acetone** – This category of exposure is highly variable depending on the products used and the conditions under which they are used. Exposure of the majority of consumers to commercial acetone sources is likely to be infrequent and of short duration. Exposure could occur through the use of acetone in personal care items or in lacquers and paint. The best way to prevent exposure to vapors is to work in well-ventilated areas.
- **Environmental releases** – Approximately 97% of the acetone released to the atmosphere comes from natural sources, such as decomposing vegetation and forest fires.[6] Man-made releases of acetone to the atmosphere are comparatively small.
- **Catastrophic release** – Industrial spills or releases are infrequent and often controlled. A spill poses a significant flammability issue. Levels of acetone in water as low as 1% can create a flammable headspace. Acetone may react vigorously with certain oxidizing agents such as sodium hydroxide (NaOH). Appropriate emergency response personnel should be called for large spills. Fires may be controlled with carbon dioxide or dry chemical extinguishers or alcohol foam.[7] The combustion products are carbon monoxide (CO), carbon dioxide (CO_2) and water (H_2O).

Health Information

Acetone has been studied extensively and is generally recognized to have low acute and chronic toxicity if ingested and/or breathed. Breathing high concentrations (around 9200 ppm) in the air caused irritation of the throat in humans in as little as 5 minutes. Breathing concentrations of 1000 ppm caused irritation of the eye and throat in less than 1 hour; however, breathing 500 ppm of acetone in the air caused no symptoms of irritation in humans even after 2 hours of exposure. Acetone is not currently regarded as a carcinogen, a mutagenic chemical or a concern for chronic neurotoxicity effects.[8]

Acetone can be found as an ingredient in a variety of consumer products ranging from cosmetics to processed and unprocessed foods. Acetone has been rated as a GRAS (Generally Recognized as Safe) substance when present in beverages, baked goods, desserts, and preserves at concentrations ranging from 5 to 8 mg/L.[9] Additionally, a joint U.S-European study found that acetone's "health hazards are slight."[10]

An extensive study was also conducted on "reasonably anticipated children's exposures to acetone" from commonly found items such as the solvent in nail tip remover, nail polish remover, spray paint and spot remover. The conclusion was that acetone exposure from a child's environment and from consumer products is unlikely to pose significant health risks. It was determined that 90 percent of acetone found in children was naturally produced in their bodies.[11] The rest came primarily from natural food sources, such as onions, grapes, cauliflower, tomatoes, milk, cheese, beans and peas, as well as from mother's milk.

Acetone in the Human Body

Acetone is naturally produced and disposed of in the human body as a result of normal metabolic processes. Reproductive toxicity tests show that it has low potential to cause reproductive problems. In fact, the body naturally increases the level of acetone in pregnant women, nursing mothers and children because their higher energy requirements lead to higher levels of acetone production.[12] The medical community is now using ketogenic diets that increase acetone in the body to reduce epileptic attacks in infants and children who suffer from recalcitrant refractory epilepsy.

Environmental Information

Acetone is not expected to present a threat to the environment because of its low toxicity, high volatility and complete solubility in water. The intent, however, is to minimize any exposure to the environment from manufacturing and use activities. Firefighting guidelines should be followed closely. Additional information can be found on the Safety Data Sheet (SDS).

Physical Hazard Information

Acetone is a highly flammable material in both the liquid and vapor forms, has a relatively high vapor pressure, and should be handled only with adequate ventilation and in areas where ignition sources have been removed (e.g. matches and unprotected light switches).

The flash point for acetone is -4ºF /-20ºC.[13]

Regulatory Information

Regulations may exist that govern the manufacture, sale, transportation, use and/or disposal of Acetone. 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
- Dow Acetone: The Versatile, High Solvency Intermediate (385KB PDF)
- American Chemistry Council Acetone Panel submission to the Voluntary Children's Chemical Evaluation Program, September 10, 2003

For more business information about acetone, visit Dow's Epoxy Products and Intermediates web site.

References

1 Capacity and demand information from www.the-innovation-group.com/ChemProfiles/Acetone.htm
2 www.the-innovation-group.com/ChemProfiles/Acetone.htm
3 Dow Acetone Safety Data Sheet.
4 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, page 22, based on 1995 numbers.
5 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, page 3.
6 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, page 4.
7 *Dow Acetone: The Versatile, High Solvency Intermediate*, page 11, Form No. 115-00648-0603X.pdf SMG.
8 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, page 15.
9 *OECD SIDS Initial Assessment Report for the 9th SIAM*; UNEP Publications, June 26-July 1, 1999, page 9.
10 OECD SIDS Dossier and SIAR (1999); *Acetone VCCEP Submission*, September 10, 2003, page 1.
11 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, page 9.
12 American Chemistry Council, *Acetone VCCEP Submission*, September 10, 2003, pages 4-5.
13 Dow Acetone Safety Data Sheet.

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