Cumene

98-82-8

Hazard Summary

Cumene is used in a variety of petroleum products. Acute (short-term) inhalation exposure to cumene may cause headaches, dizziness, drowsiness, slight incoordination, and unconsciousness in humans. Cumene has a potent central nervous system (CNS) depressant action characterized by a slow induction period and long duration of narcotic effects in animals. Cumene is a skin and eye irritant. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of cumene in humans. Animal studies have reported increased liver, kidney, and adrenal weights from inhalation exposure to cumene. EPA has classified cumene as a Group D, not classifiable as to human carcinogenicity.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (6), which contains information on oral chronic toxicity of cumene and the Reference Dose (RfD) and inhalation chronic toxicity and the RfC, and EPA's Toxicological Review of Cumene, In Support of Summary Information on the Integrated Risk Information System. (7)

Uses

- Cumene is used as a thinner for paints, lacquers, and enamels and as a component of high octane fuels. (1,2,4)
- Cumene is also used in the manufacture of phenol, acetone, acetophenone, and methylstyrene. (1,8)

Sources and Potential Exposure

- Cumene is a constituent of crude oil and finished fuels. It is released to the environment as a result of its production and processing from petroleum refining, the evaporation and combustion of petroleum products, and by the use of a variety of products containing cumene. (1)
- The most probable route of human exposure is by the inhalation of contaminated air from the evaporation of petroleum products. (1)
- Exposure may also occur through the consumption of contaminated food or water. (1)

Assessing Personal Exposure

• No information was located regarding the measurement of personal exposure to cumene.

Health Hazard Information

Acute Effects:

- Acute inhalation exposure to cumene may cause headaches, dizziness, drowsiness, slight incoordination, and unconsciousness in humans. (1,2,7)
- Cumene has a potent CNS depressant action characterized by a slow induction period and long duration of narcotic effects in animals. (1,3,4)
- Acute inhalation exposure also causes CNS depression in rodents. (1,6,7)
- Cumene is a skin and eye irritant in humans and animals. (1-4)

 Tests involving acute exposure of rats, mice, and rabbits, have demonstrated cumene to have moderate acute toxicity by inhalation or dermal exposure and low to moderate acute toxicity by ingestion. (5)

Chronic Effects (Noncancer):

- No information is available on chronic exposure to cumene in humans. (7)
- Inhalation studies have reported increased liver, kidney, and adrenal weights in rats. (6,7)
- Increased kidney weight was observed in rats chronically exposed to cumene via gavage (experimentally placing the chemical in the stomach). (1,6,7)
- The Reference Concentration (RfC) for cumene is 0.4 milligrams per cubic meter (mg/m). The RfC is an estimate (with uncertainty spanning perhaps an order of magnitude) of a continuous inhalation exposure to the human population (including sensitive subgroups), that is likely to be without appreciable risk of deleterious noncancer effects during a lifetime. It is not a direct esimator of risk but rather a reference point to gauge the potential effects. At exposures increasingly greater than the RfC, the potential for adverse health effects increases. Lifetime exposure above the RfC does not imply that an adverse health effect would necessarily occur. (6,7)
- EPA has high confidence in the study on which the RfC was based because it had adequately sized groups, extensive and thorough histopathological analyses, and included ancillary studies for neurotoxicity and ocular pathology; medium confidence in the database because the critical effect, altered tissue weights, was the same across routes of exposure, however, neither 2-year chronic nor multigenerational reproductive studies are available; and consequently medium confidence in the RfC. (6,7)
- The Reference Dose (RfD) for cumene is 0.1 milligrams per kilogram body weight per day (mg/kg/d) based on increased kidney weight in rats. (6,7)
- EPA has low confidence in the study on which the RfD was based since relatively small group sizes were tested; medium to low confidence in the database because, although two subchronic inhalation studies with the same species provide supportive data, there are no chronic nor multigenerational reproductive studies; and, consequently, low to medium confidence in the RfD. (6,7)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of cumene in humans.
- Inhalation studies in rats and rabbits reported no significant adverse effects on reproduction or fetal development. (6,7)
- No effects on sperm were observed in male rats exposed by inhalation. (6,7)

Cancer Risk:

- No information is available on the carcinogenic effects of cumene in humans or animals.
- EPA has classified cumene as a Group D, not classifiable as to human carcinogenicity. (6,7)

Physical Properties

- The chemical formula for cumene is $C_0 H_{12}$, and its molecular weight is 120.19 g/mol. (8)
- Cumene occurs as a colorless flammable liquid that is insoluble in water. (2,4,8)
- Cumene has a sharp, penetrating, gasoline-like odor, with an odor threshold of 0.088 parts per million (ppm). (1,2,4,9)
- The vapor pressure for cumene is 4.5 mm Hg at 25 °C, and its log octanol/water partition coefficient (log K_{ow}) is 3.66. (1)

Conversion Factors (only for the gaseous form):

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : mg/m^3 = (ppm) × (molecular weight of the compound)/(24.45). For currents 1 = (22) compound)/(24.45). For cumene: 1 ppm = 4.92 mg/m^2 .



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ACGIH TLV--American Conference of Governmental and Industrial Hygienists' threshold limit value expressed as a time-weighted average; the concentration of a substance to which most workers can be exposed without adverse effects.

 LC_{50} (Lethal Concentration₅₀)--A calculated concentration of a chemical in air to which exposure for a specific length of time is expected to cause death in 50% of a defined experimental animal population.

NIOSH IDLH--National Institute of Occupational Safety and Health's immediately dangerous to life or health limit; NIOSH recommended exposure limit to ensure that a worker can escape from an exposure condition that is likely to cause death or immediate or delayed permanent adverse health effects or prevent escape from the environment. NIOSH REL--NIOSH's recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h timeweighted-average exposure and/or ceiling.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a timeweighted average; the concentration of a substance to which most workers can be exposed without adverse effect averaged over a normal 8-h workday or a 40-h workweek.

The health and regulatory values cited in this factsheet were obtained in December 1999.

ຼື Health numbers are toxicological numbers from animal testing or risk assessment values developed by EPA.

[°] Regulatory numbers are values that have been incorporated in Government regulations, while advisory numbers are nonregulatory values provided by the Government or other groups as advice. OSHA numbers are regulatory,

whereas NIOSH and ACGIH numbers are advisory.

This NOAEL is from the critical study used as the basis for the EPA RfC.

Sumamry created in April 1992, updated January 2000

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