

Vinyl bromide

593-60-2

Hazard Summary

Workers may be occupationally exposed to vinyl bromide via inhalation during its manufacture or use. Acute (short-term) and chronic (long-term) studies indicate that the liver is the primary target organ following inhalation exposure to vinyl bromide in humans and animals. In high concentrations, vinyl bromide may produce dizziness, disorientation, and sleepiness in humans. Acute exposure of rats to very high concentrations via inhalation has showed liver and kidney damage and neurological effects. Chronic inhalation exposure primarily damages the liver, causing foci in the liver of rats. Vinyl bromide has been shown to be a potent carcinogen in rats exposed by inhalation, producing liver angiosarcomas. EPA has classified vinyl bromide as a Group B2, probable human carcinogen.

Please Note: The main sources of information for this fact sheet are EPA's Integrated Risk Information System (IRIS) (3), which contains information on inhalation chronic toxicity of vinyl bromide and the [RfC](#) and EPA's Health and Environmental Effects Profile for Vinyl Bromide. (5)

Uses

- Vinyl bromide is primarily used in the manufacture of flame retardant synthetic fibers. Its copolymer with vinyl chloride is also used for preparing films, for laminating fibers, and as rubber substitutes. (2,3)

Sources and Potential Exposure

- Workers may be occupationally exposed to vinyl bromide via inhalation during its manufacture or use. (1,2)
- Exposure may occur in the vicinity of facilities that manufacture or use this compound. (1)

Assessing Personal Exposure

- No information was located regarding the measurement of personal exposure to vinyl bromide.

Health Hazard Information

Acute Effects:

- Acute and chronic studies indicate that the liver is the primary target organ following inhalation exposure to vinyl bromide. (3)
- In high concentrations, vinyl bromide may produce dizziness, disorientation, and sleepiness in humans. (4)
- Acute exposure of rats to very high concentrations via inhalation has showed liver and kidney damage and neurological effects (hypoactivity, drowsiness, and anesthesia). (3)
- In rabbits, liquid vinyl bromide is slightly to moderately irritating to eyes, but nonirritating to skin. (1)
- Acute animal tests in rats have demonstrated vinyl bromide to have [moderate](#) to [high](#) acute toxicity by oral exposure. (4)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of vinyl bromide in humans.

- Chronic inhalation exposure primarily damages the liver, causing foci in the liver of rats. Hematological effects and elevated liver and kidney weights have also been observed in rats. (3,5)
- The Reference Concentration (RfC) for vinyl bromide is 0.003 milligrams per cubic meter (mg/m^3) based on hypertrophy and basophilic and eosinophilic foci in the liver in rats. 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 estimator 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. (3)
- EPA has medium confidence in the study on which the RfC was based because of the lack of consistency across duration and concentration in the effects and because a no-observed-adverse-effect level (NOAEL) was not identified; low confidence in the database because of the lack of developmental or reproductive toxicity studies and lack of a chronic study in a second species; and, consequently, low confidence in the RfC. (3)
- EPA has not established a Reference Dose (RfD) for vinyl bromide. (3)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of vinyl bromide in animals or humans. (3,5)

Cancer Risk:

- No information is available on the carcinogenic effects of vinyl bromide in humans.
- Vinyl bromide has been shown to be a potent carcinogen in rats exposed by inhalation, producing liver angiosarcomas. (3,5,7)
- EPA has classified vinyl bromide as a Group B2, probable human carcinogen.

Physical Properties

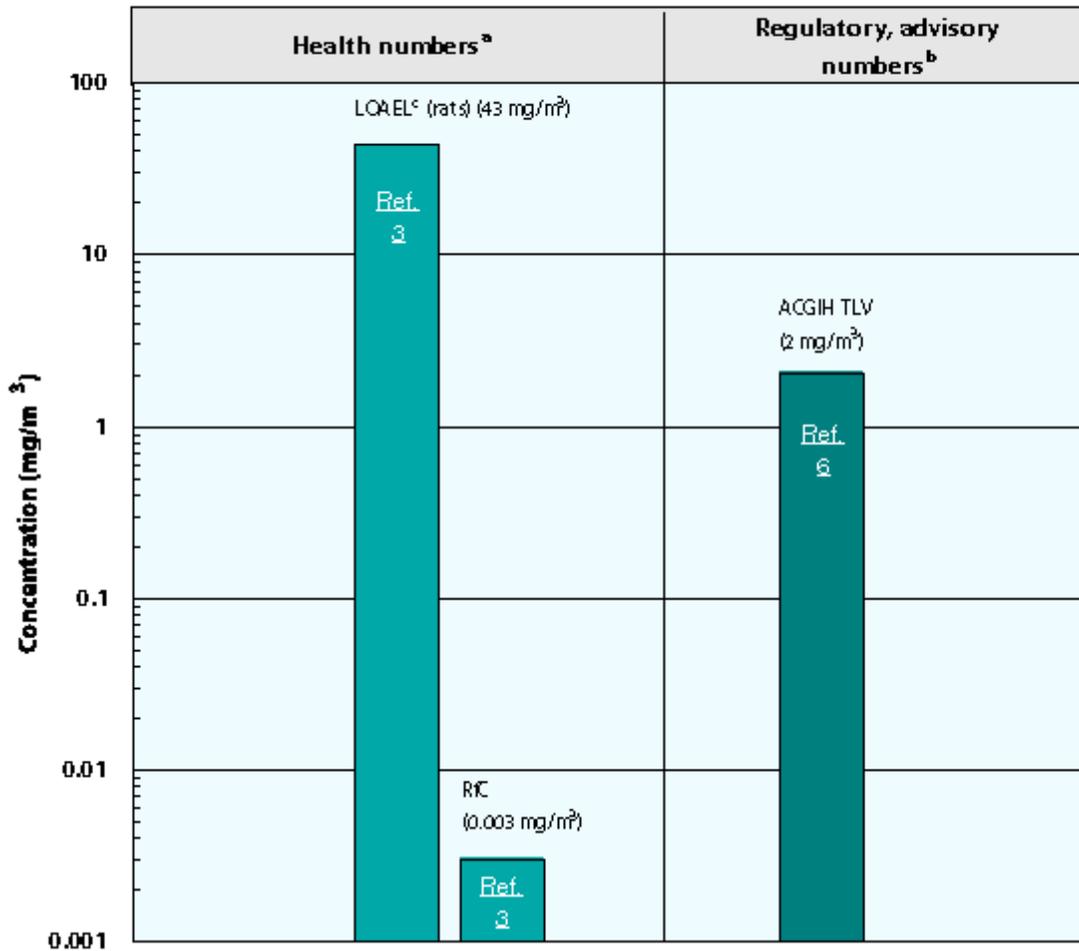
- The chemical formula for vinyl bromide is $\text{C}_2\text{H}_3\text{Br}$, and its molecular weight is 106.9 g/mol. Common synonyms for vinyl bromide include bromoethene and bromoethylene. (2,5)
- Vinyl bromide occurs as a colorless gas at ambient temperature and pressure. (5)
- The odor threshold has not been established.
- The vapor pressure for vinyl bromide is 1,033 mm Hg at 20 °C. (5)

Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $\text{mg}/\text{m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For vinyl bromide: $1 \text{ ppm} = 4.37 \text{ mg}/\text{m}^3$. To convert concentrations in air from $\mu\text{g}/\text{m}^3$ to mg/m^3 : $\text{mg}/\text{m}^3 = (\mu\text{g}/\text{m}^3) \times (1 \text{ mg}/1,000 \mu\text{g})$.

Health Data from Inhalation Exposure

Vinyl Bromide



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.

LOAEL --Lowest-observed-adverse-effect level.

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

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

^b 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. ACGIH numbers are advisory.

^c The LOAEL is from the critical study used as the basis for the EPA RfC.

Summary created in April 1992, updated in January 2000

References

1. U.S. Department of Health and Human Services. Hazardous Substances Data Bank (HSDB, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.
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3. U.S. Environmental Protection Agency. Integrated Risk Information System (IRIS) on Vinyl Bromide. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
4. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS, online database). National Toxicology Information Program, National Library of Medicine, Bethesda, MD. 1993.

5. U.S. Environmental Protection Agency. Health and Environmental Effects Profile for Bromoethene (Vinyl Bromide). EPA/600/x-84/143. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1984.
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7. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans: Some Chemicals Used in Plastics and Elastomers. Volume 39. World Health Organization, Lyon. 1986.