

Quinoline

91-22-5

Hazard Summary

Quinoline is used mainly as an intermediate in the manufacture of other products. Potential exposure to quinoline may occur from the inhalation of cigarette smoke. Quinoline breaks down quickly in the atmosphere and water. Acute (short-term) inhalation exposure to quinoline vapors irritates the eyes, nose, and throat and may cause headaches, dizziness, and nausea in humans. Information on the chronic (long-term), reproductive, developmental, or carcinogenic effects of quinoline in humans is not available. Liver damage has been observed in rats chronically exposed to quinoline by ingestion. An increased incidence of liver vascular tumors has been observed in rats and mice orally exposed to quinoline. EPA has provisionally classified quinoline as a Group C, possible human carcinogen

Please Note: The main source of information for this fact sheet is EPA's Health and Environmental Effects Profile for Quinoline. (3) Other secondary sources include the Hazardous Substances Data Bank (HSDB) (1), a database of summaries of peer-reviewed literature, and the Registry of Toxic Effects of Chemical Substances (RTECS) (4), a database of toxic effects that are not peer reviewed.

Uses

- Quinoline is used mainly as an intermediate in the manufacture of other products. (3)
- Quinoline is also used as a catalyst, a corrosion inhibitor, in metallurgical processes, in the manufacture of dyes, as a preservative for anatomical specimens, in polymers and agricultural chemicals, and as a solvent for resins and terpenes. It is also used as an antimalarial medicine. (2,3,7)

Sources and Potential Exposure

- Workers in certain industries may be occupationally exposed to quinoline by inhalation, ingestion of particulates, or dermal contact. (1,2)
- A potential source of very low exposure to quinoline includes the inhalation of ambient air contaminated by emissions from petroleum refining, coal mining, quenching and coking, and release in shale oil, synthetic coal conversion wastewaters, and wood preservative wastewaters. Levels of 2–7 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$) have been measured in ambient air. However, quinoline breaks down quickly in air. (1,3)
- Quinoline is found at higher levels in cigarette smoke (1–20 $\mu\text{g}/\text{cigarette}$). (1,3)
- Underground coal gasification has been a source of quinoline contamination of groundwater. Individuals may be exposed by consumption of contaminated water. However, quinoline breaks down quickly in water. (1)

Assessing Personal Exposure

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

Health Hazard Information

Acute Effects:

- Acute inhalation exposure to quinoline vapor irritates the eyes, nose, and throat, and may cause headaches, dizziness, and nausea, and, at high concentrations, coma in humans. (3)
- Tests involving acute exposure of rats and rabbits have demonstrated quinoline to have high acute toxicity by oral or dermal exposure. (4)

Chronic Effects (Noncancer):

- Information on the chronic effects of quinoline in humans is not available. (3)
- Liver damage has been observed in rats chronically exposed to quinoline by ingestion. (3)
- EPA has not established a Reference Concentration (RfC) or Reference Dose (RfD) for quinoline. (5)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of quinoline in humans or animals. (3)

Cancer Risk:

- No human studies are available on the carcinogenicity of quinoline. (3)
- An increased incidence of liver hemangioendotheliomas (liver vascular tumors) and other liver tumors has been observed in rats and mice orally exposed to quinoline. (3)
- EPA has classified quinoline as a Group B2, probable human carcinogen. (5)
- EPA has calculated an oral cancer slope factor of 3 (mg/kg/d)^{-1} . (5)

Physical Properties

- The chemical formula for quinoline is $\text{C}_9\text{H}_7\text{N}$, and it has a molecular weight of 129.15 g/mol. (7) Quinoline
- occurs as a colorless, hygroscopic liquid that darkens with age and is sparingly soluble in water but is more easily soluble in hot water. Water solubility at 25°C is 6,110 milligrams per liter (mg/L). (1,3,7)
- Quinoline has a penetrating, pungent odor. (3,7)
- The vapor pressure of quinoline is 0.0091 mm Hg at 25 °C and its log octanol/water partition coefficient ($\log K_{ow}$) is 2.03. (1,3)

Note: There are very few health numbers or regulatory/advisory numbers for quinoline; thus, a graph has not been prepared for this compound.

The health values cited in this factsheet were obtained in September 2001.

Conversion Factors:

To convert concentrations in air (at 25°C) from ppm to mg/m^3 : $\text{mg/m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For quinoline: $1 \text{ ppm} = 5.3 \text{ mg/m}^3$.

References

Summary created in April 1992, updated in January 2000

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.
2. G.D. Clayton and F.E. Clayton, Eds. Patty's Industrial Hygiene and Toxicology. Volume IIA, 3rd revised ed. John Wiley & Sons, New York. 1981.
3. U.S. Environmental Protection Agency. Health and Environmental Effects Profile for Quinoline. EPA/600/x-85/355. Environmental Criteria and Assessment Office, Office of Health and Environmental Assessment, Office of Research and Development, Cincinnati, OH. 1985.
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.

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5. U.S. Environmental Protection Agency. *Integrated Risk Information System (IRIS)*. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 2001.
6. U.S. Environmental Protection Agency. *Health Effects Assessment Summary Tables*. FY 1997 Update. Office of Research and Development, Office of Emergency and Remedial Response, Washington, DC. EPA/540/R-97-036. 1997.
7. *The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals*. 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.