

Quinone (p-Benzoquinone)

106-51-4

Hazard Summary

Occupational exposure to quinone may occur in the dye, textile, chemical, tanning, and cosmetic industries. Acute (short-term) exposure to high levels of quinone, via inhalation in humans, results in irritation of the eyes, consisting of discoloration of the conjunctiva and cornea, and causes dermatitis from dermal exposure. Chronic (long-term) inhalation exposure to quinone in humans may result in visual disturbances, and chronic dermal contact causes skin ulceration. No information is available on the reproductive, developmental, or carcinogenic effects of quinone in humans. The results of available animal studies are insufficient to evaluate the carcinogenicity of quinone. EPA has not evaluated quinone for carcinogenicity.

Please Note: The main sources of information for this fact sheet are the Hazardous Substances Data Bank (HSDB) (2), a database of summaries of peer-reviewed literature, and the Handbook of Toxic and Hazardous Chemicals and Carcinogens. (1) Other secondary sources include the Registry of Toxic Effects of Chemical Substances (RTECS) (3), a database of toxic effects that are not peer reviewed, and the International Agency for Research on Cancer (IARC) monographs on chemicals carcinogenic to humans. (5)

Uses

- Quinone is used as a chemical intermediate, a polymerization inhibitor, an oxidizing agent, a photographic chemical, a tanning agent, and a chemical reagent. (5)

Sources and Potential Exposure

- Occupational exposure to quinone may occur in the dye, textile, chemical, tanning, and cosmetic industries. (1)
- Inhalation exposure to quinone may occur from tobacco smoke. (2)

Assessing Personal Exposure

- No information is available on the assessment of personal exposure to quinone.

Health Hazard Information

Acute Effects:

- Acute exposure to high levels of quinone, via inhalation in humans, is highly irritating to the eyes, resulting in discoloration of the conjunctiva and cornea, while dermal exposure causes dermatitis with skin discoloration and erythema. (1,2,5)
- Animal studies have reported effects on the kidneys from exposure to quinone. (2)
- Tests involving acute exposure of rats have shown quinone to have high acute toxicity from oral exposure. (3)

Chronic Effects (Noncancer):

- Chronic dermal contact to quinone in humans may result in skin ulceration, while chronic inhalation exposure may result in visual disturbances. (1,2)

- EPA has not established a Reference Concentration (RfC) or Reference Dose (RfD) for quinone. (4)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of quinone in humans or animals.

Cancer Risk:

- No information is available on the carcinogenic effects of quinone in humans.
- Quinone has been tested (in older animal studies) by dermal application, inhalation, and subcutaneous injection. However, the results are insufficient to evaluate the carcinogenicity of the compound. (5)
- EPA has not classified quinone for carcinogenicity. (4)
- IARC has classified quinone as a Group 3, not classifiable as to the carcinogenicity to humans. (5)

Physical Properties

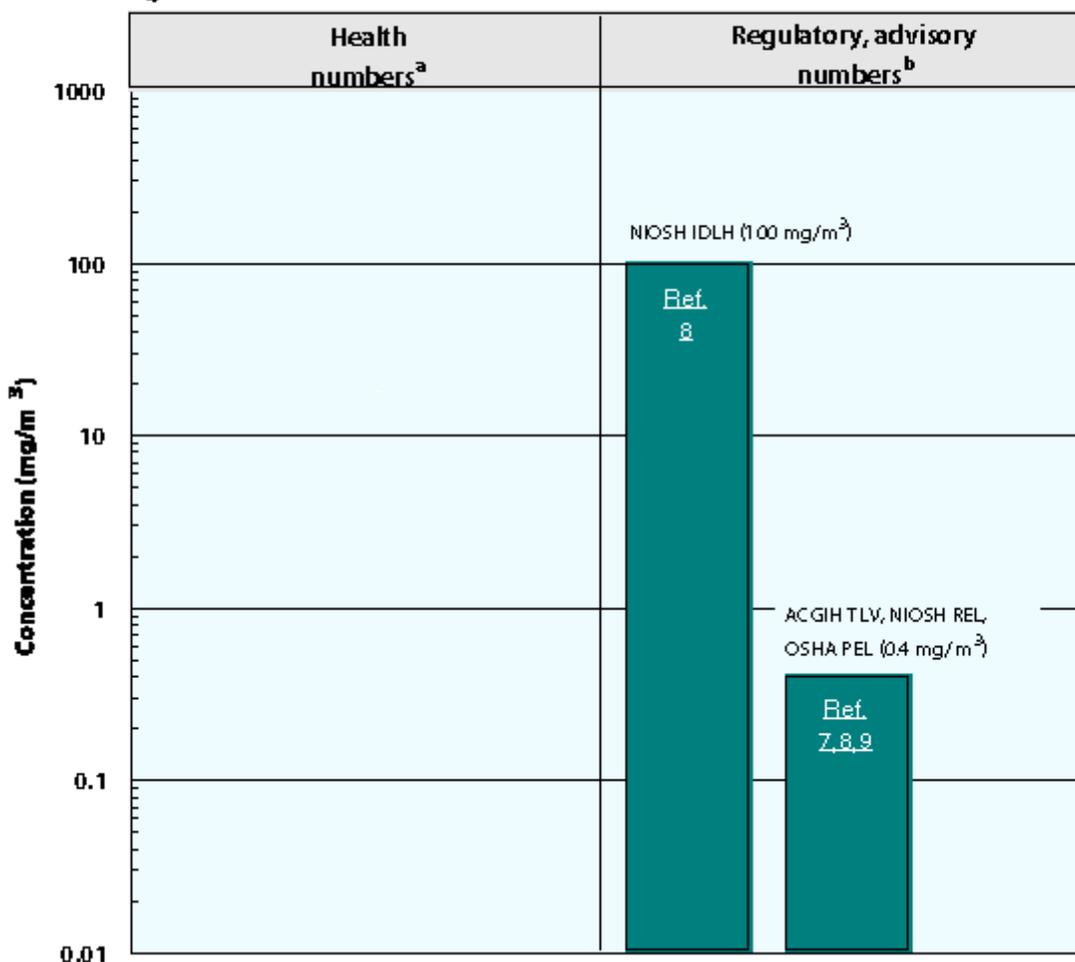
- Quinone exists as yellow prisms, with a penetrating odor resembling that of chlorine. (5)
 - The odor threshold for quinone is 0.084 parts per million (ppm). (6)
 - The chemical formula for quinone is C₆H₄O₂, and the molecular weight is 108.1 g/mol. (1)
 - The log octanol/water partition coefficient (log K_{ow}) for quinone is 0.20. (2)
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Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m³: $\text{mg/m}^3 = (\text{ppm}) \times (\text{molecular weight of the compound}) / (24.45)$. For quinone: 1 ppm = 4.42 mg/m³.

Health Data from Inhalation Exposure

Quinone



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.

NIOSH REL--National Institute of Occupational Safety and Health's recommended exposure limit; NIOSH-recommended exposure limit for an 8- or 10-h time-weighted-average exposure and/or ceiling.

NIOSH IDLH -- NIOSH's immediately dangerous to life or health concentration; 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.

OSHA PEL--Occupational Safety and Health Administration's permissible exposure limit expressed as a time-weighted 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.

^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. OSHA numbers are regulatory, whereas NIOSH and ACGIH numbers are advisory.

References

Summary created in April 1992, updated in January 2000

1. M. Sittig. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd ed. Noyes Publications, Park Ridge, NJ. 1985.
2. 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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4. U.S. Environmental Protection Agency. [Integrated Risk Information System \(IRIS\) on Quinone](#). National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.
5. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Volume 15. World Health Organization, Lyon. 1977.
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7. American Conference of Governmental Industrial Hygienists (ACGIH). 1999 TLVs and BEIs. Threshold Limit Values for Chemical Substances and Physical Agents. Biological Exposure Indices. Cincinnati, OH. 1999.
8. National Institute for Occupational Safety and Health (NIOSH). [Pocket Guide to Chemical Hazards](#). U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control and Prevention. Cincinnati, OH. 1997.
9. Occupational Safety and Health Administration (OSHA). Occupational Safety and Health Standards, Toxic and Hazardous Substances. Code of Federal Regulations 29 CFR 1910.1000. 1998.