Catechol (Pyrocatechol)

120-80-9

Hazard Summary

Exposure to catechol may occur during its manufacture and use. Skin contact with catechol causes eczematous dermatitis in humans. In humans, absorption through the skin results in an illness resembling that induced by phenol, except convulsions are more pronounced. Large doses of catechol can cause depression of the central nervous system (CNS) and a prolonged rise of blood pressure in animals. Due to the lack of information regarding the duration of exposure in the above studies, it is not clear whether these health effects were observed following acute (short-term) or chronic (long-term) exposure. Tumors in the glandular stomach were observed in orally exposed rats. The International Agency for Research on Cancer (IARC) has classified catechol as a Group 2B, possible human carcinogen. EPA has not classified catechol with respect to potential carcinogenicity.

Please Note: The main sources of information for this fact sheet are the IARC monographs on chemicals carcinogenic to humans (3), 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literature and the Registry of Toxic Effects of Chemical Substances (RTECS) (2), a database of toxic effects that are not peer reviewed.

Uses

- Catechol is used as a photographic developer, a developer for fur dyes, as an intermediate for antioxidants in rubber and lubricating oils, in polymerization inhibitors, and in pharmaceuticals. (1,3,4)

Sources and Potential Exposure

- Catechol may be released into the environment during its manufacture and use. (1)
- The major routes of human exposure are consumption of contaminated drinking water and ingestion of contaminated food. (1)
- Catechol occurs naturally in fruits and vegetables. (7)
- It has been detected in cigarette smoke. (7)

Assessing Personal Exposure

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

Health Hazard Information

Acute Effects:

- Skin contact causes eczematous dermatitis in humans. (1,3-6)
- In humans, absorption through the skin results in an illness resembling that induced by phenol, except convulsions are more pronounced. (1,5,6)
- Large doses of catechol can cause depression of the CNS and a prolonged rise of blood pressure in animals. The rise of blood pressure appears to be due to peripheral vasoconstriction. (1,5,6)
- Due to the lack of information regarding the duration of exposure in the above studies, it is not clear whether these health effects were observed following acute or chronic exposure.
- Acute animal tests in rats, mice, guinea pigs, and rabbits have demonstrated catechol to have high acute

toxicity by oral or dermal exposure. (2)

Chronic Effects (Noncancer):

- No information is available on the chronic effects of catechol in humans or animals.
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for catechol.

Reproductive/Developmental Effects:

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

Cancer Risk:

- No information is available on the carcinogenic effects of catechol in humans.
- In orally exposed rats, adenocarcinomas in the glandular stomach were reported. (7)
- Catechol increased the carcinogenic effects of benzo[a]pyrene on the skin in mice when applied together dermally. (1,3)
- No increase in malignant tumors was observed in orally exposed mice. (7)
- EPA has not classified catechol with respect to potential carcinogenicity.
- IARC has classified catechol as a Group 2B, possibly carcinogenic to humans. (7)

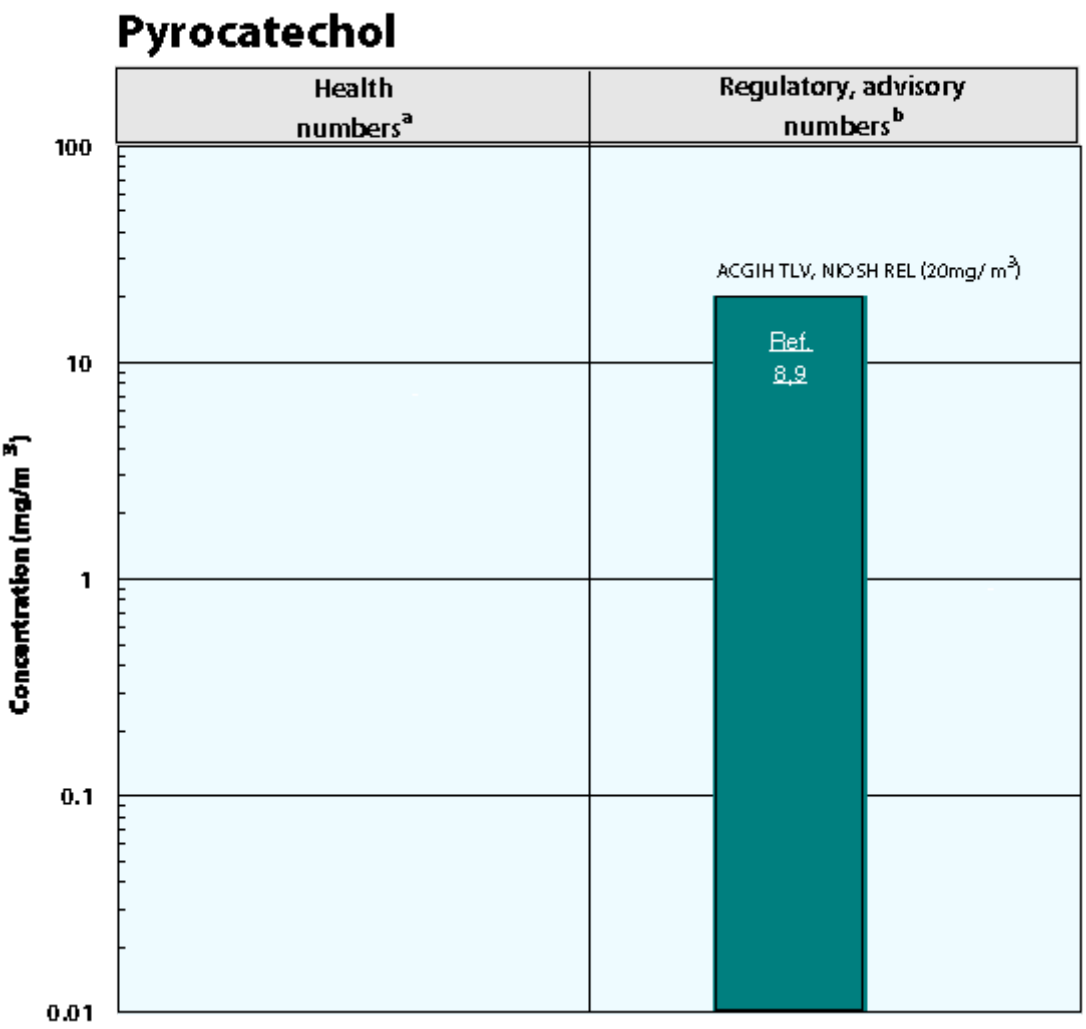
Physical Properties

- The chemical formula for catechol is $C_6H_6O_2$, and its molecular weight is 110.11 g/mol. (3,4)
- Catechol occurs as colorless tablets or monoclinic crystals that discolor in air and are soluble in water. (1,3,4)
- Catechol has a faint, phenolic odor; the odor threshold has not been established. (1)
- The vapor pressure for catechol is 0.03 mm Hg at 20 °C, and its log octanol/water partition coefficient (log K_{ow}) is 0.88. (1)

Conversion Factors:

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 catechol: 1 ppm = 4.5 mg/m^3.

Health Data from Inhalation Exposure



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.

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. NIOSH and ACGIH numbers are advisory.

Summary created in April 1992, updated in 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.
2. U.S. Department of Health and Human Services. Registry of Toxic Effects of Chemical Substances (RTECS, online database). National Toxicology Program, National Library of Medicine, Bethesda, MD. 1993.
3. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man: Some Fumigants, the Herbicides 2,4-D and 2,4,5-T, Chlorinated Dibenzodioxins and Miscellaneous Industrial Chemicals. Volume 15. World Health Organization, Lyon.

1977.
4. The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals. 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.
5. 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.
6. M. Sittig. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd ed. Noyes Publications, Park Ridge, NJ. 1985.
7. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans: Re-Evaluation of Some Organic Chemicals, Hydrazine and Hydrogen Peroxide. Volume 71. World Health Organization, Lyon. 1999.
8. 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.
9. 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.