

4-Aminobiphenyl

92-67-1

Hazard Summary

Limited exposure to 4-aminobiphenyl occurs since it is no longer produced commercially. Acute (short-term) inhalation exposure to 4-aminobiphenyl produces headaches, lethargy, cyanosis, urinary burning, and hematuria (the presence of blood in urine) in humans. 4-Aminobiphenyl is a known human bladder carcinogen and animal studies have reported an increase in bladder and liver tumors from oral exposure. EPA has not classified 4-aminobiphenyl for potential carcinogenicity; however, the International Agency for Research on Cancer (IARC) has classified 4-aminobiphenyl as a Group 1 carcinogen, the agent is carcinogenic to humans.

Please Note: The main sources of information for this fact sheet are the IARC monographs on chemicals carcinogenic to humans (2,4) and the Hazardous Substances Data Bank (HSDB) (1), a database of summaries of peer-reviewed literature. Other secondary sources include the Registry of Toxic Effects of Chemical Substances (RTECS) (7), a database of toxic effects that are not peer reviewed and The Merck Index: An Encyclopedia of Chemicals, Drugs, and Biologicals (6).

Uses

- 4-Aminobiphenyl is no longer manufactured commercially; it was used as a rubber antioxidant and a dye intermediate in the past. (3,5,6)

Sources and Potential Exposure

- Currently, individuals are unlikely to be exposed to 4-aminobiphenyl in the workplace because it is no longer manufactured commercially. However, past exposure may have occurred in the workplace. (1,2)
- 4-Aminobiphenyl is found in tobacco smoke; smokers have been found to have higher levels of the breakdown products of 4-aminobiphenyl in their blood than nonsmokers. (1)

Assessing Personal Exposure

- A method exists to measure the breakdown products of 4-aminobiphenyl in the blood. However, this is a newly developed research method that is not currently available for routine use. (1)

Health Hazard Information

Acute Effects:

- Acute inhalation exposure to 4-aminobiphenyl produces headaches, lethargy, cyanosis, urinary burning, and hematuria (the presence of blood in urine) in humans. (3)
- Tests involving acute exposure of rats, mice, and rabbits have demonstrated 4-aminobiphenyl to have moderate to high acute toxicity from ingestion. (7)

Chronic Effects (Noncancer):

- No information is available on the chronic (long-term) effects of 4-aminobiphenyl in humans or animals.
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for 4-aminobiphenyl.

Reproductive/Developmental Effects:

- 4-Aminobiphenyl has been shown to cross the placenta in humans and has been detected in fetal blood. No other information is available on the reproductive or developmental effects of 4-aminobiphenyl in humans or animals. (1)

Cancer Risk:

- 4-Aminobiphenyl is a known human bladder carcinogen, based on epidemiological studies of occupationally exposed workers who reported a high incidence of bladder cancer. (1,2-5)
- 4-Aminobiphenyl is carcinogenic in mice, rats, rabbits, and dogs. Bladder and liver tumors have been observed in mice, and bladder tumors have also been observed in rabbits and dogs following oral administration. Mammary gland and intestinal tumors have been reported in rats exposed by subcutaneous injection. (1,2,4,5)
- EPA has not classified 4-aminobiphenyl for potential carcinogenicity.
- IARC has classified 4-aminobiphenyl as a Group 1 carcinogen; i.e., there is sufficient evidence from epidemiological studies to support a causal association between the exposure and cancer. (4)

Physical Properties

- The chemical formula for 4-aminobiphenyl is $C_{12}H_{11}N$, and its molecular weight is 169.22 g/mol. (2,6)
- 4-Aminobiphenyl is a yellowish-brown crystalline solid and is slightly soluble in cold water and very soluble in hot water. (3,6)
- The odor threshold for 4-aminobiphenyl has not been established.
- The log octanol/water partition coefficient ($\log K_{ow}$) for 4-aminobiphenyl is 2.80. (1)

Note: There are very few health numbers or regulatory/advisory numbers for 4-aminobiphenyl; thus a graph has not been prepared for this compound. The health values cited in this factsheet were obtained in December 1999.

Conversion Factors:

To convert concentrations in air (at 25°C) from ppm to mg/m^3 : $mg/m^3 = (ppm) \times (\text{molecular weight of the compound}) / (24.45)$. For 4-aminobiphenyl: 1 ppm = 6.92 mg/m^3 .

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.
2. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man. Volume 1. World Health Organization, Lyon. 1972.
3. M. Sittig. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd ed. Noyes Publications, Park Ridge, NJ. 1985.
4. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans: Chemicals, Industrial Processes and Industries Associated with Cancer in Humans. IARC Monographs. Volumes 1 to 29. Supplement 4. World Health Organization, Lyon. 1982.
5. U.S. Department of Health and Human Services. The Newest Report on Carcinogens, 1998 Summary. Public Health Service, National Toxicology Program, 1998.
6. The Merck Index. An Encyclopedia of Chemicals, Drugs, and Biologicals. 11th ed. Ed. S. Budavari. Merck and Co. Inc., Rahway, NJ. 1989.
7. 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.