

Hexamethylphosphoramide

680-31-9

Hazard Summary

Hexamethylphosphoramide is no longer used in large quantities in the United States. No information is available on the acute (short-term), chronic (long-term), reproductive, developmental, or carcinogenic effects of hexamethylphosphoramide in humans. Acute animal studies have reported effects on the kidneys and lungs from oral exposure to hexamethylphosphoramide, while chronic oral studies in animals have reported an increased incidence of lung disease. An increased incidence of nasal tumors from inhalation exposure to hexamethylphosphoramide was reported in rats. EPA has not classified hexamethylphosphoramide for carcinogenicity; however, the International Agency for Research on Cancer (IARC) has classified it as a Group 2B, possible human carcinogen.

Please Note: The main sources of information for this fact sheet are 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literature and the Registry of Toxic Effects of Chemical Substances (RTECS), a database of toxic effects that are not peer reviewed. (1)

Uses

- Hexamethylphosphoramide is no longer used in large quantities in the United States. (1)
- Currently, hexamethylphosphoramide is used in small quantities as a solvent in research laboratories. (2)
- Hexamethylphosphoramide was used in the past as a selective solvent for gases, a polymerization catalyst, a stabilizer against thermal degradation in polystyrene, and an additive to polyvinyl resins. (5)

Sources and Potential Exposure

- Because hexamethylphosphoramide is no longer produced or used in large quantities in the United States, the major source of environmental exposure is hazardous waste storage sites. (1)
- Occupational exposure to hexamethylphosphoramide may occur for a small number of individuals, primarily those who use the chemical in research laboratories. (1,2)

Assessing Personal Exposure

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

Health Hazard Information

Acute Effects:

- No information is available on the acute effects of hexamethylphosphoramide in humans.
- Animal studies have reported effects on the kidneys and lungs from acute, oral exposure to hexamethylphosphoramide. (2)
- Acute animal tests in rats, have shown hexamethylphosphoramide to have **moderate** acute toxicity from oral exposure. (3)

Chronic Effects (Noncancer):

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

- Animal studies have reported an increased incidence of lung disease from chronic oral exposure to hexamethylphosphoramide. (1,4)
- EPA has not established a Reference Concentration (RfC) or a Reference Dose (RfD) for hexamethylphosphoramide. (5)

Reproductive/Developmental Effects:

- No information is available on the reproductive or developmental effects of hexamethylphosphoramide in humans.
- Animal studies have reported reproductive effects, including reduced fertility, a reduction in sperm count, and significantly reduced testicular weights from oral exposure to hexamethylphosphoramide. (1,2,5)

Cancer Risk:

- No information is available on the carcinogenic effects of hexamethylphosphoramide in humans.
- Animal studies have reported an increased incidence of nasal tumors from inhalation exposure to hexamethylphosphoramide. (2,4,5)
- EPA has not classified hexamethylphosphoramide for carcinogenicity.
- IARC has classified hexamethylphosphoramide as a Group 2B, possible human carcinogen. (5)

Physical Properties

- Hexamethylphosphoramide is a colorless liquid with an aromatic odor. (1)
- The odor threshold for hexamethylphosphoramide is not available.
- The chemical formula for hexamethylphosphoramide is $C_6H_{18}N_3OP$, and the molecular weight is 179.24 g/mol. (1)
- The vapor pressure for hexamethylphosphoramide is 0.07 mm Hg at 25 °C, and it has a log octanol/water partition coefficient ($\log K_{ow}$) of 0.28. (1)

Note: There are very few health numbers or regulatory/advisory numbers for hexamethylphosphoramide; thus, a graph has not been prepared for this compound. The health information cited in this factsheet was obtained in December 1999.

Conversion Factors:

To convert concentrations in air (at 25 °C) from ppm to mg/m^3 : $mg/m^3 = \frac{1}{24.45} (\text{ppm}) \times (\text{molecular weight of the compound})$. For hexamethylphosphoramide: $1 \text{ ppm} = 7.33 \text{ mg/m}^3$.

Summary created in April 1992, updated January 2000

References

1. U.S. Environmental Protection Agency. Chemical Hazard Information Profile on Hexamethylphosphoramide. Prepared by Chemical Effects Information Center, Oak Ridge National Laboratory, Oak Ridge, TN. 1982.
2. M. Sittig. Handbook of Toxic and Hazardous Chemicals and Carcinogens. 2nd ed. Noyes Publications, Park Ridge, NJ. 1985.
3. 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.
4. 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.
5. International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. Supplement 7. World Health Organization, Lyon. 1987.