

Phenanthrene

CAS Number: 85-01-8

What is phenanthrene?

Phenanthrene is one of a group of chemicals called polycyclic aromatic hydrocarbons, PAHs for short. PAHs are often found together in groups of two or more. They can exist in over 100 different combinations but the most common are treated as a group of 15. PAHs are found naturally in the environment but they can also be man-made. Phenanthrene is a colorless, crystal-like solid but can also look yellow. PAHs are created when products like coal, oil, gas, and garbage is burned but the burning process is not complete.

Very little information is available on the individual chemicals within the PAH group. Most of the information available is for the PAH group as a whole. Information specific to phenanthrene is included in this fact sheet when available.

What is phenanthrene used for?

Most of the PAHs are used to conduct research. Like most PAHs, phenanthrene is used to make dyes, plastics and pesticides, explosives and drugs. It has also been used to make bile acids, cholesterol and steroids.

How can phenanthrene enter and leave your body?

One of the most common ways phenanthrene can enter your body is through breathing contaminated air. It can get into your lungs when you breathe it. If you work in a hazardous waste site where PAHs are disposed, you are likely to breathe phenanthrene and other PAHs. If you eat or drink food and water that are contaminated

with PAHs, you could be exposed.

Exposure can also occur if your skin comes into contact with contaminated soil or products like heavy oils, coal tar, roofing tar or creosote where PAHs have been found. Creosote is an oily liquid found in coal tar and is used to preserve wood. Once in your body, the PAHs can spread and target fat tissues. Target organs include kidneys, liver and fat. However, in just a matter of days, the PAHs will leave your body through urine and feces.

How can you be exposed to phenanthrene?

You can be exposed to most PAHs in the environment, in your home and in the workplace. Because PAHs exist naturally in the environment, and they are man-made, you can be exposed in a number of ways. Fumes from vehicle exhaust, coal, coal tar, asphalt, wildfires, agricultural burning and hazardous waste sites are all sources of exposure.

You could be exposed to PAHs by breathing cigarette and tobacco smoke, eating foods grown in contaminated soil or by eating meat or other food that you grilled. Grilling and charring food actually increases the amount of PAHs in the food.

If you work in a plant that makes coal tar, asphalt and aluminum, or that burns trash, you can be exposed to PAHs. You can also be exposed if you work in a facility that uses petroleum or coal or where wood, corn and oil are burned.

What are the health effects of exposure to phenanthrene?

A number of PAHs have caused tumors in laboratory animals that were exposed to PAHs through their food, from breathing contaminated air and when it was applied to their skin. When pregnant mice ate high doses of a PAH (benzo(a)pyrene), they experienced reproductive problems. In addition, the offspring of the pregnant mice showed birth defects and a decrease in their body weight. Other effects include damage to skin, body fluids and the immune system which help the body fight disease. However, these effects have not been seen in humans.

What levels of exposure have resulted in harmful health effects?

There is no information available from studies on humans to tell what effects can result from being exposed to individual PAHs at certain levels. However, breathing PAHs and skin contact seem to be associated with cancer in humans. Animal studies showed that exposing mice to 308 parts per million (ppm) of PAHs (specifically benzo (a) pyrene) in food for 10 days (short term exposure) caused birth defects. Mice exposed to 923 ppm of benzo (a) pyrene in food for months developed problems in the liver and blood.

The U.S. Environmental Protection Agency has indicated that not enough information exists to classify phenanthrene as a cancer causing substance.

Where can I get more information?

Contact your state health or environmental department, or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road, N.E., E-29
Atlanta, Georgia 30333

References

1. Agency for Toxic Substances and Disease Registry (ATSDR). *Public Health Statement, Polycyclic Aromatic Hydrocarbons*. Atlanta, GA: U.S. Department of Health and Human Services, 1990.
2. Faust, Rosmarie A., Oak Ridge National Laboratory, Chemical Hazard Evaluation Group. *Toxicity Summary for Phenanthrene*. Oak Ridge, TN:1993.