



BENZO(A)PYRENE

What is benzo(a)pyrene?

Benzo(a)pyrene is part of a class of chemicals called polycyclic aromatic hydrocarbons (PAH). PAHs usually occur as complex mixtures, not as single compounds.

Benzo(a)pyrene is often used as an indicator chemical to measure exposure to PAH mixtures. The United States Environmental Protection Agency (EPA) lists benzo(a)pyrene as a drinking water contaminant, a hazardous air pollutant, and a hazardous substance.

Where can benzo(a)pyrene be found and how is it used?

Benzo(a)pyrene is released into the air by natural and human processes. A main source of benzo(a)pyrene is incomplete burning. In nature, benzo(a)pyrene arises from forest fires and the eruption of volcanoes. Fossil fuels, crude oils, shale oils, soot, and coal tars contain benzo(a)pyrene. Sources of benzo(a)pyrene from human activities include stoves/furnaces burning fossil fuels (especially wood and coal), motor vehicle exhaust, cigarettes, and many industrial combustion processes. Benzo(a)pyrene can be found in surface water, tap water, rainwater, groundwater, wastewater, and sewage sludge. Manmade releases of benzo(a)pyrene are to the air, where sunlight turns the chemical into a dry form that falls to the ground and breaks down in the soil. There is no known intentional industry production or use of benzo(a)pyrene.

How can people be exposed to benzo(a)pyrene?

You could be exposed to benzo(a)pyrene through:

- **Breathing** air containing benzo(a)pyrene in the workplace. This can occur if you work in coking, coal-tar and asphalt production plants, or in smokehouses or where local trash is burned. You can also breathe benzo(a)pyrene from cigarette smoke, wood smoke, vehicle exhaust, asphalt roads, or smoke from burning farm plants.
- **Contact** with benzo(a)pyrene in the air, water, or soil near a waste site, or another polluted site.
- **Eating** grilled or charred meats. You can also be exposed through contaminated cereals, flour, bread, vegetables, fruits, meats, and processed or pickled foods.
- **Drinking** contaminated water or cow's milk. Nursing infants may be exposed through breast milk, especially if the mother lives near a waste site containing benzo(a)pyrene.

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How does benzo(a)pyrene work and how can it affect my health?

Short-term health effects can be a skin rash or eye irritation with redness and/or a burning sensation. Exposure to sunlight and the chemical together can increase these effects.

Long-term health effects can be deadly. Benzo(a)pyrene can cause skin, lung, and bladder cancer in humans and in animals. If benzo(a)pyrene is on your skin when you are being exposed to sunlight or ultraviolet light, the risk of skin cancer is greater. Exposure to coal tar and pitch increases the likelihood of cancer. Repeated exposure to substances containing benzo[a]pyrene may cause the skin to thicken and darken, and for pimples to appear. Long-term skin changes include both loss of color and reddish areas, thinning of the skin, and warts. Bronchitis may result from repeated exposure to mixtures containing benzo(a)pyrene.

How is benzo(a)pyrene poisoning treated?

There is no treatment for benzo(a)pyrene. A doctor will treat the symptoms. In all cases of poisoning, medical treatment should be sought immediately. A doctor may prescribe a different treatment depending on circumstances of the poisoning and the symptoms.

What should I do if exposed to benzo(a)pyrene?

Anyone who may have been exposed to high levels of benzo(a)pyrene should be removed from the source of exposure immediately. Clothing in contact with benzo(a)pyrene should be removed and discarded. Skin and eyes exposed to benzo(a)pyrene should be flushed with clean water for at least 15 minutes. Seek medical attention immediately.

What factors limit use or exposure to benzo(a)pyrene?

Workers should use benzo(a)pyrene in a regulated, enclosed area with local exhaust ventilation. If venting is unavailable, workers should wear respirators. All workers should wear protective work clothing. The area should be marked as a site where benzo(a)pyrene is handled, used, stored, or formed. Hazard and warning information should be posted.

In the case of a chemical release, workers should wash thoroughly immediately after exposure and at the end of the work shift. Communicate all health and safety information to potentially exposed workers before releases occur.

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Is there a medical test to show whether I've been exposed to benzo(a)pyrene?

There are tests that can show PAHs in body tissues or blood. These tests cannot show how much a person was exposed to or how the exposure occurred. They also cannot tell if there will be harmful effects.

Technical information for benzo(a)pyrene

CAS Number: 50-32-8

Chemical Formula: C₂₀H₁₂

Carcinogenicity (EPA): Benzo[a]pyrene is “carcinogenic to humans” based on strong and consistent evidence in animals and humans.

MCL (Drinking Water): 0.0002 mg/L

OSHA Standards: Regulates exposure limits to benzo[a]pyrene indirectly as “Coal tar pitch volatiles.” The legal airborne permissible exposure limit (PEL) is 0.2 mg/m³ averaged over an 8-hour work shift.

NIOSH Standards: Regulates exposure limits to benzo[a]pyrene indirectly as “Coal tar pitch volatiles.” The exposure limit is 0.1 mg/m for a 10-hour workday, within a 40-hour workweek.

Resources

Agency for Toxic Substances and Disease Registry (ATSDR). 1995. *Toxicological Profile for polycyclic aromatic hydrocarbons (PAHs)*. Atlanta, GA: U.S. Department of Health and Human Services.

ATSDR ToxFAQs on Polycyclic Aromatic Hydrocarbons. 1996
<https://wwwn.cdc.gov/TSP/ToxFAQs/ToxFAQsDetails.aspx?faqid=121&toxid=25>

Integrated Risk Information System (IRIS) Toxicological Review of Benzo[A]Pyrene (Final Report). 2017.
https://cfpub.epa.gov/ncea/iris/iris_documents/documents/toxreviews/0136tr.pdf

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