

## Naphthalene (C<sub>10</sub>H<sub>8</sub>)

### **What is naphthalene?**

- Naphthalene is a white crystalline powder that is produced from coal tar and has the characteristic odor of mothballs.
- Naphthalene is naturally present in fossil fuels such as petroleum and coal and is produced when wood or tobacco is burned.

### **What are the uses of naphthalene?**

- Naphthalene is used as a moth repellent, disinfectant, and deodorizer.
- Naphthalene is used in making concrete, plasterboards, rubber, paints, and as a tanning agent in the leather industry.
- Naphthalene is also used for the production of the insecticide carbaryl.
- Naphthalene is the major constituent of creosote, a compound used to protect timber from insects and fungi.

### **Is naphthalene present in the environment?**

- Soil and water can become contaminated with naphthalene from spills occurring during the storage, transport and disposal of petroleum and coal tar.
- Naphthalene can pass through the soil into underground water.
- Some of the naphthalene in soil and water will evaporate into the air.
- Naphthalene may also be broken down in water by bacteria.
- Naphthalene in water breaks down to half of its amount over a couple of days to a few months.
- Naphthalene can become airborne during certain industrial and manufacturing processes.
- Naphthalene can enter indoor air through the use of moth balls and other consumer products that contain this substance.



- Naphthalene also enters indoor air from unvented kerosene heaters and tobacco smoke.
- Once in the air, naphthalene rapidly breaks down.
- Naphthalene does not accumulate in fish or animals.

### **How are people exposed to naphthalene?**

- Exposure to naphthalene occurs primarily through air, especially in areas of high traffic or where fumes from evaporating gasoline or fuel oil are present.
- Exposure to naphthalene occurs in the vicinity of petroleum refineries and coal coking operations.
- Exposure to naphthalene occurs through inhalation of cigarette smoke.
- Exposure to naphthalene can also occur by ingesting or handling mothballs or other consumer products containing this compound.
- Workplace exposure to naphthalene can occur in factories where naphthalene-containing products are made.
- Showering or bathing in water containing naphthalene may also result in exposure to this substance.

### **How does naphthalene enter and leave the body?**

- Naphthalene can enter the body through the lungs, skin, and gut.
- The blood carries naphthalene to the liver and other organs.
- Small amounts of naphthalene may be present in fatty tissues and breast milk.
- Naphthalene and its breakdown products leave the body mainly in the urine within a few days.

### **How harmful is exposure to naphthalene?**

- Exposure to high levels of naphthalene in air can cause nausea, vomiting, diarrhea, blood in the urine, and a yellow color of the skin.



- Ingesting large amounts of naphthalene can destroy or change red blood cells so they cannot carry oxygen and cause anemia.
- Severe or long-lasting anemia can damage the heart, brain, and other body organs.
- Symptoms that occur with anemia include fatigue, lack of appetite, restlessness, and a pale appearance of the skin.
- Anemia caused by exposure to naphthalene may be passed to unborn children.
- Naphthalene in breast milk can also be passed to the infant.
- Long term exposure to naphthalene can lead to liver and kidney damage.
- People with ancestors from the Mediterranean countries or Africa may be more sensitive to the toxic effects of naphthalene than people of other origins.

### **Can exposure to naphthalene cause cancer?**

- The Department of Health and Human Services (DHHS) concludes that naphthalene is reasonably anticipated to be a human carcinogen.
- The International Agency for Research on Cancer (IARC) concludes that naphthalene is possibly carcinogenic to humans.
- The U.S. Environmental Protection Agency (EPA) concludes that naphthalene is a possible human carcinogen.

### **Is there a medical test to show whether I've been exposed to naphthalene?**

- Naphthalene or its breakdown products can be measured in body tissues and fluids, such as blood, urine, stool, maternal milk, or fat, but these measurements cannot be used to predict potential health effects.
- Past exposures to naphthalene are difficult to detect since it is rapidly removed from the body.
- To be useful, samples should be collected within a day or two of exposure.

### **What is the treatment for naphthalene poisoning?**

- Emergency medical care should be sought in cases of suspected naphthalene poisoning.
- Naphthalene poisoning is treated by removing the person from the source and then with supportive medical care in a hospital setting.
- No specific antidote exists for naphthalene poisoning.

### **Are there recommendations to protect public health?**

- EPA – Recommends a one-day Drinking Water Health Advisory of 500 µg/L micrograms per liter (µg/L) is not expected to cause any adverse effects in children.
- EPA – Recommends a Drinking Water Health Advisory, Drinking Water Equivalent of 700 µg/L of water is not expected to cause any adverse effects in adults.
- EPA – Lifetime exposure to 0.1 ppm (100 ppb or µg/L) of naphthalene is not expected to cause any adverse effects.
- Occupational Safety and Health Administration (OSHA) – Legal limit of 10 parts per million (ppm) (50 mg/m<sup>3</sup>) of naphthalene in workplace air averaged over an 8-hour work day, 40 hour workweek.
- **National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit (REL):** 10 ppm, 50 mg/m<sup>3</sup> time weighted average (TWA); 15 ppm, 75 mg/m<sup>3</sup> short term exposure limit (STEL) in air.
- The World Health Organization has a guideline of 0.01 milligram per cubic meter (mg/m<sup>3</sup>) of naphthalene in air.

### **What can I do to prevent exposure to naphthalene?**

- Identify and limit sources of exposures.
- While tap and bottled water generally do not contain naphthalene, well water may sometimes be contaminated with enough naphthalene to create a potential health hazard. If drinking water is obtained from a well fed by water from an area where the soil or groundwater is believed to contain naphthalene, the water should be checked for this chemical to ensure its concentration is below current guidelines.



- Activated carbon filtration can be used to remove naphthalene from drinking water but it has limited capabilities.

### **What should I do if I believe I am ill as a result of exposure to naphthalene?**

- If you experience symptoms that you think may be related to naphthalene exposure, you should consult your physician.

### **Where can I get more information?**

For more information, contact:

The Pennsylvania Department of Health, Division of Environmental Health Epidemiology, P.O. Box 90, Harrisburg, Pennsylvania, 17108. Telephone number: 717-787-1708 or visit the following websites:

The U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substance and Disease Registry's Information Center. Telephone number: 800-232-4636.

### **References**

- (1) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry (ATSDR). August, 2005. Toxicological Profile for Naphthalene.
- (2) U.S. Department of Health and Human Services, Public Health Service, Agency for Toxic Substances and Disease Registry, Division of Toxicology and Environmental Medicine, ToxFAQs<sup>TM</sup>; Naphthalene, August 2005.
- (3) WHO Guidelines for Indoor Air Quality: Selected Pollutants, World Health Organization, Regional Office for Europe, Working Group, November 2009.

Agency for Toxic Substances and Disease Registry (ATSDR), Chronic Toxicity Summary Naphthalene. U.S. Public Health Service, Atlanta, Georgia: ATSDR, available at: [http://www.oehha.org/air/chronic\\_rels/pdf/91203.pdf](http://www.oehha.org/air/chronic_rels/pdf/91203.pdf).