

Acenaphthene and Drinking Water

Acenaphthene is a contaminant that has been found in drinking water in Minnesota. The Minnesota Department of Health (MDH) developed a health-based guidance value for acenaphthene in drinking water and, based on this value, does not expect levels in drinking water to harm Minnesotans.

Summary

Acenaphthene is one of a group of chemicals called polycyclic aromatic hydrocarbon (PAHs). PAHs are a group of naturally occurring pollutants. Acenaphthene is a natural component of crude oil and coal tar and is sometimes found in drinking water. Acenaphthene has been found in Minnesota waters. Public water systems are monitored for acenaphthene, but private well owners should have their wells tested if they are concerned about acenaphthene in their drinking water. Acenaphthene can be found in car exhaust, cigarette smoke, and some foods.

Acenaphthene

Acenaphthene is a natural component of crude oil and coal tar. Acenaphthene is widespread in our environment as a result of the uses of oil and tar. Acenaphthene can be created through incomplete combustion, such as forest fires, lightning strikes, and volcanic activity.¹ Acenaphthene has been found in car exhaust, wastewater, pesticides, and cigarette smoke.² Acenaphthene is also found in textile dyes.



Acenaphthene in Minnesota Waters

The Minnesota Pollution Control Agency (MPCA) does not regularly monitor public water supplies for acenaphthene, but does test waters near sites with known PAH contamination. The MPCA has detected acenaphthene in public drinking water wells at a maximum concentration of 1.7 parts per billion (ppb).³ Acenaphthene is listed as a contaminant of Lake Superior by the Great Lakes Water Quality Board.⁴

MDH Guidance Value

Based on available information, MDH developed a guidance value of 100 ppb for acenaphthene in drinking water. A person drinking water at or below the guidance value would have little or no risk of health effects.

Potential Health Effects

The health effects of brief exposures to acenaphthene are unknown. Longer-term animal studies show that acenaphthene can cause increased liver weight and decreased adrenal gland weight.

Potential Exposure to Acenaphthene

People are exposed to acenaphthene because it is often found in air, water, food, and soil. One of the most common ways people are exposed to acenaphthene is through inhaling it from car exhaust, cigarette smoke, or fires. Acenaphthene can also be ingested through eating contaminated food or drinking contaminated water. Grilling foods is another way to be exposed, as the cooking process can release acenaphthene. Some people are exposed to acenaphthene at work, especially if they work with petroleum refining or coal tar products.

Acenaphthene in the Environment

Acenaphthene, like other PAHs, is formed when a material, such as gasoline or wood, burns incompletely. PAHs stick to very small particles that go into the air. People and animals may breathe in the particles that contain acenaphthene and other PAHs. The particles and acenaphthene eventually settle back onto the ground or into ponds, lakes, or rivers. Acenaphthene can also be washed into water by rain. Acenaphthene may settle into sediment or soil. When acenaphthene is attached to particles in soil or water it can be swallowed by animals, including fish or taken up by plants.

When acenaphthene enters the environment, it can remain in the soil, water, or air. Eventually, PAHs are broken down into less harmful molecules by the action of microbes, chemical interactions, or sunlight.

Potential Environmental Impacts of Acenaphthene

Acenaphthene is toxic to aquatic organisms at concentrations lower than the reported values in surface water. The MPCA has evaluated the toxic effects of acenaphthene and established a water quality standard to protect fish and other aquatic life. Acenaphthene damages the DNA of cells and affects endocrine activity. A bigger concern is the potential for acenaphthene to build up in aquatic sediments, which could pose a risk to organisms that dwell in or near the bottom of lakes and rivers.

Health Risk Assessment Unit

The MDH Health Risk Assessment Unit evaluates the health risks from contaminants in groundwater. MDH works in collaboration with the Minnesota Pollution Control Agency and the Minnesota Department of Agriculture to understand the occurrence and environmental effects of contaminants in water.

References

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3. Minnesota Pollution Control Agency (MPCA) 2014. Interagency submission to MDH.
4. Great Lakes Water Quality Board 1983. Report on Great Lakes Water Quality.