

toxics release inventory

Chemical Profile

Environment Division

Hydrogen Fluoride

What is hydrogen fluoride?

Hydrogen fluoride (HF) is a colorless, gas that has a pungent, irritating odor.

Hydrogen fluoride gas easily dissolves in water and the resulting solution is hydrofluoric acid.

Hydrofluoric acid is an important industrial chemical. It is used to fabricate aluminum and stainless steel, etch circuit boards, and make solvents. Concentrated hydrofluoric acid is used to etch glass.

How is hydrogen fluoride released by electric utilities?

Trace amounts of fluoride are present in coal and oil. When electric utilities burn these fuels in their power plants, fluoride is released in very small amounts. Some of this fluoride combines with hydrogen to form hydrogen fluoride.

Some coal-burning power plants use pollution control devices to remove sulfur from gases leaving their stacks. These devices also remove some of the hydrogen fluoride from stack gas before it reaches the air. Fluoride-bearing wastes captured by pollution control devices are usually sent to ash ponds or land disposal sites.

Hydrogen fluoride from power plants is about 84% of all the hydrogen fluoride from human activities released into the air each year in the United States. Almost all hydrogen fluoride from power plants comes from burning coal.

The U.S. Environmental Protection Agency (EPA) estimates that U.S. power plants burning coal released about 32,100 tons of hydrogen fluoride into the air in 1994.

Is hydrogen fluoride also released by other sources?

Most hydrogen fluoride released into the air by natural sources comes from volcanoes. Smaller amounts come from ocean spray, forest fires, weathering rocks, and dust.

Hydrogen fluoride released into the environment by human activities outside the utility industry comes mainly from industrial boilers that burn coal and oil, facilities that fabricate aluminum and stainless steel, and agricultural use of phosphate fertilizers. Industries reporting to EPA released 6,257 tons of hydrogen fluoride into the environment in 1996. Nearly all was released into the air.

What happens to hydrogen fluoride after it is released by electric utilities?

Hydrogen fluoride released into the air from power plants easily dissolves in airborne water to form dilute hydrofluoric acid. Some of this hydrofluoric acid forms tiny liquid droplets or thin films on tiny dust particles. As droplets and particles incorporate more water, the hydrofluoric acid they contain becomes more dilute. By the time these droplets

and particles reach surface soil and water by settling to the ground or washing out of the air in rain and snow, the hydrofluoric acid they contain is very dilute. The amount of hydrofluoric acid that stays in the air or falls to the ground depends on local wind, rain, and moisture in the air.

How might people be exposed to hydrogen fluoride?

People are commonly exposed to trace amounts of hydrofluoric acid when they breathe airborne droplets or particles that contain it. Industrial workers may be exposed to concentrated hydrogen fluoride fumes or hydrofluoric acid solutions.

What are the potential effects of hydrogen fluoride on human health?

Hydrogen fluoride fumes can irritate people's eyes, skin, and breathing passages, and concentrated fumes can damage body tissues over time. Direct contact with concentrated hydrofluoric acid solutions can burn the skin. However, there is no evidence that common exposures to dilute hydrofluoric acid in airborne droplets or particles can harm human health. Also, hydrogen fluoride has not been found to cause cancer.

How likely is it that utility releases pose a risk to human health?

It is unlikely that hydrogen fluoride from power plants poses a significant risk to human health. In its 1998 Report to Congress, EPA evaluated potential exposures to hydrogen fluoride from nearly 600 U.S. power plants. It concluded that the amount of hydrogen fluoride released into the air by power plants would never reach unhealthy levels at any location in the United States.

How is hydrogen fluoride regulated?

The Occupational Safety and Health Administration and the National Institute for Occupational Safety and Health have set limits on the amount of hydrogen fluoride in workplace air.

Where can I get more information about hydrogen fluoride?

The Agency for Toxic Substances and Disease Registry (ATSDR) has a fact sheet with answers to frequently asked health questions about hydrogen fluoride. It is available through the ATSDR Information Center at 1-800-447-1544, or on the Internet at <http://atsdr1.atsdr.cdc.gov:8080/tfacts11.html>

Those interested in detailed information about hydrogen fluoride from power plants may read EPA's report, *Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units*. This Final Report to Congress, issued in March 1998, is published by the EPA Office of Air Quality Planning and Standards and Office of Research and Development. It is available on the Internet at <http://www.epa.gov/ttn/oarpg/t3rc.html>