

## HYDROGEN FLUORIDE

### What is hydrogen fluoride?

Hydrogen fluoride (HF) is a colorless gas or liquid that is made up of a hydrogen atom and a fluorine atom. It creates strong fumes, readily dissolves in water, and both the liquid and gas will cause severe burns upon contact. The liquid form is called hydrofluoric acid. Commercially, HF is used in the manufacture of fluorocarbons, which are used as refrigerants, solvents and aerosols.

Low levels of sodium fluoride are found in products such as toothpaste and water. Sodium fluoride is different than hydrogen fluoride. A concentrated release of hydrogen fluoride can cause harm.

### How can someone come into contact with hydrogen fluoride?

Exposure to small amounts of fluoride can occur by breathing air, drinking water, eating food or using some other products that contain fluoride. Fluoride in low amounts will not harm people, and may actually have health benefits such as preventing tooth decay.

- **In the air:** Small amounts of fluoride are normally found in the air. The amount of fluoride that you breathe in a day is much less than what you may consume in food and water. You may breathe in higher levels of fluoride in areas near coal-fired power plants or fluoride-related industries (e.g., aluminum smelters, phosphorus fertilizer plants) or near hazardous waste sites.
- **In the water:** Many communities fluoridate their water supplies to prevent dental decay (the recommended level of fluoride is around 1 part per million). Persons living in non-fluoridated areas may be exposed through beverages and foods processed in fluoridated areas because they are likely made with fluoridated water.
- **In the soil:** The concentration of fluoride in soils is usually between 200 and 300 parts per million. However, levels may be higher in areas containing fluoride-containing mineral deposits. Higher levels also may be present where phosphate fertilizers are used, where coal-fired power plants or fluoride-releasing industries are located, or near hazardous waste sites. Exposure to fluoride can occur through skin contact with these soils.
- **In food:** While food generally contains low levels of fluoride, food grown in areas where soils have high amounts of fluoride or where phosphate fertilizers are used may have higher levels. Tea and some seafood have been found to have high levels of fluoride. Dental products, such as toothpastes, fluoride gels and fluoride rinses also contain fluoride. These products are not made to be swallowed but are safe when used as directed.
- **At work:** Those who work in industries where fluoride-containing substances are used (most notably in the electronics industry where hydrogen fluoride may be used to etch glass in TV picture tubes or to clean silicon chips and in aluminum and phosphate fertilizer plants) may be exposed to high levels of fluoride from breathing in hydrogen fluoride or fluoride-containing dust. Exhaust systems or protective masks may help protect against this type of contact.

**Hydrogen fluoride as a weapon:** HF can be an “agent of opportunity.” This means that someone could explode the vehicle of transportation (truck, train) that is being used to ship the chemical, or destroy tanks that store the chemical. HF would then be released into the air.

Please note: Just because you come into contact with hydrogen fluoride does not mean you will get sick from it.

## What happens if someone gets sick from hydrogen fluoride?

- **Breathing it in:** Hydrogen fluoride is a very irritating gas. People breathing in hydrogen fluoride have complained of eye, nose and skin irritation. Breathing in a large amount of HF also can harm the lungs and heart. Kidney and testes damage have been observed in animals breathing hydrogen fluoride. Large amounts of it can cause death.
- **Skin and eyes:** Hydrofluoric acid can burn the eyes and skin. At first, skin may only appear red and may not be painful. Deeper damage to skin may take several hours or days, with development of deep, painful wounds. When not treated properly, serious skin damage and tissue loss can occur. In the worst cases, a large amount of hydrofluoric acid on the skin can lead to death caused by the fluoride affecting the lungs or heart.

## How likely is someone to die from contact with hydrogen fluoride?

The effects of hydrogen fluoride will depend on the concentration of exposure, length of time and way the person is exposed. A highly concentrated solution or large amount in the air is more likely to cause severe effects, including death.

## What is the treatment for hydrogen fluoride poisoning?

- **Prevention of illness after contact:** First, leave the area where the hydrogen fluoride was released and move to fresh air.
  - **Remove clothing.**
    - Then, quickly take off clothing that may have hydrogen fluoride on it. If possible, any clothing that has to be pulled over the head should be cut off the body instead so the chemical does not get near the eyes, mouth or nose. If helping other people remove their clothing, try to avoid touching any contaminated areas.
  - **Wash affected areas.**
    - As quickly as possible, wash any chemical from the skin with lots of soap and water.
    - If the eyes are burning or vision is blurred, rinse your eyes with plain water for 10 to 15 minutes.
    - If contact lenses are worn, remove them and put them with the contaminated clothing. Do not put the contacts back in. If eyeglasses are worn, wash them with soap and water. Eyeglasses can be put back on after they are washed.
    - If you are wearing jewelry that you can wash with soap and water, wash it and put it back on. If it cannot be washed, put it with the contaminated clothing.
  - **Discard contaminated items.**
    - Place the clothing and any other contaminated items inside a plastic bag. Avoid touching contaminated areas of the clothing. If you can't avoid touching contaminated areas, or you aren't sure where the contaminated areas are, wear rubber gloves or use tongs, sticks or similar objects. Anything that touches the contaminated clothing should also be placed in the bag.
    - Seal the bag, and then seal that bag inside another plastic bag.
    - Call the local county health department right away. (Visit [www.idph.state.il.us//local/alpha.htm](http://www.idph.state.il.us//local/alpha.htm) for a listing of all county health departments in Illinois or check your local phone book.)
    - When the local or state health department or emergency personnel arrive, tell them what you did with your clothes. The health department or emergency personnel will arrange for further disposal. Do not handle the plastic bags yourself.
- **Treatment of illness:** Treatment for HF poisoning consists of washing the chemical off the body as soon as possible and providing supportive medical care (intravenous fluids, medicine to control pain) in a hospital setting. No antidote exists for HF poisoning. People with severe burns should seek medical treatment. Medical personnel may use specialized calcium-containing antidotes to treat HF poisoning.

(Hydrogen fluoride continued)

### **Is there a vaccine for hydrogen fluoride poisoning?**

No, there is no vaccine for hydrogen fluoride poisoning.

### **What should be done if someone comes into contact with hydrogen fluoride?**

If you think that you or someone you know may have come into contact with large amounts of hydrogen fluoride, contact the local county health department right away. (Visit [www.idph.state.il.us//local/alpha.htm](http://www.idph.state.il.us//local/alpha.htm) for a listing of all county health departments in Illinois or check your local phone book.)

If you or someone you know is showing symptoms of a hydrogen fluoride poisoning, call your health care provider or the Illinois Poison Center right away. The toll-free number for the poison center is 1-800-222-1222.

### **Where can one get more information about hydrogen fluoride?**

- U.S. Centers for Disease Control and Prevention      [www.bt.cdc.gov/agent/hydrofluoricacid/index.asp](http://www.bt.cdc.gov/agent/hydrofluoricacid/index.asp)
- Illinois Department of Public Health                      [www.idph.state.il.us](http://www.idph.state.il.us)
- Illinois Poison Center    [www.IllinoisPoisonCenter.org](http://www.IllinoisPoisonCenter.org)