

This fact sheet answers the most frequently asked health questions (FAQs) about sulfur trioxide (SO<sub>3</sub>) and sulfuric acid. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Sulfur trioxide (SO<sub>3</sub>) is formed from sulfur dioxide; SO<sub>3</sub> forms sulfuric acid when it comes in contact with water. Sulfuric acid can cause burns to the skin, eyes, lungs, and digestive tract. Severe exposure can result in death. This substance has been found in at least 47 of the 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

### What are sulfur trioxide and sulfuric acid?

(Pronounced sŭl'fər trī' ōk'sīd' and sŭl-fyŭŕ'īk ä'sīd)

Sulfur trioxide (SO<sub>3</sub>) is generally a colorless liquid. It can also exist as ice- or fiber-like crystals or as a gas. When SO<sub>3</sub> is exposed to air, it rapidly takes up water and gives off white fumes. It can react with water to form sulfuric acid.

SO<sub>3</sub> is also called sulfuric oxide and sulfuric anhydride. It is used in the production of sulfuric acid and other chemicals, and explosives.

Sulfuric acid is a clear, colorless, oily liquid that is very corrosive. It is also called sulphine acid, battery acid, and hydrogen sulfate. It is used in the manufacture of fertilizers, explosives, other acids, and glue; in the purification of petroleum; in the pickling of metal; and in lead-acid batteries (used in most vehicles).

### What happens to sulfur trioxide and sulfuric acid when they enter the environment?

- Much of the sulfuric acid in the air is formed from sulfur dioxide released when coal, oil, and gas are burned.

- SO<sub>3</sub> is formed when sulfur dioxide reacts with water in the air.
- Sulfuric acid dissolves in the water in air and can remain suspended in air for varying periods of time.
- Sulfuric acid is removed from the air in rain.
- Sulfuric acid contributes to the formation of acid rain.

### How might I be exposed to sulfur trioxide and sulfuric acid?

- Working in the chemical or metal plating industry; producing detergents, soaps, fertilizers, or lead-acid batteries; or working in printing and publishing or photography shops.
- Breathing outdoor air where coal, oil, or gas are burned.
- Touching the material that forms on the outside of your car battery.
- Breathing air near a hazardous waste site where SO<sub>3</sub> is disposed of.
- Coming in contact with toilet bowl cleaners mixed with water.

ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>

### **How can sulfur trioxide and sulfuric acid affect my health?**

Touching sulfuric acid will burn your skin, and breathing sulfuric acid can result in tooth erosion and respiratory tract irritation. Drinking sulfuric acid can burn your mouth, throat, and stomach; it can result in death. If you get sulfuric acid in your eyes, it will cause your eyes to water and will burn.

### **How likely are sulfur trioxide and sulfuric acid to cause cancer?**

People who have breathed large quantities of sulfuric acid at work have shown an increase in cancers of the larynx. However, most of the people were also smokers who were exposed to other chemicals and acids as well.

The ability of sulfuric acid to cause cancer in laboratory animals has not been studied. The International Agency for Research on Cancer (IARC) has determined that occupational exposure to strong inorganic acid mists containing sulfuric acid is carcinogenic to humans. IARC has not classified pure sulfuric acid for its carcinogenic effects.

### **How can sulfur trioxide and sulfuric acid affect children?**

Children may be exposed in the same ways as adults; however, they may be more at risk due to accidental injuries and accidents in the home. Teenagers may have jobs (such as car repair) in which they have contact with sulfuric acid.

Children may have increased sensitivity to sulfuric acid in air, due to their smaller airway diameters and the fact that they

breathe more air per kilogram of body weight than adults.

### **How can families reduce the risk of exposure to sulfur trioxide and sulfuric acid?**

- Keep household products like drain and toilet bowl cleaners containing sulfuric acid out of the reach of children.
- Wear protective gloves when using products that contain sulfuric acid.
- Keep car batteries away from children.

### **Is there a medical test to show whether I've been exposed to sulfur trioxide and sulfuric acid?**

There is no medical test to determine whether you have been exposed to sulfur trioxide or sulfuric acid. Breathing in acids, including sulfuric acid, will increase the acidity of your saliva. Measuring the acidity of saliva may determine whether you have been exposed to acid but cannot tell which acid.

### **Has the federal government made recommendations to protect human health?**

EPA limits the amount of sulfur dioxide that can be released into the air. This limits the amount of sulfur trioxide and sulfuric acid that form from sulfur dioxide in the air.

The Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH) limit the amount of sulfuric acid in workroom air to 1 milligram per cubic meter of air (1 mg/m<sup>3</sup>).

### **References**

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological profile for sulfur trioxide (SO<sub>3</sub>) and sulfuric acid. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html> ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.

