

This fact sheet answers the most frequently asked health questions (FAQs) about sulfur dioxide. 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: Exposure to sulfur dioxide occurs from breathing it in the air. It affects the lungs and at high levels may result in burning of the nose and throat, breathing difficulties, and severe airway obstructions. This chemical has been found in at least 16 of 1,467 National Priorities List sites identified by the Environmental Protection Agency (EPA).

What is sulfur dioxide?

(Pronounced sŭl' fər dī' ōk' sīd')

Sulfur dioxide is a colorless gas with a pungent odor. It is a liquid when under pressure, and it dissolves in water very easily.

Sulfur dioxide in the air comes mainly from activities such as the burning of coal and oil at power plants or from copper smelting. In nature, sulfur dioxide can be released to the air from volcanic eruptions.

What happens to sulfur dioxide when it enters the environment?

- When released into the environment, sulfur dioxide moves into the air.
- In the air, it can be converted to sulfuric acid, sulfur trioxide, and sulfates.
- Sulfur dioxide dissolves in water.
- Once dissolved in water, sulfur dioxide can form sulfurous acid.
- Sulfur dioxide can be absorbed into the soil, but we don't know if or how it moves in soil.

How might I be exposed to sulfur dioxide?

- Breathing air containing it or touching it.
- Working in industries where it occurs as a by-product, such as copper smelting or power plants.
- Working in the manufacture of sulfuric acid, paper, food preservatives, or fertilizers.
- Living near heavily industrialized activities where sulfur dioxide occurs.

How can sulfur dioxide affect my health?

Exposure to very high levels of sulfur dioxide can be life threatening. Exposure to 100 parts of sulfur dioxide per million parts of air (100 ppm) is considered immediately dangerous to life and health. Burning of the nose and throat, breathing difficulties, and severe airway obstructions occurred in miners who breathed sulfur dioxide released as a result of an explosion in a copper mine.

Long-term exposure to persistent levels of sulfur dioxide can affect your health. Lung function changes were seen in some workers exposed to low levels of sulfur dioxide for 20 years or more. However, these workers were also exposed to other chemicals, so their health effects may not have been from sulfur dioxide alone. Asthmatics have also been shown

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

to be sensitive to the respiratory effects of low concentrations of sulfur dioxide.

Animal studies also show respiratory effects from breathing sulfur dioxide. Animals exposed to high concentrations of sulfur dioxide showed decreased respiration, inflammation of the airways, and destruction of areas of the lung.

How likely is sulfur dioxide to cause cancer?

There are no studies that clearly show carcinogenic effects of sulfur dioxide in people or animals. Studies have investigated workers in the copper smelting and pulp and paper industries, but the results are inconclusive since the workers were also exposed to arsenic and other chemicals. The one available animal study suggests that sulfur dioxide may be a carcinogen in mice. The International Agency for Research on Cancer (IARC) has classified sulfur dioxide as Group 3, not classifiable as to human carcinogenicity.

How can sulfur dioxide affect children?

Children who live in or near heavily industrialized areas where sulfur dioxide occurs may experience difficulty breathing, changes in the ability to breathe deeply, and burning of the nose and throat. It is not known whether children are more vulnerable to these effects than adults. However, children may be exposed to more sulfur dioxide than adults because they breathe more air for their body weight than adults do.

Long-term studies surveying large numbers of children indicate that children who have breathed sulfur dioxide pollution may develop more breathing problems as they get older, may make more emergency room visits for treatment of wheezing fits, and may get more respiratory illnesses than other children. Children with asthma may be especially sensitive even to low concentrations of sulfur dioxide, but it is not known whether asthmatic children are more sensitive than asthmatic adults.

How can families reduce the risk of exposure to sulfur dioxide?

Families living near heavily industrialized areas where sulfur dioxide occurs should limit their outdoor activities during times of high air pollution. By paying attention to news bulletins and air pollution advisories, families can control the amount of their exposure. People with respiratory difficulties should pay special attention to these warnings, and asthmatic children's outdoor exercise should be limited when high levels of sulfur dioxide are present in air.

Is there a medical test to show whether I've been exposed to sulfur dioxide?

Sulfur dioxide in the body is changed into other sulfur-containing chemicals in the body. These breakdown products can be measured in blood and urine, but this requires special equipment that is not routinely available in a doctor's office. Furthermore, exposure to chemicals other than sulfur dioxide can also produce sulfate, so the presence of sulfate breakdown products in your body does not necessarily mean you have been exposed to sulfur dioxide.

Has the federal government made recommendations to protect human health?

EPA has set an air quality standard of 0.03 ppm for long-term, 1-year average concentrations of sulfur dioxide. Short-term, 24-hour air concentrations should not exceed 0.14 ppm more than once a year.

The Occupational Safety and Health Administration (OSHA) has set a limit of 2 ppm over an 8-hour workday, 40-hour workweek.

References

Agency for Toxic Substances and Disease Registry (ATSDR). 1998. Toxicological profile for sulfur dioxide. 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.

