

SULFUR DIOXIDE OVERVIEW

The following information is from the ATSDR (Agency for Toxic Substances and Disease Registry) Toxicological Profile (ToxProfile) for Sulfur Dioxide Chapter 1: Public Health Statement.

- The full Public Health Statement is available at <https://www.atsdr.cdc.gov/ToxProfiles/tp116-c1.pdf>.
- The full ToxProfile is available at <https://www.atsdr.cdc.gov/ToxProfiles/tp116.pdf>.
- A summary of toxicological information can be found in the “ToxFAQs” for Sulfur Dioxide at <https://www.atsdr.cdc.gov/ToxProfiles/tp116.pdf>

WHAT IS SULFUR DIOXIDE?

Sulfur dioxide is a colorless gas with a pungent odor. It is a liquid when under pressure. Sulfur dioxide dissolves in water very easily. It cannot catch fire.

Sulfur dioxide in the air results primarily from activities associated with the burning of fossil fuels (coal, oil) such as at power plants or from copper smelting. In nature, sulfur dioxide can be released to the air, for example, from volcanic eruptions.

HOW CAN SULFUR DIOXIDE ENTER AND LEAVE MY BODY?

If you breathe air containing sulfur dioxide, you may absorb it into your body through your nose and lungs. Sulfur dioxide can easily and rapidly enter your bloodstream through your lungs. Once in the body, it breaks down to sulfate and leaves through the urine.

HOW CAN SULFUR DIOXIDE AFFECT MY HEALTH?

Lung function changes have been observed in some workers exposed to 0.4-3.0 ppm sulfur dioxide for 20 years or more. However, these workers were also exposed to other chemicals, making it difficult to attribute their health effects to sulfur dioxide exposure alone. Additionally, exercising asthmatics are sensitive to the respiratory effects of low concentrations (0.25 ppm) of sulfur dioxide.

For comparative purposes, typical outdoor concentrations of sulfur dioxide may range from 0 to 1 ppm. Occupational exposures to sulfur dioxide may lawfully range from 0 to 5 ppm as enforced by your state OSHA (Occupational Safety and Health Administration).

HOW CAN SULFUR DIOXIDE AFFECT CHILDREN?

Levels of sulfur dioxide in the atmosphere vary from region to region and are mainly influenced by the intensity of industry and development usually associated with cities. Therefore, children with the highest exposure to sulfur dioxide are those living near industrial sources (i.e., industries that process or burn coal or oil, copper smelting plants, sulfuric acid manufacturers, fertilizer factories, or paper pulp factories).

Most of the effects of sulfur dioxide exposure that occur in adults (i.e., difficulty breathing, changes in the ability to breathe as deeply or take in as much air per breath, and burning of the nose and throat) are also of potential concern in children, but it is unknown whether children are more vulnerable to exposure.

Long-term studies surveying large numbers of children have indicated possible associations between sulfur dioxide pollution and respiratory symptoms or reduced breathing ability. 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 is typical for children. However, studies like these are unable to provide conclusive evidence about sulfur dioxide's effects on children's health because many other pollutants are also present in the air.

It is known that exercising asthmatics are sensitive to low concentrations of sulfur dioxide. Therefore, increased susceptibility is expected in children with asthma, but it is not known whether asthmatic children are more sensitive than asthmatic adults.

IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE 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 found and measured in the blood and urine. However, their measurement requires special equipment which 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 in your body does not necessarily mean you have been exposed to sulfur dioxide. Lung function tests can be used to examine potential respiratory effects of sulfur dioxide. However, tests of lung function changes cannot determine whether or not you have been specifically exposed to sulfur dioxide because other chemicals can produce similar lung function changes.

WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government has set regulations to protect individuals from the possible health effects of breathing sulfur dioxide. EPA recommends that the long-term, 1-year average concentrations of sulfur dioxide should not exceed 0.03 ppm. The short-term, 24-hour average concentration should not exceed 0.14 ppm more than once a year. OSHA regulates levels of sulfur dioxide in the workplace. This regulation states that workroom air should contain no more than an average of 2 ppm sulfur dioxide over an 8-hour working shift for 5 consecutive days in a workweek.

NIOSH recommends that the average workroom air levels of sulfur dioxide not exceed 2 ppm over a 10-hour period. The 15-minute average exposure in air that should not be exceeded at any time during a workday is 5 ppm.