



# PUBLIC HEALTH STATEMENT

## Carbonyl Sulfide

**Division of Toxicology and Human Health Sciences**

**December 2016**

This Public Health Statement summarizes what is known about carbonyl sulfide such as possible health effects from exposure and what you can do to limit exposure.

The U.S. Environmental Protection Agency (EPA) identifies the most serious hazardous waste sites in the nation. These sites make up the National Priorities List (NPL) and are sites targeted for long-term federal clean-up activities. U.S. EPA has found carbonyl sulfide in at least 4 of the 1,832 current or former NPL sites. The total number of NPL sites evaluated for carbonyl sulfide is not known. But the possibility remains that as more sites are evaluated, the sites at which carbonyl sulfide is found may increase. This information is important because these future sites may be sources of exposure, and exposure to carbonyl sulfide may be harmful.

If you are exposed to carbonyl sulfide, many factors determine whether you'll be harmed. These include how much you are exposed to (dose), how long you are exposed (duration), and how you are exposed (route of exposure). You must also consider the other chemicals you are exposed to and your age, sex, diet, family traits, lifestyle, and state of health.

### **WHAT IS CARBONYL SULFIDE?**

Carbonyl sulfide (COS) is a colorless gas that smells like rotten eggs; it does not have an odor when it is free from impurities. Carbonyl sulfide can also be called carbon oxide sulfide and carbon oxysulfide.

At concentrations of 135 micrograms per cubic meter ( $\mu\text{g}/\text{m}^3$ ) (0.055 ppm), people may be able to smell carbonyl sulfide in air.

Carbonyl sulfide is present in both natural and human-made sources. It can be found in volcanic gases, crude petroleum oil, sulfurous waters, marshes, and soils. It is in the emissions from diesel engines, natural gas and refinery emissions, and tobacco smoke.

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**DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service**  
**Agency for Toxic Substances and Disease Registry**

[www.atsdr.cdc.gov/](http://www.atsdr.cdc.gov/) Telephone: 1-800-232-4636



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Carbonyl sulfide does not have many commercial uses, as it is primarily used in small-scale chemical syntheses. It is an intermediate in the manufacture of certain herbicides. It may also be used in the agricultural industry as a grain fumigant.

### **WHAT HAPPENS TO CARBONYL SULFIDE WHEN IT ENTERS THE ENVIRONMENT?**

Carbonyl sulfide can be released into the air, water, and soil at places where it is produced or used. Carbonyl sulfide is released to air from natural sources such as soils, wetlands, volcanoes, and oceans. It is also released during chemical processing, natural gas and oil recovery, combustion of coal, biomass burning, and others. The average carbonyl sulfide level in outdoor air is 0.0018 ppm. Carbonyl sulfide can remain in the atmosphere for 2–10 years.

Carbonyl sulfide in the atmosphere may settle to surface water or soil. Carbonyl sulfide reacts with water to form carbon dioxide and hydrogen sulfide. It is expected to rapidly volatilize to air. It does not bind to soil. It may move through the soil and enter groundwater.

### **HOW MIGHT I BE EXPOSED TO CARBONYL SULFIDE?**

Everybody is exposed to very low levels of carbonyl sulfide in the air. You may also be exposed if you consume products such as wheat, oats, barley, and canola shortly after they have been fumigated with carbonyl sulfide to increase plant resistance to insects.

If you are involved in the production or use of carbonyl sulfide, you may be exposed to higher levels in the air. You may also be exposed to higher levels if you work in a petroleum refinery or coal distillation plant.

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### **HOW CAN CARBONYL SULFIDE ENTER AND LEAVE MY BODY?**

We know that carbonyl sulfide can enter your body from the air because health effects have been observed in studies with animals. We do not know how much or how fast it can enter your body. We do not know how carbonyl sulfide is broken down in the body or how it leaves the body.

### **HOW CAN CARBONYL SULFIDE AFFECT MY HEALTH?**

We have very little information on the health effects of carbonyl sulfide. The health effects of carbonyl sulfide appear to depend on several factors such as how much you are exposed to and the length of that exposure. Studies in animals show that nervous system effects can occur after short- or long-term exposure. Animal studies show that exposure to high levels of carbonyl sulfide in the air can damage the areas of the brain that control movement and process sound information.

No human or animal studies have examined whether carbonyl sulfide exposure can cause cancer. HHS, IARC, and EPA have not classified carbonyl sulfide as to its carcinogenicity.

### **HOW CAN CARBONYL SULFIDE AFFECT CHILDREN?**

This section discusses potential health effects of carbonyl sulfide exposure in humans from when they're first conceived to 18 years of age.

There is no information on possible health problems in children who have been exposed to carbonyl sulfide. Children exposed to high levels of carbonyl sulfide may have similar health effects as adults. However, we do not know whether children are more sensitive to carbonyl sulfide than adults. We do not know if exposure to carbonyl sulfide will cause birth defects in humans. No studies looked for birth defects in animals.

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### **HOW CAN FAMILIES REDUCE THE RISK OF EXPOSURE TO CARBONYL SULFIDE?**

If your doctor finds that you have been exposed to significant amounts of carbonyl sulfide, ask whether your children might also be exposed. Your doctor might need to ask your state health department to investigate.

Carbonyl sulfide is part of the natural environment; the general population will have some exposure to carbonyl sulfide. Families can be exposed to higher levels of carbonyl sulfide if they live near natural or industrial sources of carbonyl sulfide, such as wetlands, volcanos, or coal combustion. However, their exposure levels are generally unlikely to approach those that sicken people exposed at work. Families can reduce their exposure to carbonyl sulfide by avoiding areas that are sources of carbonyl sulfide.

### **ARE THERE MEDICAL TESTS TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO CARBONYL SULFIDE?**

How carbonyl sulfide is broken down in the body and how it is removed from the body is not known. Thus, no medical tests have been identified that can determine carbonyl sulfide exposure.

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

The federal government develops regulations and recommendations to protect public health. Regulations can be enforced by law. Federal agencies that develop regulations for toxic substances include the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA). Recommendations provide valuable guidelines to protect public health but cannot be enforced by law. Federal organizations that develop recommendations for toxic substances include the Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH).

Regulations and recommendations can be expressed as “not-to-exceed” levels; that is, levels of a toxic substance in air, water, soil, or food that do not exceed a critical value usually based on levels that affect

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animals; levels are then adjusted to help protect humans. Sometimes these not-to-exceed levels differ among federal organizations. Different organizations use different exposure times (an 8-hour workday or a 24-hour day), different animal studies, or emphasize some factors over others, depending on their mission.

Recommendations and regulations are also updated periodically as more information becomes available. For the most current information, check with the federal agency or organization that issued the regulation or recommendation.

OSHA and NIOSH have not established regulations for workers exposed to carbonyl sulfide.

### **WHERE CAN I GET MORE INFORMATION?**

If you have any questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below. ATSDR can also provide publically available information regarding medical specialists with expertise and experience recognizing, evaluating, treating, and managing patients exposed to hazardous substances.

- Call the toll-free information and technical assistance number at 1-800-CDCINFO (1-800-232-4636) or
- Write to:  
Agency for Toxic Substances and Disease Registry  
Division of Toxicology and Human Health Sciences  
1600 Clifton Road NE  
Mailstop F-57  
Atlanta, GA 30329-4027

Toxicological profiles and other information are available on ATSDR's web site:  
<http://www.atsdr.cdc.gov>.

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