This Public Health Statement is the summary chapter from the Toxicological Profile for Carbonyl Sulfide. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™, is also available. This information is important 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. For more information, call the ATSDR Information Center at 1-800-232-4636.

**Overview**

We define a public health statement and show how it can help you learn about carbonyl sulfide.

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**Introduction**

A public health statement summarizes information about a hazardous substance. The information is taken from a toxicological profile developed by the Agency for Toxic Substances and Disease Registry’s (ATSDR’s) Division of Toxicology and Human Health Sciences (DTHHS). A toxicological profile is a thorough review of a hazardous substance.

This toxicological profile examines hydrogen sulfide and carbonyl sulfide. This section of the public health statement summarizes the DTHHS’s findings on carbonyl sulfide describes the effects of exposure to it, and describes what you can do to limit that exposure.

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**Carbonyl sulfide at hazardous waste sites**

The U.S. Environmental Protection Agency (U.S. EPA) identifies the most serious hazardous waste sites in the nation. U.S. EPA then includes these sites on the National Priorities List (NPL) and targets them for federal clean-up activities. U.S. EPA has found carbonyl sulfide in at least 3 of the 1,689 current or former NPL sites.

The total number of NPL sites evaluated for carbonyl sulfide is not known. However, the possibility remains that as more sites are evaluated, the number of sites at which carbonyl sulfide is found may increase. This information is important; these future sites may be sources of exposure, and exposure to carbonyl sulfide may be harmful.
A carbonyl sulfide release may be harmful

When a contaminant is released from a large area such as an industrial plant or from a container such as a drum or bottle, it enters the environment. However, such a release doesn’t always lead to exposure. You can only be exposed to a contaminant when you come in contact with it. That contact—and therefore that exposure—can occur when you breathe, eat, or drink the contaminant, or when it touches your skin.

Even if you’re exposed to carbonyl sulfide, you might not be harmed. Whether you are harmed will depend on such factors as the dose (how much), the duration (how long), and how you are exposed. Harm might also depend on whether you’ve been exposed to any other chemicals, as well as your age, sex, diet, family traits, lifestyle, and state of health.

A Closer Look at Carbonyl Sulfide

Overview

This section describes carbonyl sulfide in detail and how you can be exposed to it.

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 (µg/m³) (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.

How is carbonyl sulfide used

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.
PUBLIC HEALTH STATEMENT
Carbonyl Sulfide

Division of Toxicology and Human Health Sciences
October 2014

Where is carbonyl sulfide found

Carbonyl sulfide can be released into the air, water, and soil at places where it is produced or used.

<table>
<thead>
<tr>
<th>Possible Sources</th>
<th>Outcome</th>
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<tbody>
<tr>
<td><strong>Air:</strong> 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.</td>
<td>Carbonyl sulfide can remain in the atmosphere for 2–10 years.</td>
</tr>
<tr>
<td><strong>Water:</strong> Carbonyl sulfide might enter water from atmospheric deposition.</td>
<td>Carbonyl sulfide reacts with water to form carbon dioxide and hydrogen sulfide. It is expected to rapidly volatilize to air.</td>
</tr>
<tr>
<td><strong>Soil:</strong> Carbonyl sulfide might enter soil from atmospheric deposition.</td>
<td>Carbonyl sulfide does not bind to soil. It may move through the soil and enter groundwater.</td>
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</tbody>
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How Carbonyl Sulfide Can Affect Your Health

Overview

This section looks at how carbonyl sulfide enters your body and potential carbonyl sulfide health effects found in human and animal studies.

How carbonyl sulfide enters your 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.

How carbonyl sulfide leaves your body

We do not know how carbonyl sulfide is broken down in the body or how it leaves the body.

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

www.atsdr.cdc.gov/ Telephone: 1-800-232-4636
We have very little information on the health effects of carbonyl sulfide. Studies in animals show that nervous system effects can occur after short- or long-term exposure. 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.

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. DHHS, the International Agency for Research on Cancer (IARC), and EPA have not classified carbonyl sulfide as to its carcinogenicity.

This section discusses potential health effects of carbonyl sulfide exposure in humans from when they’re first conceived to 18 years of age and how you might protect against such effects.

There is no information on possible health problems in children who have been exposed to carbonyl sulfide. Exposed children probably will experience effects similar to those experienced by exposed adults. Whether children are more sensitive to carbonyl sulfide exposure than adults is not known.

It is not known if exposure to carbonyl sulfide causes birth defects in humans. No studies looked for birth defects in animals.
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 or unborn baby might also be exposed. Your doctor might need to ask your state health department to investigate.

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**Air**

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

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**Reducing your exposure to carbonyl sulfide**

Families can reduce their exposure to carbonyl sulfide by avoiding areas that are sources of carbonyl sulfide.

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**Medical Tests to Determine Carbonyl Sulfide Exposure**

**Overview**

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.

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**Federal Government Recommendations to Protect Human Health**

**Overview**

One way the federal government promotes public health is by regulating toxic substances or recommending ways to handle or to avoid toxic substances.
The federal government regulates toxic substances

Regulations are enforceable by law. The U.S. EPA, the Occupational Safety and Health Administration (OSHA), and the Food and Drug Administration (FDA) are some federal agencies that have adopted toxic substances regulations.

Toxic substance recommendations

The Agency for Toxic Substances and Disease Registry (ATSDR) and the National Institute for Occupational Safety and Health (NIOSH) have made recommendations about toxic substances. Unlike enforceable regulations, these recommendations are advisory only.

Not-to-exceed levels

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 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.

Some regulations and recommendations for carbonyl sulfide exposure in workers include:

<table>
<thead>
<tr>
<th>Federal Organization</th>
<th>Regulation or Recommendation</th>
</tr>
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<tbody>
<tr>
<td>Occupational Safety and Health Administration (OSHA)</td>
<td>OSHA has not established regulations for workers exposed to carbonyl sulfide.</td>
</tr>
<tr>
<td>National Institute for Occupational Safety and Health (NIOSH)</td>
<td>NIOSH has not established guidelines for workers exposed to carbonyl sulfide</td>
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DEPARTMENT of HEALTH AND HUMAN SERVICES, Public Health Service
Agency for Toxic Substances and Disease Registry

www.atsdr.cdc.gov/  Telephone: 1-800-232-4636
Additional Information

Overview
Where to find more information about and carbonyl sulfide:

Who to contact
If you have any more questions or concerns, please contact your community or state health or environmental quality department, or contact ATSDR at the address and phone number below.

Additional information from ATSDR
ATSDR can provide publicly available information regarding medical specialists with expertise and experience recognizing, evaluating, treating, and managing patients exposed to hazardous substances.

Where to obtain toxicological profile copies
Toxicological profiles are also available online at www.atsdr.cdc.gov. For more information:

- 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 30333

For-profit organizations should request final toxicological profile copies from:

National Technical Information Service (NTIS)
5285 Port Royal Road
Springfield, VA 22161
Phone: 1-800-553-6847 or 1-703-605-6000
Web site: http://www.ntis.gov/