

Phosgene

What is it?

Phosgene is a major industrial chemical used to make plastics and pesticides. At room temperature (70°F), phosgene is a poisonous gas. With cooling and pressure, phosgene gas can be converted into a liquid so that it can be shipped and stored. When liquid phosgene is released, it quickly turns into a gas that stays close to the ground and spreads rapidly. The gas may appear colorless or as a white to pale yellow cloud. At low concentrations, it has a pleasant odor of newly mown hay or green corn, but its odor may not be noticed by all people exposed. At high concentrations, the odor may be strong and unpleasant. Phosgene itself is nonflammable (not easily ignited and burned), but it can cause flammable substances around it to burn. It is also known by its military designation, "CG."

Its use

- Phosgene was used extensively during World War I as a choking (pulmonary) agent. Among the chemicals used in the war, phosgene was responsible for the large majority of deaths.
- Phosgene is not found naturally in the environment.
- Phosgene is used in industry to produce many other chemicals such as pesticides.
- Phosgene can be formed when certain compounds are exposed to heat, such as some types of plastics.
- Phosgene gas is heavier than air, so it would be more likely found in low-lying areas.

Exposure

People's risk for exposure depends on how close they are to the place where the phosgene was released.

- If phosgene gas is released into the air, people may be exposed through skin contact or eye contact. They may also be exposed by breathing air that contains phosgene.
- If phosgene liquid is released into water, people may be exposed by touching or drinking water that contains phosgene.
- If phosgene liquid comes into contact with food, people may be exposed by eating the contaminated food.

How does phosgene work?

Poisoning caused by phosgene depends on the amount of phosgene to which a person is exposed, the route of exposure, and the length of time that a person is exposed. Phosgene gas and liquid are irritants that can damage the skin, eyes, nose, throat, and lungs.

Immediate signs and symptoms

During or immediately after exposure to dangerous concentrations of phosgene, the following signs and symptoms may develop:

- Coughing
- Burning sensation in the throat and eyes
- Watery eyes
- Blurred vision
- Difficulty breathing or shortness of breath
- Nausea and vomiting
- Skin contact can result in lesions similar to those from frostbite or burns

Following exposure to high concentrations of phosgene, a person may develop fluid in the lungs (pulmonary edema) within 2 to 6 hours.

Exposure to phosgene may cause delayed effects that may not be apparent for up to 48 hours after exposure, even if the person feels better or appears well following removal from exposure. Therefore, people who have been exposed to phosgene should be monitored for 48 hours afterward. Delayed effects that can appear for up to 48 hours include the following:

- Difficulty breathing
- Coughing up white to pink-tinged fluid (a sign of pulmonary edema)
- Low blood pressure
- Heart failure

Showing these signs or symptoms does not necessarily mean that a person has been exposed to phosgene.

Long-term health effects

Most people who recover after an exposure to phosgene make a complete recovery. However, chronic bronchitis and emphysema have been reported as a result of phosgene exposure.

Protection

Leave the area where the phosgene was released and get to fresh air. Quickly moving to an area where fresh air is available is highly effective in reducing the possibility of death from exposure to phosgene.

If the phosgene release was outdoors, move away from the area where the phosgene was released. Go to the highest ground possible, because phosgene is heavier than air and will sink to low-lying areas.

If the phosgene release was indoors, get out of the building.

If you think you may have been exposed, remove your clothing, rapidly wash your entire body with soap and water, and get medical care as quickly as possible.

1. *Removing and disposing of clothing:*
Quickly take off clothing that has liquid phosgene on it. Any clothing that has to be pulled over the head should be cut off the body instead of pulled over the head. If possible, seal the clothing in a plastic bag. Then seal the first plastic bag in a second plastic bag. Removing and sealing the clothing in this way will help protect you and other people from any chemicals that might be on your clothes. If you placed your clothes in plastic bags, inform either the local or state health department or emergency personnel upon their arrival. Do not handle the plastic bags.
If you are helping other people remove their clothing, try to avoid touching any contaminated areas, and remove the clothing as quickly as possible.
2. *Washing the body:*
As quickly as possible, wash your entire body with large amounts of soap and water. Washing with soap and water will help protect people from any chemicals on their bodies.
If your eyes are burning or your vision is blurred, rinse your eyes with plain water for 10 to 15 minutes. If you wear contacts, remove them and place them in the bags with the contaminated clothing. Do not put the contacts back in your eyes. If you wear eyeglasses, wash them with soap and water. You can put the eyeglasses back on after you wash them.
If you have ingested (swallowed) phosgene, do not induce vomiting or drink fluids.
Seek medical attention right away. Dial 911 and explain what has happened.

Treatment

Treatment for phosgene exposure consists of removing phosgene from the body as soon as possible and providing supportive medical care in a hospital setting. No antidote exists for phosgene. Exposed people should be observed for up to 48 hours, because it may take that long for symptoms to develop or reoccur.