

# WORKING WITH Chlorine



**U.S. DEPARTMENT OF  
HEALTH, EDUCATION, AND WELFARE**

Public Health Service  
Center for Disease Control  
National Institute for Occupational  
Safety and Health

## WORKING WITH CHLORINE

Chlorine, a gas that is widely distributed in nature but is so reactive that it is rarely found as a free gas, is known as a potential danger to worker health in its manufacture and industrial use.

Chlorine gas itself is a pungent, greenish-yellow gas that is more than twice as heavy as air. It is manufactured by passing electricity through a solution of ordinary table salt and then is usually compressed to a liquid for shipping and storage. The handling and use of both liquid and gaseous chlorine require close attention to safety precautions and practices.

### How Chlorine Is Used

Chlorine is used in many industries as a bleach to whiten materials used in paper and textile industries, such as in making cellulose fibers for synthetic fabrics. Since it is also a powerful disinfectant, it is widely used to purify drinking water, to disinfect swimming pools, and to treat sewage.

Chlorine is widely used in the chemical industry for the manufacture of useful chemicals such as solvents, refrigerant gases, plastics, rubber products, and bug killers.

### How It Affects the Body

Chlorine is notably irritating to the mucous membranes of the eyes, nose, throat and the lungs because it reacts with body moisture to

form dangerous acids. In fact, the first symptom of exposure to it is smarting and burning of the eyes, nose and throat. Continued exposure can cause intense coughing, chest pains, and often vomiting. If breathed long enough, high concentrations of chlorine can cause muscle cramping of the throat and swell the linings of air passages, resulting in suffocation.

Liquid chlorine produces gas instantly, if spilled. Either the liquid or the concentrated gas can severely burn the skin or the eyes. "Freeze burns" can also be caused by the rapid vaporization of the liquid.

Pure chlorine gas and liquid are not flammable, but they produce flammable and explosive mixtures in combination with other chemicals such as hydrogen, hydrocarbons, alcohols and ethers. Because high temperatures and pressures are produced in the manufacture of some chlorine compounds, these processes must be rigidly controlled.

## **Warnings of Low-Level Chlorine Exposure**

The offensive odor of chlorine gas gives warning of sudden or substantial chlorine contamination, but people who are regularly subjected to chlorine soon lose their ability to smell it at concentrations below those that cause immediate effects. Such a worker can no longer tell if a little chlorine is in the air he breathes; this is dangerous because continued exposure can lead to future respiratory diseases and predispose the worker to other disease. It can also result in corrosion of the teeth. Exposure of the skin to low concentrations of chlorine for a long time can

lead to a kind of acne – “chloracne.”

## **Controlling Chlorine Hazards**

Areas in which chlorine is produced, stored, or used should be well ventilated, with exhaust vents at floor level to prevent the heavy gas from accumulating there. Exhaust air containing chlorine gas should be processed so that it doesn't do any harm in the atmosphere.

Chlorine storage and manufacturing process areas should have unobstructed, well-marked emergency exits. Work areas should have emergency gas masks, emergency showers, face-flooding and eye-washing sprays.

Workers who for any reason have to enter an area containing a high concentration of chlorine, or where accidental spillage could occur, should wear protective clothing and gloves and use a full-face airline respirator.

## **What to Do if Exposed to Chlorine**

If you find that the air you are breathing is contaminated with chlorine, hold your breath until you get the nearest emergency mask on. If you have to breathe before you can get the mask on, take very shallow breaths.

If even a little chlorine gets in your eyes or if they are subjected to strong concentrations of the gas, flush them out immediately with lots of water at the face spray. See the plant doctor afterwards.

If liquid chlorine gets on the skin anywhere, wash the area with lots of running water. You can use a mild soap, but don't put on an ointment or any medicine until the

doctor tells you to.

To protect against low-level exposure, any worker who develops chloracne, continuous headaches, or feelings of general indisposition, anxiety, or suffocation should report to the plant nurse or doctor immediately.

## **Management Responsibilities**

The employer must take every reasonable step to prevent health hazards or accidental injury to his workers. No one with a history of respiratory illness should be put to work where he could be exposed to even low concentrations of chlorine gas. Those who receive such a job should be given a complete physical examination before starting to work and at least annually thereafter.

Management is responsible for inspecting and maintaining equipment and processes, for providing safety and emergency equipment, and for instituting a continuing program of safety training.

## **Employee Responsibilities**

Each employee must be aware of the hazards to health resulting from working with chlorine and how he can best reduce the hazards through safe work practices and safety precautions. In addition, the employee should:

1. Avoid skin and eye contact with chlorine.
2. Know where emergency equipment is kept in his area and how to use it.

3. Know his job, his equipment, and what he should do in the event of an emergency.
4. Be prepared to assist other workers near him in case of emergency.
5. Make sure ventilation systems are functioning during work periods.
6. Tell his supervisor about anything unusual concerning the use of chlorine gas or liquid in his area.
7. Report to the plant nurse or doctor any unusual or chronic symptoms that he feels could be related to exposure to chlorine.

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