

Date: 6/18/05  
SOP Number: 0001

Effective: 6/18/05  
Review Date: 6/18/06

Developed By: University Department of Safety and Health

## Standard Operating Procedure For Chlorine Gas

---

### **Purpose**

The purpose of this document is to provide standard operating procedures for laboratory personnel when working with chlorine gas.

### **Overview**

Chlorine is a toxic, corrosive gas that can cause severe burns if inhaled or upon skin contact. It is a greenish-yellow nonflammable liquefied compressed gas packaged in cylinders under its own pressure. Inhalation may cause coughing, choking, nausea, vomiting, headache, dizziness, difficulty breathing, and delayed pulmonary edema, which can be fatal. Chlorine can be detected by its odor below the permissible limit; however, because of olfactory fatigue odor may not always provide adequate warning of the harmful concentrations of this substance. Chlorine is an oxidizer and will support combustion. Products of combustion are toxic.

### **Standard Operating Procedures (SOP)**

#### *Hazard Communication Labeling*

Laboratory entrance door must have a label that states the following:

**DANGER!**  
**Chlorine Gas**  
**Inhalation Hazard**  
**Authorized Personnel Only**

#### *Material Safety Data Sheets (MSDS)/Training*

1. Review material safety data sheets (MSDS) prior to working with chlorine gas. MSDS must be posted on or near the chlorine gas cylinder(s) accompanied with this SOP.
2. Emergency spill and safe handling training must be performed prior to working with chlorine gas. Training will be documented. Contact the department chemical hygiene officer (CHO) to schedule training.

### *Handling*

1. All work with chlorine should be conducted in a working chemical fume hood to prevent exposure by inhalation (if feasible).
2. Proper personal protection equipment should be worn at all times to prevent eye and skin contact (i.e. safety glasses; splash shields; gloves; laboratory coat/apron).
3. No work with chlorine gas will be performed alone. A second person familiar with the dangers and emergency procedures for handling chlorine must be present at all times within the laboratory while operations with chlorine gas are being carried out.
4. Do not drag, roll, slide or drop cylinder. Use a suitable hand truck for cylinder movement. Never attempt to lift a cylinder by its cap.
5. Secure cylinders at all times while in use.
6. Only use chlorine gas approved regulators and valves. **Consult your gas supplier for approved regulators and valves.**
7. Once cylinder has been connected to process, open valve slowly and carefully. If experiencing difficulty operating cylinder valve, discontinue use and contact supplier. Forced freeing of "frozen" or corroded valve should **NOT** be attempted.
8. Regulators and valves should be kept free of moisture. Most metals are corroded by chlorine in presence of moisture. Purge system with dry inert gas (e.g. helium or nitrogen) before this product is introduced and when system is out of service.
9. Carbon steel, stainless steel, Monel or copper are suitable materials for regulators and valves for use when no moisture is present. Hastelloy, platinum or gold offer good resistance to corrosion when moisture is present. Kel-F or Teflon are the preferred gasket materials.
10. Pressure requirements should be considered when selecting materials and designing systems.

### *Storage*

1. Store cylinders in a well ventilated, secure area, protected from the weather.
2. Cylinders of chlorine should be stored in locations appropriate for compressed gas storage and separated from incompatible compounds such as hydrogen, acetylene, ammonia and flammable materials.
3. Cylinders must be stored upright with valve outlet seals and valve protection caps in place.
4. Do not allow storage temperature to exceed 125 degrees F.
5. Store cylinders away from heavily traveled areas and emergency exits.
6. Visually inspect cylinders on a routine basis, at least weekly, for any indication of leakage or other problems.

### *Emergency Procedures*

1. In case of accidental release of chlorine gas, such as a leaking cylinder, turn off all ignition sources (if time permits), evacuate the area immediately and close the door. Implement emergency spill response plan immediately. At Drexel University contact security x **2222** or at Hahnemann University contact the emergency operator x **80**.
2. In the event of skin contact, immediately wash with soap and water and remove contaminated clothing.
3. In the case of eye contact, promptly wash with copious amounts of water for 15 minutes. Call 9-911 for immediate medical attention.
4. If chlorine is inhaled, remove to fresh air and call 9-911 for immediate medical attention.
5. The back up safety person, after making sure that the affected laboratory worker is capable of washing the affected area, should dial 9-911 immediately. After arranging immediate transport of the affected individual to the hospital, alert security (Drexel x 2222 or Hahnemann x 80). Provide security with all information pertaining to the accident.
6. The MSDS sheet for chlorine gas should be brought to the hospital to aid in treatment.

### *Leak Detection*

1. The system should be carefully leak-tested prior to introduction of chlorine into the system, periodically thereafter, and after any maintenance or modifications to the system which could affect its integrity.
2. Chlorine leaks may be detected by passing a rag dampened with aqueous ammonia over the system. White fumes indicate escaping chlorine gas. Appropriate personal protection equipment must be worn when testing for leaks. If leak is detected implement the emergency procedures as state above.
3. Atmospheric monitoring equipment with audible alarms must be installed to alert laboratory personnel of a possible chlorine gas release. The fixed detector should be place near the system to provide accurate readings. The alarm should be loud enough so that it will alert laboratory personnel upon entering the room.