

# Chlorine (Cl<sub>2</sub>)-Calibration Gas

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## Chlorine Gas (Cl<sub>2</sub>)

Chlorine gas (Cl<sub>2</sub>) differs from the element Chlorine (Cl) which is commonly found in household products. Cl<sub>2</sub> an extremely reactive and toxic gas most famously known for its deadly use in WWI. It is not flammable but has potential to react explosively with other chemicals such as ammonia and petroleum products such as gasoline and diesel. In its natural form and at room temperature, Cl<sub>2</sub> is a greenish-yellow gas with a distinct odoriferous smell similar to bleach that will almost immediately irritate your senses. Chlorine gas is heavier than air, so it remains near the ground and other low lying areas and spreads rapidly. Due to its high reactivity profile, exposure to Cl<sub>2</sub> in its natural form is rare, but possible and more likely in the workplace as it is generally found in industrial settings. The most notable threat to human beings is to the respiratory system.



# Is Chlorine Gas Reactive or Non-Reactive?

Chlorine gas is extremely reactive and is one of the most reactive elements, so much so that you will not find it in nature.

## Indications of Immediate Exposure to Chlorine Gas

Smell is the number one indication that Chlorine Gas is present, as it has a very distinguishable and sharp odor. At very low levels  $\text{Cl}_2$  will give off an odor similar to bleach or a swimming pool and will mildly irritate your mucous membranes by causing burning sensation of your nose and eyes. Exposure to 1-3ppm can typically be endured for about an hour. Dangerous concentrations of Chlorine gas can cause much more potentially threatening symptoms such as blurred vision, chest tightness or difficulty breathing, fluid in the lungs, nausea and vomiting and acute burns to the upper airways. Exposure to Chlorine gas can also cause injuries resembling frostbite to include irritation to the skin, blisters, burning pain, and redness. Exposure to concentrations of over 400ppm is generally fatal within 30 minutes of exposure.

## Exposure Limits:

0.2 - 0.4ppm	Odor threshold (decrease in odor perception occurs over time)
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< 0.5ppm	No known acute or chronic effect
0.5ppm	ACGIH TLV-TWA (8-hour time-weighted average)
1ppm	OSHA PEL (ceiling) ACGIH TLV-STEL (15 minutes) AIHA ERPG-1: The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects or perceiving a clearly defined, objectionable odor.
1 - 3ppm	Mild mucous membrane irritation, tolerated up to 1 hour
3ppm	AIHA ERPG-2: The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms which could impair an individual's ability to take protective action.
5 - 15ppm	Moderate irritation of the respiratory tract. The gas is very irritating, and it is unlikely that any person would remain in such an exposure for more than a very brief time unless the person is trapped or unconscious
10ppm	NIOSH IDLH: The airborne concentration that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere. Values are based on a 30-minute exposure.

20ppm	AIHA ERPG-3: The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects.
30ppm	Immediate chest pain, vomiting, dyspnea (shortness of breath), and cough
40 - 60ppm	Toxic pneumonitis (inflammation of the lungs) and pulmonary edema (accumulation of fluid in the lungs)
430ppm	Lethal over 30 minutes
1000ppm	Fatal within minutes.

## Industrial Uses and Applications of Chlorine Gas

In its natural form, Chlorine gas at room temperature is extremely poisonous, but once pressurized and cooled it turns into the liquid Chlorine that we are all familiar with. The most common way for Chlorine exposure to occur is through accidental spills or release which typically occurs in industrial settings. Chlorine is most commonly used as a disinfectant in household products and swimming pools and is also included as part of the sanitation process in the wastewater management industry. Chlorine (Cl<sub>2</sub>) is very versatile and there are a multitude of other industrial uses and benefits of its use. It is used in the process of producing paper as a bleaching agent, the manufacture of plastic PVC and silicone, and supports drug synthesis in the pharmaceutical industry.

## **Detection of Chlorine Gas in Industrial Settings**

You are more likely at risk for exposure in the workplace if an accidental spill or leak occurs, Chlorine is far too reactive to exist on its own in nature. It is best safety practice to ensure that you have the necessary safety precautions in place to alert you if this does occur. Although Chlorine gas is easily detectable through the use of smell, a gas detector should still be used in order to alert you of chronic low level leaks that may lead to chronic health problems. High concentrations can become deadly in the matter of minutes. Some common Gas detector models include Draeger, Industrial Scientific, and Rae Systems.

## **Handling and Storage of Cylinders Containing Chlorine Calibration Gas**

As with any potentially dangerous gas, knowledge is power. Substantial training of handling and safety practices for chlorine gas cylinders will help reduce the risk of workplace injuries and disasters occurring. It is recommended that Chlorine be stored in a separate room or even building when possible. The downwind side of a building is most ideal location for storage and the room should be kept at at least 60°F, but not exposed to extreme heat. A room used for Chlorine cylinders storage should have a ventilation system that exchanges air at least once a minute. Using a portable fixed or multigas gas detector with a Chlorine (Cl<sub>2</sub>) sensor.

- Never lift a Calibration cylinder by its hood
- Never expose a cylinder to heat or direct sunlight
- Segregate Chlorine cylinders from other compressed gases
- Transport cylinder vertically with the use of a cart or something similar

- Secure Gas Cylinder upright using chains or cage
- Do not work alone! It is always safer to have a second person available to call for help if another becomes incapacitated.

## Chlorine Calibration Gas Cylinder Sizes

Egas Depot offers a wide range of [Chlorine Calibration Gases](#). With 8 different liter sizes and 7 different options for your ppm requirements available to you, we are a one-stop shop for all of your field calibration needs.