

## Hazard Categories of Gases

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All compressed gases are considered hazardous chemicals and must be included in your OSHA Hazard Communication Program (HCP). If you have any question regarding the HCP requirements refer to 29 CFR §1910.1200. The standards tenet is that employees have both a need and a right-to-know the hazards and the identities of the chemicals they are exposed to when working.

Part of the required training is to ensure the employees know and understand the properties and necessary safety precautions before using or being exposed to any chemicals. The Material Safety Data Sheet (MSDS) gives you one tool to help with this training so your employees can know and understand all the physical and health hazards of the gases. The HCP training must also include how to detect the presence or release of a gas in the work area, understand the required personal protective equipment (PPE) and a segment on the procedures to follow in the event of an emergency such as a spill or release of a gas.

### Hazard Categories of Gases

Gases are grouped into the following six main hazard categories.

- **Toxic/Poison\*** (Gases that have LC 50 values of 5000 ppm or less)
- **Flammable** (Gases for which flammable limits in air are reported)
- **Asphyxiant** (Generally covers all the inert gases)
- **Oxidizer** (Supports and vigorously accelerates combustion)
- **Corrosive** (Corrodes material or tissue in the presence of moisture)
- **Extreme Cold** (Liquefied gas under pressure and cryogenic gases)

Many gases exhibit more than one of the six hazard categories. Hazard categories are broken down into primary hazards (P), the most severe hazard, and secondary hazard (S), less severe hazards, but where precautions are still needed. Each gas has a primary hazard and at times one or more secondary hazards. To provide the best protection, the most severe hazard must be recognized and the appropriate control measures put in place. Secondary hazards must also be recognized so added precautions and safeguards can be taken. Hazard categories can be determined from the specific gas MSDS, CGA P-1 *Safe Handling of Compressed Gases in Containers*, and the CGA *Handbook of Compressed Gases*. There may be other sources as well, but these are three of the primary sources.

As part of your employee training in the safe handling of gases, it is paramount that employees know and understand the hazards associated with the gases in the work place. By properly identifying the hazard categories of the gases can help ensure adequate training. As you can see on the following chart, many gases have more than one hazard that must be recognized and controlled.

Gases	Toxic/Poison*	Flammable	Asphyxiant	Oxidizer	Corrosive	Extreme Cold
Ammonia		S			P	S
Liquid Oxygen				P		S
Chlorine	P			S	S	
Nitrogen			P			
Propane		P	S			S
Diborane	P	S				

This is just an example of a few gases listing their primary and secondary hazards. As you review the chart, you can see the importance of knowing and understanding all the hazards of the gases you handle. You may want to consider developing a similar chart listing all your gases and identifying the primary and secondary hazards for each gas. This can be very helpful in your employee training. In addition, by properly identifying the hazard categories of your gases has the potential of influencing the following elements of your safety and health program.

- Standard Operating Procedures and best practices

- Labeling requirements
- Storage and handling practices
- Hazard communication training
- PPE requirements
- Emergency eye wash and shower requirements
- Emergency equipment on site
- OSHA PSM & EPA RMP standards
- Emergency response
- Emergency and fire prevention plans

### Key Points

- It is extremely important that management and those that direct the workforce thoroughly understand the gas properties, hazards and safety precautions and safe guards that must be in place prior to any employee exposure to a gas.
- All employees that may be exposed to a gas must be thoroughly trained regarding the inherent physical and health hazards of the gas, have the necessary PPE and be trained for its use, and know how to respond to an emergency in case of a leak, spill or fire.

\*A toxic gas is any gas that has an LC 50 less than or equal to 5000 ppm. LC 50 is defined as a concentration of a substance in air, exposure to which for a specified length of time is expected to cause the death of 50 percent of the entire defined experimental animal population.