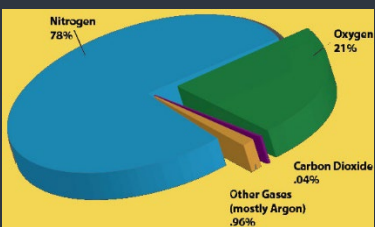


## Oxygen Levels & Effects

- 19.5 % - Minimum acceptable oxygen level
- 15 - 19% - Decreased ability to work strenuously; symptoms visible
- 12-14% - Respiration increases, Poor judgment
- 10-12% - Respiration increases, Lips cyanotic (blue)
- 8-10% - Mental failure, Fainting, Nausea, Unconsciousness, Vomiting
- 6-8% - 8 minutes – fatal
- 6-8% - 6 minutes – 50/50; brain damage is guaranteed
- 6-8% - 4-5 minutes – brain damage is likely
- 4-6% - Coma in +/- 40 seconds; Death is imminent

**Did You know that oxygen is not the most abundant gas in air? Air is made up of 78% Nitrogen, 21% Oxygen, and 1% Argon & other gasses.**



## Confined Space Entry

**Air Quality Hazard:  
Carbon Monoxide**

One of the requirements for permitted confined space entries (CSE) is continual monitoring of the atmosphere. Specifically, the amount of carbon monoxide (CO) present. CO is a by-product of burning fossil fuels, wood, paper, and charcoal.

Why is CO so dangerous though? It’s dangerous because it is colorless, odorless, and tasteless. It has almost the same density as nitrogen, meaning it does not rise or sink in air, but can be mixed throughout the space. And, hemoglobin, the portion of the red blood cell that binds to oxygen, has a stronger affinity for CO than oxygen. More than 250 times stronger. Add all of this together and you have a gas that is undetectable-to-humans that can be everywhere inside a confined space that already has relatively low airflow, and the gas displaces the oxygen in your blood causing the body’s vital organs to suffocate and die.

This means that loss of consciousness and death can happen very quickly when exposed to high concentrations of CO.

### What are the symptoms of CO poisoning?

Symptoms are often described as flu-like: dull headache, weakness, dizziness, nausea/vomiting, shortness of breath, confusion, blurred vision, and loss of consciousness.

### Preventing CO buildup in confined spaces.

Monitor the air quality, and ventilate the space! It is crucial that you have an air quality monitor that works, has been calibrated, bumped, and zeroed properly. This is the only way to detect CO. If the alarm on the monitor sounds, get everyone out of the confined space.

Additionally, you must maintain adequate ventilation and air changes per hour as directed by your company’s CSE policy. Air changes per hour can be calculated by dividing the cubic feet per hour of your ventilation fan by the cubic feet of the space.

### What to do if you suspect CO poisoning.

Get into fresh air immediately and call 911.

CO poisoning symptoms can appear very sudden, but most often are gradual in nature and continue to worsen. Basically, your body is getting some oxygen, but not the amount needed in order to survive. It’s similar to “breathing” at the top of Mt. Everest. Air is going into the lungs, but the oxygen needed is not being delivered properly.

The only cure for CO poisoning is to breathe pure, medical-grade oxygen. Remember, hemoglobin would much rather bind to CO than oxygen, so it takes high concentrations of oxygen to “flush” it from your system.