

## Summary of Hazards

### Atmospheric Hazards

#### ***Oxygen deficiency***

An oxygen deficient atmosphere contains less than 18% oxygen. The atmosphere can become oxygen deficient through:

- chemical or biological reactions that move oxygen out or consume oxygen
- combustion of flammable substances that burns oxygen
- bacterial actions (e.g. fermentation) that require oxygen
- slow chemical reactions (e.g. rust formation) that consume oxygen

When your body does not receive enough oxygen, you suffer a condition called hypoxia.

#### ***Oxygen displacement***

Oxygen is usually displaced through an inerting process, where inert gases are pumped in a confined space. Inert gases do not produce any side effects to the body. It is the lack of oxygen that makes this type of atmosphere hazardous. Side effects are similar to the ones experienced in an atmosphere that lacks enough oxygen.

#### ***Oxygen enrichment***

An oxygen enriched atmosphere contains more than 23% oxygen. The atmosphere can become enriched with oxygen when a confined space is ventilated with high concentrations of oxygen.

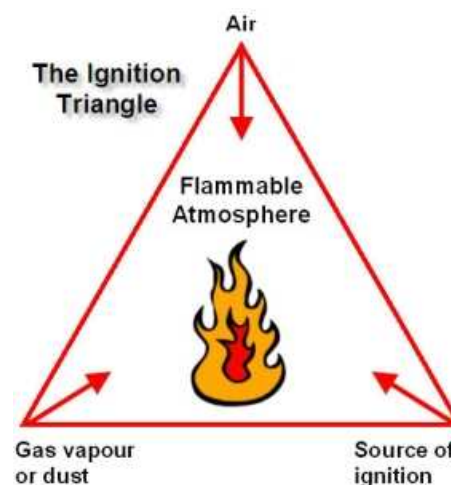
You won't have bad side effects from being exposed to high oxygen concentrations. However, an oxygen enriched atmosphere is a fire and explosion hazard – flammable materials, such as clothing and hair, will burn violently if they catch on fire.

#### ***Flammable atmosphere***

The atmosphere in a confined space may become flammable in different ways:

- vaporization of flammable liquids
- presence of chemical reaction by-products
- enriched with oxygen
- concentration of combustible dusts

However, for an atmosphere to be flammable, it must meet the three conditions illustrated in the ignition triangle on the right. Ignition will only take place if the gas concentration is between its LEL and UEL.



## ***Toxic gases***

Unlike inerting gases, toxic gases will harm you if you are in contact with them at concentrations that are above the permissible exposure limit (PEL). Toxic gases that are known to cause worker deaths in confined spaces include:

- carbon monoxide
- hydrogen cyanide
- hydrogen sulfide
- arsine
- chlorine
- nitrogen oxide
- ammonia

## ***Solvents***

Solvents/compounds are often used in the communication industry. If you are exposed to solvents/compounds, you may lose consciousness as this class of chemicals depresses the central nervous system.

Some common solvents/compounds include:

- chloroform
- methylene chloride
- trichloroethylene

## **Physical Hazards**

### ***Engulfment and drowning***

Engulfment in loose materials is one of the leading causes of death from physical hazards in confined spaces. Engulfing materials include:

- liquids
- grain
- sand
- other granular material

Workers can't escape if they get caught in moving loose solids and they will usually suffocate.

### ***Other physical hazards***

Other physical hazards include:

- electrocution
- mechanical equipment
- falling objects
- extreme temperatures
- slippery surfaces
- noise
- ledges