Instrumatics

FACTS ABOUT THE DANGERS OF OXYGEN DEPLETION AND GASES AND HOW TO AVOID THEM

OXYGEN

Normal air contains about 20.9% Oxygen. Without adequate ventilation this level falls alarmingly quickly.
In most cases simple measurement of Oxygen level is insufficient to warn of danger. Where a toxic gas is present, exposure levels of between 0.1 and 50 ppm can be fatal, (in normal air Oxygen is at 209,000 ppm). Even if for example we dilute air by 5% (50,000 ppm), an oxygen sensor would detect 19.9% Oxygen, which is still above the first low alarm point of most instruments, which is generally at 19%, the second being 17%. Most people behave abnormally at levels of 17%; death can quickly follow if the level drops a few percent more. There are more deaths from Oxygen depletion than any other gas hazard. Why, because the possibility of low Oxygen levels is often ignored where other flammable or toxic gases are considered to present a greater danger. It is also important to detect excess Oxygen levels as the flammability of anything that will burn dramatically increases. At levels of over 24% your clothing can simply burst into flames.

TOXIC GASES

The two most commonly encountered toxic gases are Hydrogen Sulphide and Carbon Monoxide.

Hydrogen Sulphide

Hydrogen Sulphide smells like rotten eggs at concentration as low as 0.1 ppm. At slightly higher concentrations it has a sweet sticky smell, a little higher you will smell nothing since Hydrogen Sulphide deadens your sense of smell by paralysis of the olfactory nerve. Consequently you cannot rely on your sense of smell to warn off impending danger. The maximum safe exposure limit for Hydrogen Sulphide is only 10 ppm. Your sense of smell will fail long before that level is reached.
Alcohol consumption up to 24 hours prior to exposure will dramatically increase susceptibility to Hydrogen Sulphide.

Carbon Monoxide

This is the most abundant toxic gas and is odourless and colourless. The maximum safe exposure level to Carbon Monoxide is only 50 ppm. Carbon Monoxide is a chemical asphyxiate, that means it combines easily with the hemoglobin in blood, reducing its Oxygen carrying capacity dramatically.

FLAMMABLE GASES

The most common flammable gas is Methane, which is a major constituent of CNG, used for cooking and heating. Methane can also occur naturally from decaying rubbish for example. The relevant physical perimeters are; lower and upper explosive limit (LEL and UEL). At consternation below LEL, explosion cannot occur due to insufficient gas. At concentrations above UEL explosion cannot occur due to lack of Oxygen.
Between these two limits real and present danger of explosion exists.
The LEL of Methane is only 5% by volume in air. The UEL being only 15% by volume in air.
Here are a few examples of other gases: -

GAS/VAPOR	LEL	UEL
Hydrogen	*4%*	*80%*
Methane	*5%*	*15%*
Ethane	*3%*	*15.5%*
Propane	*2%*	*9.5%*
Butane	*1.5%*	*8.5%*
Methanol	*5.5%*	*44%*
Hydrogen Sulphide	*4.3%*	*46%*
Acetone	*2.1%*	*13%*

As you can see almost any concentration of Hydrogen is dangerous.
The LEL and UEL above are based on normal Oxygen levels. They will vary if the Oxygen level changes.
It is also important to remember that with flammable gases a toxic risk will normally exist as well.

THE MIXING EFFECT

Gases move at high speed in a random manner. If heavier than air a gas will be more concentrated at ground level but will always be present at all levels. The reverse is also true, as gases lighter than air will be present at ground level. So crawling to safety is not an option for example. Nor is taking a gasp of Air and holding your breath while you walk to safety.

THINK ITS SAFE?

In most cases you will not even be aware of your exposure to toxic gases or Oxygen depletion. You will feel a little drowsy, not quite 100%, and then simply go to sleep. Before you are aware of any problem you will be asleep, incapacitated or simply too weak to escape the hazard. You will most likely die; it really is a simple as that. A sad but unfortunately true situation. A chilling thought. The dangers are real and often misunderstood or simply ignored, often leading to fatal results

THE ANSWER

The Crowcon range of personal and portable gas detection equipment can prevent all this. Available in combined Oxygen, toxic and flammable gas variants, Crowcon has the answer to all your gas detection requirements. In New Zealand Crowcon is represented by Instrumatics. We would be happy to provide more information, consultancy, equipment and training to you and your colleagues.