

# Crowcon Technical Note

**Document Reference:** GEN021 (Issue 2)  
**Date:** 8<sup>th</sup> December 2017  
**Document applies to:** Oxygen Depletion in Helium Applications.

## Electrochemical sensors

Crowcon currently use electrochemical sensors for the detection of oxygen deficiency, as a volume ratio. These electrochemical (fuel cell) sensors, the commonest type, are used in both portable and fixed monitors.

The response of the sensor is dependent on the rate of diffusion of oxygen to the sensor. This in turn is a function of the relative molecular weight of oxygen to that of the other gas. For example, helium has a very low molecular weight compared to pure nitrogen (the usual diluent gas). Helium increases the sensor response to oxygen compared to the oxygen response in nitrogen, and this enhancement is greater the more the helium dilutes the air. This could result in the monitor overestimating the oxygen concentration, which is a dangerous situation, if the instrument was not calibrated correctly.

For example at an actual oxygen concentration of 19% where the helium concentration is 9.5% and the nitrogen concentration is 71.5%, the sensor reads 20% oxygen; at 15% oxygen (helium concentration 28.6%) it reads 18%.

## Setting alarms

The main consideration is to ensure that the oxygen deficiency alarm is activated at the correct and appropriate concentration.

Calibrate in air as usual but *for helium* raise the alarm level from 19% (the typical alarm level) to 20%. If helium dilutes the air such that the concentration of oxygen is reduced to 19%, the sensor will read 20% and so will activate the alarm at the right level.

For Nitrogen and Argon depletion risk applications standard alarm settings are still appropriate.

In all cases it is important to ensure the instruments are regularly calibrated and maintained.