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Pentane vs. Methane Calibration

When detecting a known combustible gas Industrial Scientific recommends that for best accuracy the portable monitoring instrument be calibrated to the gas which you are detecting whenever possible. For example, if you are detecting natural gas or methane the instrument should be calibrated to methane.

However, if the portable instrument is used to detect combustible gases in general, without specifically knowing what gas is going to be present, Industrial Scientific recommends that the monitor be calibrated with a known concentration of pentane.

Combustible gases produce signals from the standard LEL type sensor at levels inversely proportional to the molecular weight of the gas. Light gases produce a higher signal than heavier gases. Methane being very light yields a very high signal on the typical sensor. Heavier hydrocarbons such as pentane and hexane produce a significantly lower signal than a gas such as methane. For this reason, it is advantageous to calibrate instruments to pentane, because as lighter gases such as methane, hydrogen, propane and ethane are detected, the response will be higher than normal and all reading and alarm errors will side in the direction of safety. When calibrating with a lighter gas, the instrument's ability to accurately detect the heavier compounds is somewhat diminished.

Example 1: Instrument calibrated to 50% LEL methane encounters a concentration of 15% LEL pentane. This gas level exceeds the OSHA limits for confined space entry procedures. However, in this example because the instrument is calibrated to methane, the display reading when detecting the 15% LEL pentane gas would only be 7% LEL. The instrument would erroneously indicate that the conditions are safe for entry.

Example: An instrument calibrated to 50% LEL pentane encounters a concentration of 8% LEL methane. In this case because the instrument is calibrated to the lighter gas, the instrument would read 16% LEL and produce and alarm when encountering the 8% LEL gas. Although the reading is not accurate, it has forced the user to error on the side of caution in a situation which is close to exceeding the recommended limits.

Like the examples above instruments calibrated to methane and exposed to 15% LEL concentrations of toluene, xylene or butyl alcohol would yield readings of 7%, 6% and 7% respectively. The same instruments calibrated to pentane and exposed to the same gases would yield concentrations of 14%, 11% and 15% respectively.

It can be easily deduced from these examples that the more appropriate calibration gas for use in general hydrocarbon detecting instruments when the target gas is unknown is pentane.

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