

Expanding Your Toolbox: Pairing Your PID with FTIR

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Photo Ionization Detectors, or PIDs, are widely used among hazardous materials teams, fire departments, and environmental response teams because of the broad range of chemicals which can be detected and quantified using a PID.

Introduction

PIDs use an ultraviolet light source to ionize gas samples with low ionization energy and detect the number of positive and negative ions which are mathematically proportional to the concentration of molecules in the air. There are several different lamp strengths available with the most common ones being 9.8eV (Argon), 0.6eV (Krypton), and 11.7eV (Xenon).

A 10.6eV lamp seems to be the most widely used due to cost (both unit cost and maintenance) and number of chemicals ionized. Using a calibration standard, an operator can very accurately measure the concentration of the target gas or vapor. If encountering a gas different from the calibration standard, the operator can apply an instrument specific correlation factor to mathematically correct the reading. Factors can vary from 0.1 to ~400 (Chloropicrin using a 10.6eV lamp) which means that the actual concentration in air can vary greatly from the reading provided by the PID depending on the contaminate. The challenge is that, to apply the correct factor, the operator must know the identity of the gas being measured.

Challenge

Hazardous Materials Technicians will commonly use predetermined action levels for multiple hazards when responding to unknown atmospheric conditions. Hazards monitored include flammability, oxygen level, toxicity, corrosivity, radioactivity, and reactivity. Monitoring toxicity presents a unique challenge as there is no universal toxicity meter; the hazard depends on both the identity and the concentration of the toxic substance. A PID can be used to monitor a toxic gas, but it



Source: U.S. Marine Corps. Naha Military Port, Japan.

doesn't identify it or even accurately predict the concentration without knowing the identity. It can be used to tell that something is present, but the identification is required to understand the toxic risk.

Solution

The RedWave XplorIR now provides real-time gas and vapor identification, allowing an operator to better assess an unknown atmosphere. With the name of the contaminant, the toxicity can be easily determined, and the IDLH can be used to set a threshold value. Furthermore, the identification allows the operator to choose the correct PID correction factor, allowing the PID to give accurate concentration measurements.

The XplorIR now fills a huge gap in emergency response air monitoring technology that will forever change the way that risk assessment is performed on hazardous materials incidents. Now that gas identification can be accomplished early in an incident, operators can use the built-in correction factor libraries on many PIDs that allow for accurate concentration measurement of contaminants. Gas identification also allows setting action levels based on exposure guidelines of specific contaminants to further increase safety.



The RedWave XplorIR provides real-time gas and vapor identification.

The XplorIR will also make it easier to locate the source of the gas or vapor. Once the identity is known, a likely source of that gas can then be sought out. This is opposite of the current method of finding the highest concentration of gas, then trying to determine the identity from container labeling or other physical clues. Directly identifying the gas with the XplorIR reduces the amount of time it takes to mitigate an incident which decreases the potential of public exposure.

Conclusion

It is my opinion that the introduction of the RedWave XplorIR to the emergency response market is the greatest advancement since the introduction of the PID in the 1970s. Used together, with the XplorIR providing the identification and the PID providing the concentration, a complete picture of many gas incidents can be determined.



XPLORIR

In collaboration with:



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