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# Choosing the right gas detection for your worksite

Since each worksite is unique and can present different safety challenges, it's important to identify and assess risks at each of your company's locations, then select the best gas detection technology to mitigate those risks. Here's a step-by-step guide.

## Considering the gases

Companies use portable gas detectors to alert workers of the presence of combustible gases. Combustible gases fall into one of three categories:

- Hydrocarbon gases
- Hydrogen gas
- Other combustible gases (e.g., ammonia)

Most combustible gases that can be problematic at worksites are hydrocarbon compounds such as methane, butane, benzene and propane. These organic chemical compounds only contain the elements carbon and hydrogen. When one of these compounds mixes with the right amount of oxygen at a certain temperature, the heat breaks apart the hydrocarbon bonds. The result is $CO_2$ and water, with energy being released through heat.

A similar reaction occurs with hydrogen. However, because there are no carbon atoms involved, the reaction only produces water and heat.

Other combustible gases that pose worksite threats are typically more dangerous because of their toxicity, rather than their flammability, although both issues can occur with these gases. Using hydrogen sulfide as an example, toxicity is reached at 100 ppm, while the gas doesn't become combustible until it reaches 40,000 ppm.

Next, we'll dive into finding the right solution for your risk factors.

## Modern combustible gas detector technology

The threat of explosion from flammable gases and vapors can cause severe injuries or death. If the potential for a flammable gas leak is present on your worksite, you need to understand your options for a combustible gas detection system. Today, there are three different types of sensors in use:

*Catalytic bead (pellistor) sensors.* Dr. Oliver Johnson developed the catalytic combustion sensor in the 1920s at Standard Oil Company (now Chevron). This type of sensor uses beads, also called pellet-resistors or pellistors, and has historically been the most common technology used for combustible gas detection.

*Nondispersive infrared (NDIR) sensors.* About 50 years later, Kozo Ishida filed a patent for the infrared gas detection system. Although advancements have taken place with this type of system over the past few decades, the foundational principle remains the same. Ishida developed a way to shine infrared light at a specific wavelength through a gas sample. If hydrocarbon gases are present, the returning wavelength will be weaker because the gases absorb infrared light.

*Molecular property spectrometer (MPS) sensors.* The year 2020 saw the first revolutionary advancement in multi-gas detection technology in decades: the MPS sensor. Although the pellistor and NDIR sensors are still widely in use, this brand-new technology takes gas detection in the workplace to an entirely different level. The next generation of combustible gas sensors using MPS technology is changing the gas detection industry due to:

- Accurate detection of multiple flammable gases, reducing costly false alarms.
- Being immune to poisoning (including sensor poisoning from exposure and silicones).
- No need for recalibration.
- Automatic compensation for environmental conditions.

MPS sensors can accomplish all of this with many of the most common combustible gases, including hydrogen, methane, ethane, propane, butane, pentane, hexane, toluene, xylene, ethylene, propylene and isopropanol.

This multi-combustible gas sensor can classify gases by molecular weight and density, with six possible classifications: hydrogen; hydrogen-containing mixtures; natural gas; and light, medium or heavy gases/mixtures. When this data is used in combination with GPS location-enabled connected devices, your company can have high visibility into the types, locations and frequency of flammable gases being encountered by employees at a worksite.

## Comparing types of combustible gas detectors

When a company includes each of the following types of detectors in their program, although it brings redundancy, it also ensures reliability. These types of detectors are:

- Personal gas detectors. Personal gas monitors are portable devices that workers wear to detect the presence of gases in their breathing zones. This is the last line of defense against gas exposure and, when a combustible gas reaches a predefined level, workers will be warned to evacuate.
- Fixed gas detection monitors. Fixed detection monitors play a key role in locations where an ongoing risk of combustible gas presence exists, serving as a first line of defense. Permanent sensors are strategically located to provide early warnings, operating continually as they are hardwired into the facility's electrical system. Fixed detection monitors communicate with other facility systems to automate crucial procedures involved in worker evacuations and equipment shutdowns. There are, however, some facilities using "temporary" area monitors as more permanent solutions due to their multi-gas capabilities and other options that provide added flexibility.
- Area gas monitors. Not all worksites are suitable for fixed detection monitors — perhaps because of the requirements for confined space entry, as an example. In those situations, area monitors are typically recommended. They provide the early warning benefits of fixed devices in a way that's independent of overall site infrastructure, but they can also be easily moved and redeployed to another location that requires them. Area monitors are also used in temporary situations or during an emergency response.

## New capabilities in gas detection

Connectivity should not be an option, add-on or afterthought when it comes to gas detection and worker safety. Focusing on how to best leverage cloud-connected gas detection technology to provide real-time situational awareness that can save lives and provide valuable data-driven insights will allow businesses to focus on what matters most.

Connectivity also means all situational data from each device is automatically streamed to a cloud, powering live compliance and analytics dashboards. In an instant, businesses are able to see the operational and compliance status of their fleet. Users gain insight into where and how gas detection equipment is being used and what hazards are being encountered, allowing them to access critical information that helps empower decision making and drive their business.

When you are ready, reach out to gas detection experts who are able to help you select the best gas detection for your unique environment and worksite.

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