

Gas Safety in Smaller Pharmaceutical Facilities

The use of gases is both fundamental and commonplace within the pharmaceutical and biopharmaceutical industries, used in a variety of settings, from the production process to essential sterilisation or decontamination procedures. But each gas required in these processes is accompanied by risks and can pose significant hazards to the health of employees, and sometimes to the safety of the whole facility. Gas safety is therefore a critical consideration in the sector, with constant and reliable gas monitoring and detection needed to protect personnel and plant from the buildup of higher concentrations of gases or environments where oxygen displacement can occur, either through accidental releases or leakage. This makes the implementation of a reliable gas detection system in the pharmaceutical industry crucial.

The approach and type of system used will normally depend on the complexity of the setting, and this is likely to be different in smaller pharmaceutical facilities or science laboratory settings than it would be in a large production facility.

The wide variety of gases and the different ways they are used, combined with the potentially high-risk nature of the

hazards involved, can make gas safety seem a challenging area, further complicated by regularly evolving legislation and advice.

As a result, it can be difficult to know the best approach to take to ensure that the highest standards of safety are maintained. This is particularly true in smaller settings, not least because in such environments, health and safety knowledge (and resources) may be less comprehensive. This contrasts with, for example, a multinational pharmaceutical company, which may well have a large global health and safety team with specialists in gas detection.

For this reason, finding the right gas detection system for the task and working in partnership with an experienced and reputable provider to find the best solution can be particularly valuable within smaller or less complex facilities.

Example: Bio-Decontamination of Isolators or Enclosures

Hydrogen peroxide is a powerful disinfectant and sterilant for decontaminating equipment, facilities and medical devices, and is frequently a preferred substance for these processes due to its bioactive effect in killing bacteria.

While effective decontamination is essential in the pharmaceutical industry,

safeguards must be taken to protect the health of personnel from the toxic effects of hydrogen peroxide.

Gas detection has two applications in this example. In the first instance, to monitor levels inside an isolator or other enclosure to ensure that the required concentration is reached and maintained for the required length of time, and once the decontamination is complete, the sensor will ensure the absence of hydrogen peroxide before the isolator is opened. The detector is attached to a small control panel that identifies the presence of hydrogen peroxide and indicates when it is unsafe to enter an area.

Secondly, gas detection is required for ongoing monitoring to alert personnel to leaks and enable action to be taken and accidents to be prevented.

If there is a leak, the gas detection system can be set up to automatically shut off the gas supply, preventing the situation from escalating. The system will also automatically shut off the vaporiser and turn on ventilation systems to help disperse the gas.

At the same time, both audible and visual alarms will be triggered, such as a siren and flashing beacon, so that personnel can act quickly secure the area and safeguard colleagues.

This example also provides a useful reminder about the way in which well-designed gas detection systems can improve productivity within facilities. Due to its toxicity, when hydrogen peroxide is in use, some sites mandate that a set time period must elapse before re-entry to the space is permitted. This can be based upon calculations around room volume, air changes per hour (HVAC system effectiveness), whether it was fogging, vaporised hydrogen peroxide (VHP), or manual wipe, plus considerations for temperature and humidity.

In the case of VHP bio-decontamination in pharma cleanrooms, the cycle can take 2–6 hours in total, with aeration dominating the time. However, with gas detection installed, it is possible to confidently reduce this time with proven metrics around gas concentrations





delivered by gas detection, meaning your facility's uptime and productivity can be improved whilst still maintaining the highest safety standards.

Avoiding Misconceptions and 'Work-Arounds'

Understandably, many organisations approach the topic of gas safety, at least initially, relying, in part, on their existing knowledge of the topic. However, there are many common misconceptions.

A good generic example is hydrogen sulphide. Because of its well-known 'rotten eggs' smell, many think that a leak or build-up would be obvious, but this is not the case. Above a certain concentration, hydrogen sulphide damages the nasal receptors, making safe detection impossible without proper monitoring technology.

Specific training on gas safety – particularly the gases relevant to your setting or facility – is often an invaluable way of helping to correct these types of misconceptions.

Another key issue to be aware of is that different types of monitoring and detection devices are needed for different settings and applications. For example, a common mistake (or 'work-around') is for portable personal gas detection devices to be used instead of a fixed-point detector. Most importantly, they cannot warn an operative when an area is safe to enter (outside of that space) without having to enter the hazardous area in the first place. Furthermore, their alarms are designed to be heard or seen when worn on the person, so they are not sufficiently loud to warn someone

on the other side of a room, or other large space. And portable monitors are battery-powered, which introduces an opportunity for human error if they are not sufficiently charged, rendering them unsuitable for constant monitoring requirements.

Using fixed gas detection removes the opportunity for human error or risk-taking in situations where, for example, a portable device may have run out of charge, but due to operational or production pressures, the temptation might be to enter an area of risk anyway, on the assumption that it's only for a short time.

A gas detection device should be easy to use and provide the right functionality for the task.

Top Tips

1. Keep it simple – particularly for smaller settings. A well-chosen gas detection system supported by expert advice from a trusted and knowledgeable provider is often more than enough for lower-complexity environments.
2. To this end, work with the company supplying the gas detection system to minimise touchpoints so that the diagnostic information and configuration of the transmitter can be read directly from a controller. This allows for a single touchpoint, which is easy to access and can be linked to an alarm which sounds if there is a leak to activate swift evacuation of the building.
3. Ask the company with which you are considering working what experience they have in your industry and make

sure that they can handle the full range of gas safety issues in your business. Additionally, ensure the company has strong engineering, installation and service and maintenance capabilities to support you through the process and look after your system longer-term.

4. Consider the total cost of ownership of gas detection and monitoring devices – quality can vary, and it's important to ask, for example, how long consumable parts such as sensors or batteries should last. There can be significant differences in the lifespan of such parts, and the frequency with which they may need to be replaced can make the difference between good and poor value in the long term. While there is the added requirement that in the pharmaceutical industry, sensors may need a minimum life span to comply with the Good Manufacturing Practice (GMP), the minimum standards which must be met in production processes.
5. Be alert to 'workarounds' in your organisation. Sometimes, particularly in smaller settings, people can be complacent about gas safety and take matters into their own hands.

Gas detection of airborne hazardous substances is an issue that is attracting growing focus, not least with the increased use of new and more environmentally sustainable practices and materials. Obtaining good advice from trusted partners is an effective way for health and safety professionals to efficiently address gas safety concerns, from the small and simple to the sophisticated and bespoke, ensuring peace of mind for all concerned.



Megan Hine

Megan Hine, Safety Gas Detection Systems Lead, Draeger Safety UK is an experienced gas safety practitioner leading Draeger's work on gas safety systems across the UK and Ireland, focusing on fixed gas detection. With over a decade in the safety sector, she has supported major industrial operators and new market entrants, advising on gas detection, prototype trials, and engineering projects. Megan is a passionate industrial safety advocate, frequent speaker, InstMC committee member, and advisor to the University of Aberdeen on gas safety.