Impact of Using an ALTAIR® 5X Gas Detector Configured with Both Phosphine & Hydrogen Sulfide Sensors

Technical Bulletin

WE KNOW WHAT'S AT STAKE.

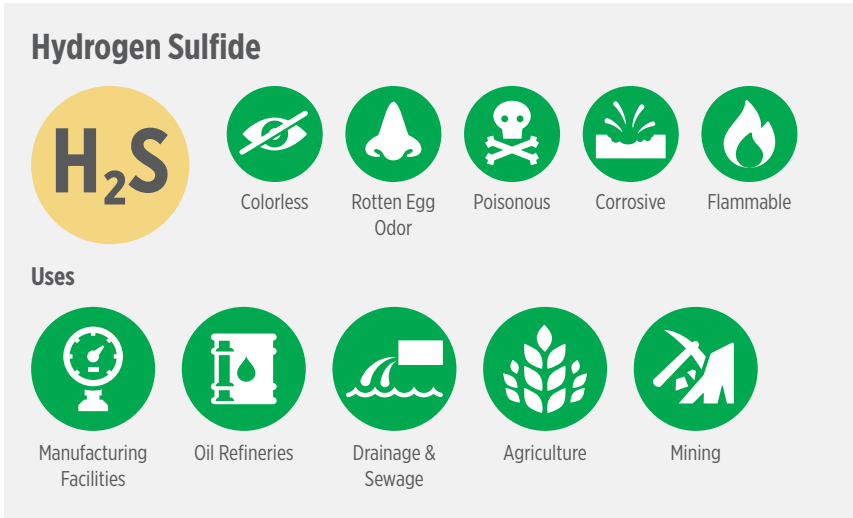
What is Phosphine?

Phosphine, PH_3 is a colorless and very toxic gas that is immediately dangerous to life and health at 50 ppm. PH_3 gas is typically used in the semiconductor industry to introduce phosphorus into silicon crystals. It is also used as a fumigant, a polymerization initiator, and as an intermediate for the preparation of several flame retardants.

What is Hydrogen Sulfide?

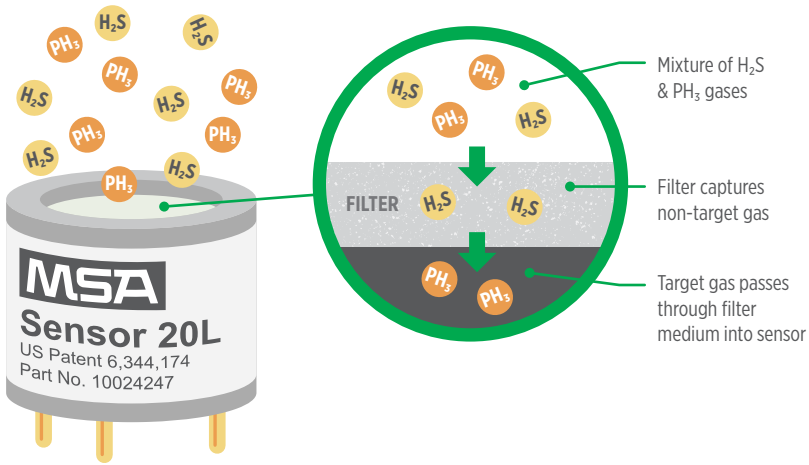
Hydrogen sulfide, H_2S is a colorless gas with the characteristic foul odor of rotten eggs. It is poisonous, corrosive, and flammable.

H_2S gas is a fairly common gas found in many different industrial applications such as manufacturing facilities (typically, where sulfuric acid is present or used in process), oil refineries, food processing (as an insecticide), drainage and sewage areas, agriculture, and any mining operation.



What is Cross Sensitivity?

Many electrochemical sensors can experience cross sensitivity, which is a reaction to gases or vapors other than the target gas. Most sensors have internal filters to reduce the exposure to and limit the impact of non-target gases. The filters are selective and absorb certain competing gases by chemically bonding it and preventing the passage through the sensor. Phosphine (PH_3) sensors have a known cross sensitivity to hydrogen sulfide H_2S.



Impact of H_2S on a PH_3 Sensor

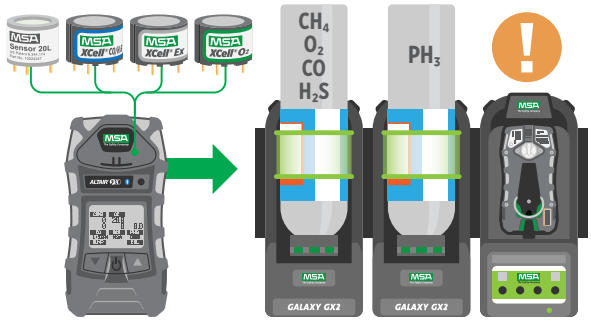
When H_2S and PH_3 sensors are configured into the same ALTAIR 5X Gas Detector, the bump and calibration processes cause the PH_3 sensors to be exposed to H_2S. The internal filter in the PH_3 sensor will capture H_2S, but over time will outgas the H_2S. Continued exposure to H_2S through calibration and bump testing over time will cause the sensitivity of the PH_3 sensor to gradually decrease and shorten its life; in some cases the life of the PH_3 sensor can be reduced to a few months. Because the decrease from bump and calibration exposure is gradual, calibrating and daily bump testing in accordance with the operating manual* will identify the drift from the H_2S cross sensitivity effect. As long as the ALTAIR 5X Gas Detector continues to pass the bump test and/or calibration, the PH_3 sensor is still within the acceptable limits and performance is not negatively impacted. If bump testing and calibration are not performed in accordance with the operating manual, over time the H_2S exposure can result in erroneously low readings for PH_3. As a reminder, the operating manual contains the following warnings related to bump testing:

WARNING

- It is recommended that a Bump Test is performed before each day's use, and adjust if necessary.
- Perform a Bump Test more frequently if exposed to silicone, silicates, lead-containing compounds, hydrogen sulfide, or high contaminant levels.

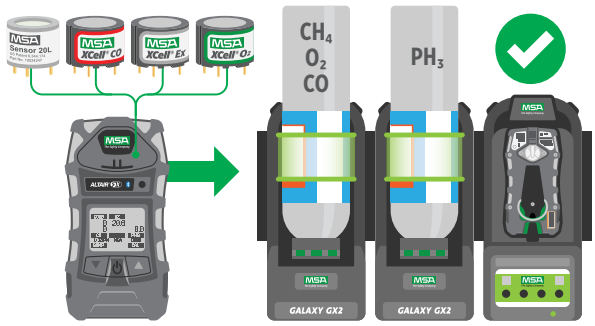
Incorrect use can cause death or serious personal injury.

If your detector is configured with a PH_3 sensor, and no H_2S sensor, you can prolong the life of your PH_3 sensor by not unnecessarily introducing H_2S during the calibration and bump test. For example, if your detector is configured with PH_3, CO, O_2, LEL, do not use a mixture of "quad gas", which contains CO, H_2S, O_2, and combustible gas. Rather use a mixture of CO, O_2, and combustible gas along with a separate cylinder for PH_3. MSA has an extensive list of gas mixtures and can assist with your selection.



Typical Configuration: ALTAIR 5X with PH_3, CO/H_2S, Combustible, O_2

Proper GALAXY GX2 Test System configuration, however H_2S exposure will expedite the decline in PH_3 sensor life.



Configuration where H_2S is not needed: ALTAIR 5X with PH_3, CO, Combustible, O_2

Best practice is to use a multi-gas cylinder that does not contain H_2S if it is not necessary.

** Operating Manual*
ALTAIR® 5X Multigas Detector
ALTAIR® 5X IR Multigas Detector
Or
Operating Manual
ALTAIR® 5X PID Multigas Detector

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