Use of PIDs

Use of Photo Ionisation Detectors (PID's)

PID's are used to detect and measure the level of Volatile Organic Compounds (VOC's) in air. They are used to monitor the presence of VOC's but they cannot tell you which gas is present, only the parts per million or parts per billion in relation to the calibration gas.

Choice of lamp

There are three different lamp voltages available for PID's, the standard voltage is 10.6eV. A low voltage 9.8eV and a high voltage 11.7eV lamp are also available. Whilst the 10.6eV and 9.8eV lamps have a long life (of 3 years or more) the 11.7eV lamp has a very short life (a one month warranty is given on these lamps). The choice of lamp will depend on the Ionisation Potential of the VOC - anything under 10.7 is detectable by a 10.6eV - for anything over 10.6 and under 11.7 an 11.7eV lamp should be used. 11.7eV lamps are very temperamental and we do not recommend using them unless you have to - if you are looking for Acetylene for example with an ionisation potential of 11.4 this will not be detected by the 10.6eV so you would have to use the 11.7eV lamp.

Correction Factors

If you know that only one VOC is present at a location the volume of this VOC can be calculated using a correction factor. For example, you know that only Acetone is present, your PID tells you that there are 250ppm in the air, the correction factor for Acetone with a 10.6eV lamp is 0.7. Multiply 250ppm by 0.7 would give you 175ppm of Acetone present. It is worth noting that the correction factors for the 11.7eV and 10.6eV lamps are different (in some cases by large factors) - for Acetone the correction factor for an 11.7eV lamp is 1.4 so if your PID is reading 250ppm there is actually 350ppm present. If you are running an 11.7eV and 10.6eV lamp side by side they may give very different readings because of this.

PIDs and Weather conditions

Most PID problems arise because of weather conditions. PID meters do not like the cold and definitely do not like moisture. If you are running a PID in either of these conditions it is important to follow the operating procedures below. Particularly in very moist conditions ensure you use the correct filtering system to keep moisture from the places that it can cause problems. Never store a PID in a car or a cold place over night as this will greatly affect performance.

Below are a set of standard operating procedures that will help to get the best out of your PID:

- Whenever using a PID we would recommend turning the instrument on for 10 minutes prior to use. This does three things; warms up the instrument meaning you are more likely to get accurate results (as gas is easier to monitor in a warm environment) and alleviates any problems known with potential condensation forming within the instrument; means the lamp gets up to full power to allow for maximum possible measurement of VOCs and, thirdly, gets the pump in operation clearing out any residual VOCs from the last monitoring session.

- Replace filters routinely. These should be changed when visibly wet or dirty.

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- Clean lamp on a monthly basis. The recommended method of cleaning lamps differs from manufacturer to manufacturer and whilst each will recommend their own technique which should be followed the important thing is that it is performed on a regular basis. This will remove any VOCs that have been allowed past the hydrophobic filter and that "sit" on the lamp face. Never touch this surface with your fingers.

- Whatever the time of year do not store your instrument in a car or cold place over night, we recommend leaving the instrument on charge when not in use. This will not affect the life of the battery meaning you have a best possible condition instrument.

- If you are attaching extension tubing to the PID only use Teflon tubing as Tygon, Rubber and most other tubes absorb VOCs over time. The exception to this is Isobutylene so you can use Tygon for calibration/ bump testing.

- Frequently "Bump" (gas) test your instrument. This is done by attaching 100ppm Gas can of Isobutylene to the end of the instrument and checking the response (allowing time for warm up). The instrument should read somewhere between 90-10PPM (10%). If beyond these realms you should calibrate your instrument.

For borehole monitoring:

- Try and do a methane gas measurement (CH4) before using your PID as Methane can not be read by a PID but can absorb the UV light emanated by the lamp and can therefore cloud VOC measurement. You should be aware of this as it can be a large clouding factor if in the presence of large quantities of Methane.

- We recommend using some extension tubing as if there has been a large movement in groundwater (not uncommon in the UK!) then it is possible you'll have a flooded borehole and could therefore suck up water into the instrument which will require a return to Van Walt for repair.

For headspace monitoring:

- After collecting your sample always try and leave it in a warm atmosphere for at least half an hour before measurement as this will keep any condensation within the container to a minimum and again means you will get the most accurate gas concentration measurements. Moisture is not a friend to a PID.

- Make sure you keep the probe in the head space and don't allow it to sink into the soil. It is a "gas" monitor so doesn't like sucking up soil too much!