

Not all passive samplers are equal

Groundwater passive sampling is growing in acceptance as it claims to be able to deliver cost savings of up to 70% together with more consistent, accurate results acquired safely, quickly and cost effectively.

As a result three different sampling principles have developed:

- **Diffusion:** these samplers work on the principle of reaching an osmotic equilibrium with the surrounding water so the chemical constituents in the groundwater diffuse into the sampler over a period of time, the chemical content of the sample is equal to that of the groundwater in that part of the well.
- **Grab:** for an equilibrated instantaneous snap shot in time of the groundwater conditions in a well. They are deployed in a well and left until the groundwater conditions have re-equilibrated and at that time the sample is captured and sent off to a laboratory for analysis.
- **Adsorption:** samplers for air, soil gas and water require no post sampling freezing/cooling as once a sample vial is closed the compounds are trapped.

However, when it comes to passive samplers there is no 'one size fits all solution'. Each of the three methods and the equipment associated with each has advantages and disadvantages so a careful evaluation should be made. Because not all passive samplers are equal we recommend you consider the following before selecting the principal you will be adopting:

- **Costs/budget:** some samplers are more cost effective than others and you need to consider laboratory costs and the availability of laboratories for sample analysis.
- **Sample volumes:** some sampling techniques work well for small volumes whereas others are much more appropriate for large scale, long term monitoring situations.
- **Number/type of analytes/compounds:** are you sampling for organics/inorganics, volatiles, sensitive analytes such as Redox, pH and Turbidity?
- **Repeatability:** will you be sampling over a longer period of time and will you need to repeat the sampling process regularly?
- **Operator dependency:** will the proficiency of the operator impact on your results?
- **Ease of use:** is the device simple to use, does it require a specialist consultant to collect samples?
- **Sample transfer/no exposure to the atmosphere:** if you are sampling for volatiles any exposure to the atmosphere could impact on the results.
- **Available headspace**
- **Disturbance to well water:** a sampling technique that causes turbidity will make repeating the sample virtually impossible and affect the quality of the water sample.
- **Same depth every time:** for consistency and repeatability it is important to sample in the same section of a well as the chemical content of the water sample will vary at different depths in a well.

We have evaluated the main products available for passive/no purge sampling and come up with the following assessment of their individual strengths and weaknesses:

