Making Field Extractions a Reality

With advances in SPE devices, it is possible to extract pesticides from water in the field and transport only the disks or cartridges to the laboratory for elution and analysis. This eliminates the risk of glass breakage during collection, transport, and shipping, in addition to greatly reducing freight costs, the SPE media also preserves micro pollutants that are prone to hydrolysis. The portability of SPE devices raises the possibility of extracting water samples at remote field sites where the collection site may be located far away from the nearest analytical laboratory.

Numerous studies have shown that SPE devices can be used to extract pesticides from water and to preserve sample integrity until laboratory analysis. Researchers from a interlaboratory, multistate regional project (S-271) demonstrated that pesticides in surface and deionized water could be extracted on C 18 disks in one laboratory and shipped to another laboratory for elution and analysis with minimal loss of recovery for most pesticides when compared with in-house analysis.

The interlaboratory study also revealed technical problems as listed below:

- The difficulty of realigning the disks onto another laboratory's extraction manifold so that the same area that was exposed for extraction was also exposed for elution.
- There was also a problem with restricted flow rates and clogging of the filter with surface water particulates during extraction of some disks, requiring pre-filtration.
- The disks were delicate and not designed for shipping, and required excessive handling and makeshift wrapping.

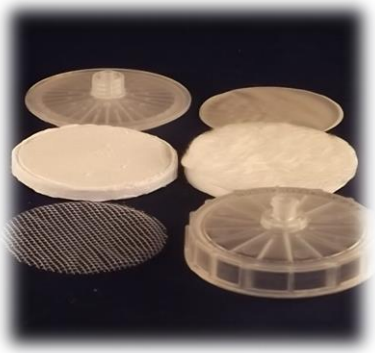
Other problems with field SPE extractions using existing technology:

- The disks required field apparatus for extraction which included extraction manifolds and pumps which require a power supply, cumbersome glass ware and toxic solvents.
- The grab bottles the sample was held in could not be solvent rinsed into the elution volume, as the elution was performed in the laboratory. The SPE disks or cartridges were thus biased low due to retained non-polars left on the bottle walls.
- The samples obtained were simple field extracted grab samples, still a snap shot in time and not a time integrative,
- The disk extract volume only represented a few liters at best and couldn't sequester 50-100 liters necessary for ultra low level quantitation.

The Solution

A recent manufacturing innovation called (Continuous Low-Level Aquatic Monitoring) or **C.L.A.M**. has developed a solution package which addresses all the field extraction problems and makes true field extraction a reality. The C.L.A.M uses field hardened disks to actively draw a known volume of water through the SPE media first during the extraction event. All the SPE media types are supported in custom housings which incorporate inlet flow dispersion, triple lofted glass pre-filters, supporting filters, and inert screens to field harden and reduce clogging.

All the Media disks are designed with Luer Lok ends which can connect one or many disks together allowing total and dissolved studies or mixed media studies, Luer plugs are used to seal the disks before and after deployment, providing secure unbreakable transport container



The C.L.A.M disks are designed to have the water drawn through the disk first, preventing contamination of tubing and loss of analytes on pump, tubing or vessel walls. The CLAM disk is the shipping bottle and the SPE extraction disk and will be solvent eluted and rinsed in the laboratory preventing biased low results due to surface retention of the taqrget analytes,

The extraction event is powered by a small subersible pump. It draws the water through the disks while floating or submerged at flow rates of 50-70 ml/min. The lofted pre-filtration and the gentle flow rates allow for the extraction of up to 100 liters in most fresh or marine waters, and can operate for 36 hours, using a rechargable lithum ion battery

C.L.A.M.s weigh just over two pounds the internal battery, and can be easily taken to remote areas and left unattended to sample continuously for up to 36 hours at submerged depths up to 100 feet in marine or fresh waters

Different media Disks can be locked together such as a pre-filter disk or different media types to obtain total/dissolved studies, differing polarity extractions, or to study any potential breakthrough.

The disks can also be used with peristalic pumps, at powered land or boat stations.The disks can be weighted, submerged in the water with a a tubing line, and a known volume is drawn up through the submerged disk via the tubing. This arrangement will allow longer extraction events at lower flow rates, and much greater extraction depths.

Advantage over existing field disks

- SPE media is encased in a microglass fiber matrix wafer, and locked inplace within the encasement, removing the realignment stigma and channeling due to rough handeling.

- Lofted prefiltration of the media allows large sample volumes to be extracted

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- The disk holder encapsulating the media wafer is a sturdy shipping container which can be sealed with Luer-Lok plugs.

- The C.L.A.M system is a submersible self contained extraction manifold performing method 3535 with out the use of glass ware and other combersome laboratory equiptment,solvents and power sources.

- The Water passes through the disk first, preventing cross contamination and analyte losses on surface walls.

- Provides a time integrative quantitative extraction event of up to 36 hours.

- The Extraction event can represent up to 100 liters allowing adequate volume for ulta low detection or adequate volume for multiple analysis and methods.

- Holding time issues are resolved as the SPE media provides inhibits biodegradation and hydrolis and the units can be frozen as a sediment for long term storage for many months.

- Reduces shipping cost as the water is simply left behind .