



## OVERCOME MEMORY EFFECT IN DIOXIN EXTRACTION ON ENVIRONMENTAL MATRICES

### | CUSTOMER



SYNLAB

is one of the largest service laboratories in Europe and the largest laboratory service provider for clinics, hospitals and the environmental industry. SYNLAB has representation in more than 40 countries on four different continents around the world. They have 19,000 employees and perform around 500,000,000 analyses per year.

### | CHALLENGE

The environmental department of SYNLAB Linköping is focused on the determination of organic pollutants in different matrices, such as Dioxins and Furans, PAH's and PCB's. The main issue with their technique is related to memory effect/ carryover in the extraction cells. It requires long and tedious cleaning procedures of the extraction vessels.

### | SOLUTION

The Milestone's ETHOS X microwave system with the FastEX-24 rotor is specifically designed to overcome the memory effect and the cleaning steps by using disposable glass vials. Its ease of use and high throughput reduce overall costs and time.

### | BACKGROUND

In 2017, SYNLAB acquired ALcontrol Group, a major European provider of environmental testing services. This allowed SYNLAB to expand to the Netherlands, Sweden, Denmark and into markets that were highly complementary to the Group's main focus. ALcontrol had expertise in the field of environmental analysis, including testing for the clean-up and monitoring of soil, ground and drinking water, food and consumer health, oil, fuel and asbestos. SYNLAB now has laboratories in four different locations in Sweden.

### | CHALLENGE

The environmental department of SYNLAB Linköping carries out a large selection of organic pollutant analyses. They work to determine dioxins in soils, sludges, bottom sediments, ashes and building materials and in some food matrices, above all in fish samples.

They follow the European standard method EN 1948 and several Swedish standard methods, such as SIS-CEN/TS 16190:2013.

They analyze about 100 samples per week, depending on the project in implementation and the large amount of the total requires an extraction process.

With 40-year history as a contract laboratory, their lab is well equipped for organic pollutant testing with the latest technologically advanced instrumentation, such as GC-MS, GC-MS-MS and magnetic sector mass spectrometer.

They equipped their laboratory with a Milestone's ETHOS X microwave extraction system with the fastEX-24 rotor to extraction from soils and solid matrices.

## LAB PROFILE EXTRACTION | ENVIRO



In particular, they are focused on the determination of the following classes of organic pollutants:

- Dioxins
- PAH's
- PCB's

### THE ETHOS X IMPLEMENTATION

SYNLAB's Laboratory performs extractions using different techniques, such as sonication, soxhlet and automated soxhlet systems. In particular, they have two (2) Accelerated Solvent Extraction systems to extract dioxins from environmental matrices.

The main issue with this technique is related to memory effect/ carryover in the extraction cells. The stability of the dioxins requires long and tedious cleaning procedures of the extraction vessels. Moreover, they have experience solvent leakage and high maintenance costs.

As a result, with conventional extraction systems, it is not possible to achieve the high throughput requested by daily assignments.

*"At SYNLAB, we were impressed with the efficiency of the new Milestone ETHOS X with the fastEX-24 rotor over other technologies already available in our lab."*

They decided to move their current extraction methods to microwave technology. The main reason for the change is gaining efficiency, because they can run 24 samples simultaneously. Secondly, the ETHOS X's ease of use as the fastEX24 rotor is specifically designed to overcome the memory effect and the cleaning steps by using disposable glass vials as reaction vessels, which are placed into a pressure reactor. This approach leads to ensure great analytical blanks and completely avoid carryover between runs. This results in increasing throughput and lowering labor costs. The glass vials are inexpensive and consumable cost are negligible. They can now process up to 24 samples in 40 minutes with the fastEX-24 rotor, reducing the cost per analysis.

In 2018 they approximately extracted 1500 dioxin soil samples with the ETHOS X system.

*"The results demonstrate the efficiency of the ETHOS X as sample preparation method for the determination of contaminants. ETHOS X provides extracts with significant lower time compared to all the other extraction techniques, avoiding any memory effect."*



The results obtained with microwave technology show recovery of all the molecules in the range of 80-120% with great reproducibility. Even after a dioxins extraction the blanks are always below 0,065 ug/Kg, thanks to the use of disposable glass vials, which allow to completely overcome memory effect and carryover.

*"ETHOS X microwave system was easy to implement since the Milestone Application Team and Kovalent's Team (Milestone Partner in Sweden) helped us". No learning curve or expertise is needed to use the system: operators simply follow a quick-to-adopt process to prepare the run.*

*"Thanks to ETHOS X, extraction is no more a bottleneck. We really like the fact that the system is designed around the disposable glass tubes, because it also avoids contamination, which is a very challenging issue in dioxins determination."*

### FUTURE PLANS

They have chosen Milestone microwave technology over conventional extraction techniques for its advantages in terms of effectiveness, reproducibility and reduced solvent consumption. They are planning to further expand the ETHOS X capabilities by replacing some of the processes done with soxhlet or other techniques.

### ABOUT MILESTONE

With over 50 patents and more than 20,000 instruments installed in laboratories around the world, Milestone has been widely recognized as the global leader in metals prep technology for the past 30 years. Committed to providing safe, reliable and flexible platforms to enhance your lab's productivity, customers worldwide look to Milestone for their metals digestion, organic extractions, mercury analysis and clean chemistry processing needs.



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