MILESTONE
HELPING CHEMISTS

SUPERIOR LAB EFFICIENCY IN DETERMINATION OF **ORGANIC POLLUTANTS**

ETHOS X

Advanced Microwave Extraction System for Environmental Applications

SIMPLE
HANDLING

HIGH
THROUGHPUT

SUPERIOR RETURN
ON INVESTMENT

CONSISTENCY &
REPRODUCIBILITY

SAFETY AND
RELIABILITY

ETHOS X

DESIGNED BY YOU
DEVELOPED FOR YOU

Determination of organic pollutants in environmental matrices is a common task for thousands of laboratories worldwide, as it leads to controlling and protecting our environment from high levels of contaminants. This analysis is often done to evaluate the effectiveness of a remediation process, to assess the contamination in waste, in waste landfills and for general environmental monitoring. Therefore, every day environmental laboratories deal with several challenges to ensure high quality data and fast turnaround time while maintaining their competitiveness. Extraction of pollutants from solid matrices is often performed with techniques that limit the productivity and have high running costs. Milestone listened to the needs of environmental laboratory professionals by developing the ETHOS X with the fastEX-24 rotor, which allows for simultaneous extraction of 24 samples in 40 minutes with minimal solvent usage. By using large volume disposable glass vials, the fastEX-24 rotor simplifies handling and allows to achieve lower detection limits.

MICROWAVE-ASSISTED EXTRACTION

Solvent extraction is the least evolved and one of the most error-prone steps in pollutant analysis. Many laboratories still use the Soxhlet method that was developed in 1879! Microwave-assisted extraction combined with closed vessels, heats the extraction solvent above its atmospheric boiling point. The elevated temperature of the solvent increases the solubility of the analytes of interest, leading to a dramatic reduction of extraction time. Microwave extraction is faster and produces more accurate and precise results than other methods. Typical applications of microwave-assisted solvent extraction include chlorinated pesticides, semi-volatile organics, PAHs, PCBs, chlorinated herbicides, phenols, organophosphorus pesticides, dioxins and furans.

HIGHER PRODUCTIVITY AT LOWER COST FOR GREATER ROI

When determining organic pollutants, most environmental labs aim to improve productivity and lower detection limits with easy-to-implement solution. The sample preparation technique plays a pivotal role in overcoming this challenge.

EASE OF USE WITH DISPOSABLE GLASS VIALS

The ETHOS X operation is simple: samples are loaded into large volume disposable glass vials (1) with appropriate solvent mixture (2), placed into the Weflon vessel (3) and sealed (4). The unique Weflon material ensures homogeneous heating in all vessels, therefore increasing extraction efficiency even when different matrices are processed simultaneously, which enhances the lab's workflow. The accurate contactless temperature sensor ensures full control of the extraction cycle in all positions and displays real-time the temperature of all samples on the dedicated user interface. The 100-mL glass disposable vials accommodate large sample amounts of up to 30 g, enabling lower detection limits with minimal solvent volume. In addition, the memory effects often observed with polymer vessels or with other technologies are eliminated. This is a valuable feature for trace analysis of challenging species such as dioxins.

GREATER RETURN ON INVESTMENT

The competitive nature of the environmental analysis market requires today's laboratories to have innovative solutions that provide faster turnaround times. With throughput capabilities of 24 samples in only 40 minutes, the ETHOS X with fastEX-24 reduces overall analysis costs by increasing productivity. The combination of lower solvent volumes, less maintenance needs, and the use of inexpensive disposable glass vials decreases the cost per sample to enhance your lab's competitiveness and profitability.

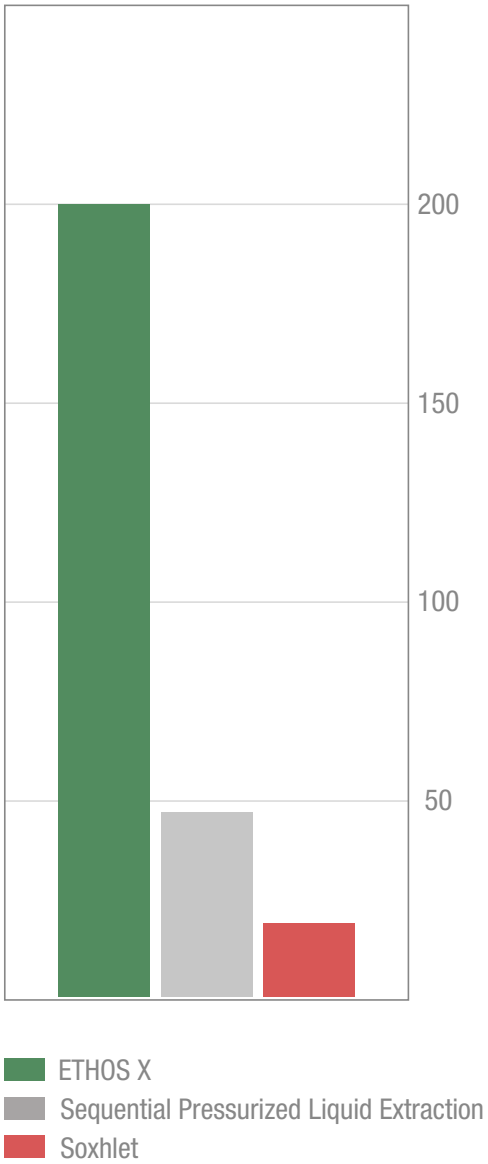
	Soxhlet	Sonication	Pressurized Liquid Extraction	ETHOS X
Sample Size (g)	10-30	30	10-20	2-30
Solvent Volume per sample (mL)	300-500	300-400	15-30	15-30
Extraction time (min)	Days	Hours	270 min - 24 samples	40 min - 24 samples
Productivity (8 hours)	Low	Low	Moderate	Very high
Initial investment	Low	Low	High	Moderate
Cost per sample*	Moderate	Moderate	High	Low

**solvent - handling - time - productivity - maintenance*

PRODUCTIVITY

Although new extraction technologies have been developed in recent years, they have fallen short on addressing the needs of environmental labs. The ETHOS X with fastEX-24 overcomes productivity limitations of other conventional approaches by enabling the extraction of a large number of samples in a single workday. Other technologies process one sample at a time sequentially, requiring long extraction cycles. The ETHOS X simultaneously processes 24 samples in only 40 minutes and eliminates cleaning steps by using disposable glass vials. The graphic below compares the typical daily productivity using the Milestone ETHOS X, Sequential Pressurized Liquid Extraction and Soxhlet.

Samples in 8 hours



ACHIEVING LOWER DETECTION LIMITS
WITH HIGHER SAMPLE AMOUNT

30 gram soil sample
in disposable glass vials (actual size)

RELIABLE SOLUTION
FOR UP-TO-DATE ANALYSIS OF ORGANIC POLLUTANTS

COMPLIANCE

Several official methods describe the use of microwave closed-vessel technology to enhance the extraction efficiency of organic pollutants, such as US EPA 3546, ASTM and other national methods. The top-right table reports the typical conditions used in US EPA 3546.
The ETHOS X with fastEX-24 further enhances the performance of microwave technology for the extraction of water-insoluble or slightly water-soluble organic compounds from soils, clays, sediments, sludges, and solid wastes. In fact, the ETHOS X with fastEX-24 can be used for solvent extraction of chlorinated pesticides, semi-volatile organics, PAHs, PCBs, chlorinated herbicides, phenols, organophosphorus pesticides, dioxins and furans.

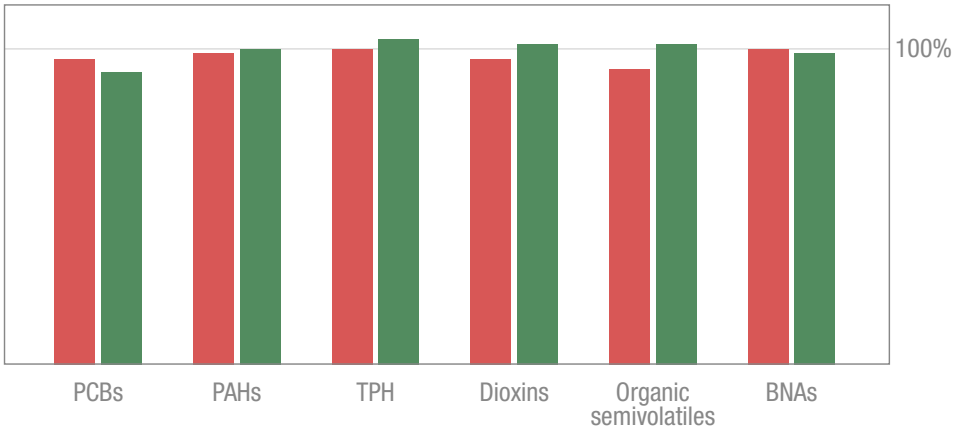
US EPA 3546 method outline

Sample amount	2-20 gram
Solvents type	Hexane and Acetone (1:1)
Solvents volume	25 mL
Temperature	100-115°C
Time at temperature	10-20 minutes

Compound	*Typical samples*
PCBs	Soils, clays, sediments, sludges, and solid wastes
PAHs	
Semivolatile organics	
Phenols	
Chlorinated pesticides	
Organophosphorus pesticides	
Chlorinated herbicides	
Dioxins	

CONSISTENCY

Data quality and reliability are key features for environmental labs. The ETHOS X with the fastEX-24 rotor provides fast, accurate and precise analysis. Weflon vessels allow to simultaneously process various matrices ensuring optimal extraction efficiency. In addition, the unique design of the fastEX-24 rotor with its large volume disposable glass vials (100 mL) eliminates cross contamination and memory effect, providing reproducible results.



Milestone ETHOS X recovery study and comparison vs Soxhlet for various organic compounds.

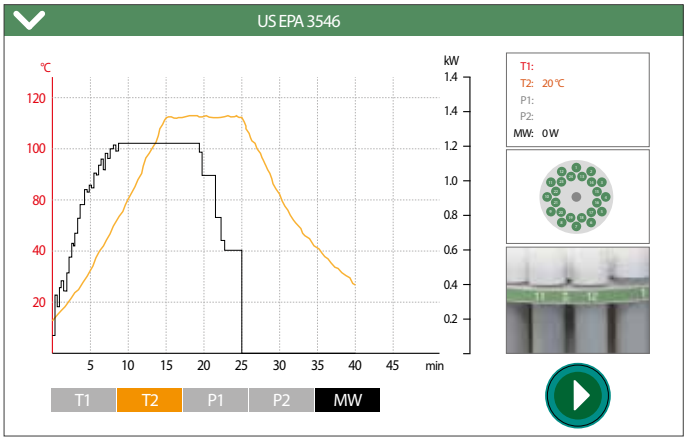
The ETHOS X offers a seamless integration of microwave hardware, user interface, contactless temperature control and rotor technology. This combination results in a powerful sample preparation tool for the determination of pollutants in environmental samples, overcoming the limitations of conventional extraction techniques.

SAFETY AND CONTROL

The ETHOS X cavity delivers high microwave power of up to 1900 watts, resulting in faster heating and shorter extraction times. Robustness and reliability are essential characteristics in an environmental lab to avoid any lapses in the daily operation. The ETHOS X has a rugged stainless-steel construction to ensure a longer lifetime and to eliminate lab's downtime. The system is equipped with a contactless sensor that controls the temperature during the whole extraction process in all vessels, providing higher safety and reproducibility. The use of a non-invasive sensor, in combination with the Weflon vessels, simplify user operation while delivering accurate temperature control.

USER INTERFACE

The user interface runs an icon-driven, multi-language software with pre-loaded extraction methods. Using the touchscreen, the operator simply selects a method and presses "START" to begin a new extraction process. The extraction parameters are displayed real time on the terminal and can be stored or transferred via LIMS.



FLEXIBILITY

Elemental analysis by atomic spectroscopy is a standard analysis in environmental laboratories. The ETHOS X enables digestion of environmental matrices such as soils, sediments, wastewater in full compliance with official methods like US EPA. Several options are available to match the laboratory requirements.

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Established in 1988, Milestone is headquartered in Italy and has offices in Germany, Switzerland, the Unites States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers premium application and service support. Milestone's mission is to help chemists by offering them the most advanced instrumentation for sample preparation and direct mercury analysis in the world. Our industry-leading technology, in combination with fast, responsive service and applications support, allows Milestone to support our goal of providing you the highest return on investment possible.

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