MILESTONE
HELPING CHEMISTS

# SUPERIOR LAB EFFICIENCY IN THE 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-24eT 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-24eT 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 also greener approach, it combines efficient heating with lower consumption of solvents to produce more accurate and precise results. Typical applications of microwave-assisted solvent extraction include chlorinated pesticides, semi-volatile organics, PAHs, PCBs, chlorinated herbicides, phenols, organophosphorus pesticides, dioxins and furans.

MILESTONE
GREEN TECHNOLOGIES

# 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 vessel (3) and sealed (4). The unique vessel design, in combination with the accurate temperature control, enables extraction of different matrices 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 other technologies are eliminated, expediting even 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-24eT 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.

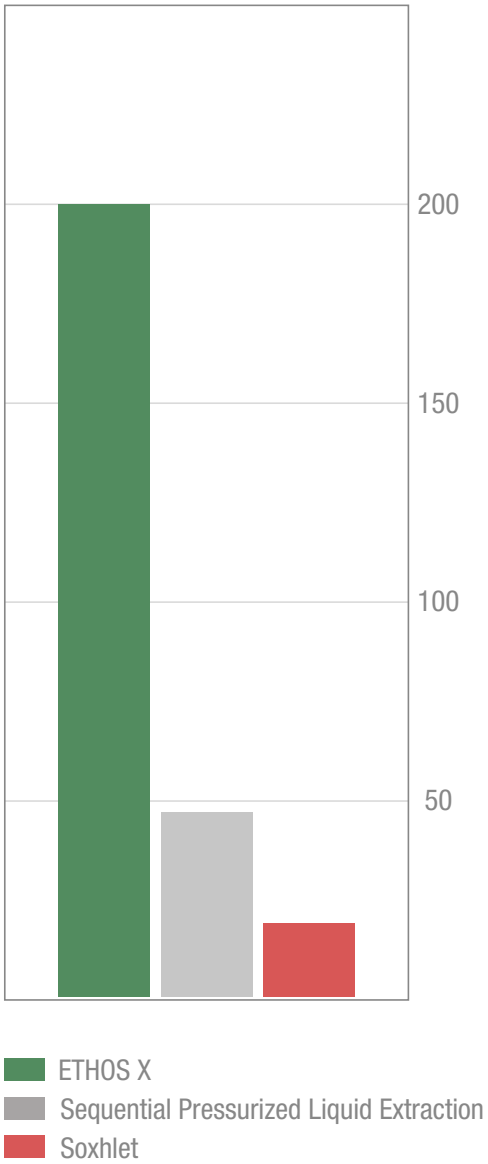
| | Soxhlet | Sonication | Pressurized Liquid Extraction | ETHOS X |
|---|---|---|---|---|
| Sample Size (g) | 10-30 | 30 | 10-20 | 2-30 |
| Solvent Volume per sample (mL) | 300-500 | 300-400 | 15-30 | 15-30 |
| Extraction time (min) | Days | Hours | 270 min - 24 samples | 40 min - 24 samples |
| Productivity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

**Including: 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-24eT 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 *Table 1* reports the typical extraction conditions.

The ETHOS X with fastEX-24eT 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-24eT can be used for solvent extraction of chlorinated pesticides, semi-volatile organics, PAHs, PCBs, chlorinated herbicides, phenols, organophosphorus pesticides, dioxins and furans.

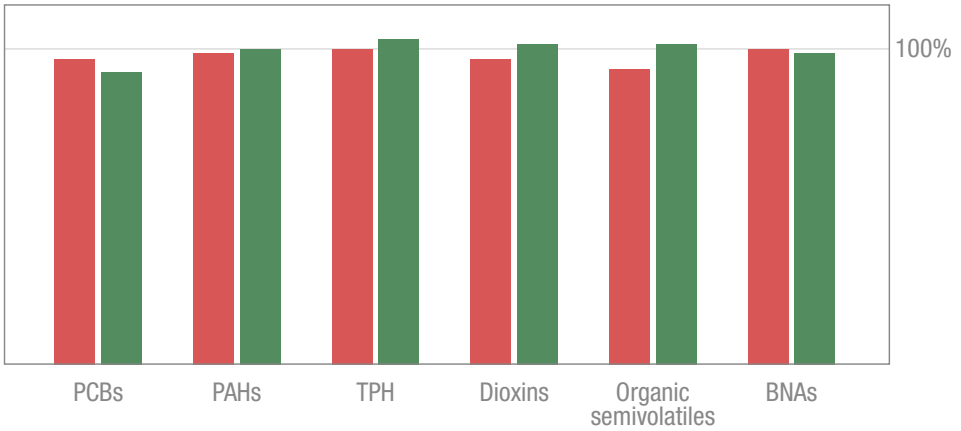
*Table 1: Typical extraction conditions*

| | |
|---|---|
| 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-24eT rotor provides fast, accurate and precise analysis. The vessels, in combination with the temperature sensor, allow to simultaneously process various matrices ensuring optimal extraction efficiency. In addition, the unique design of the fastEX-24eT 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.*

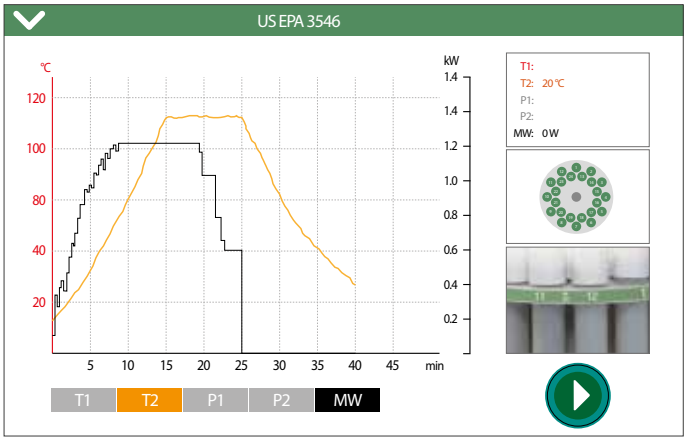
The ETHOS X offers a seamless integration of microwave hardware, user interface, contactless temperature control and rotor technology. This combination results in a powerful sample preparation tool for the determination of pollutants in environmental samples, overcoming the limitations of conventional 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, the easyTEMP, that directly controls the temperature during the whole extraction process in all vessels, providing higher safety and reproducibility. The use of a non-invasive sensor simplify user operation while delivering accurate temperature control.

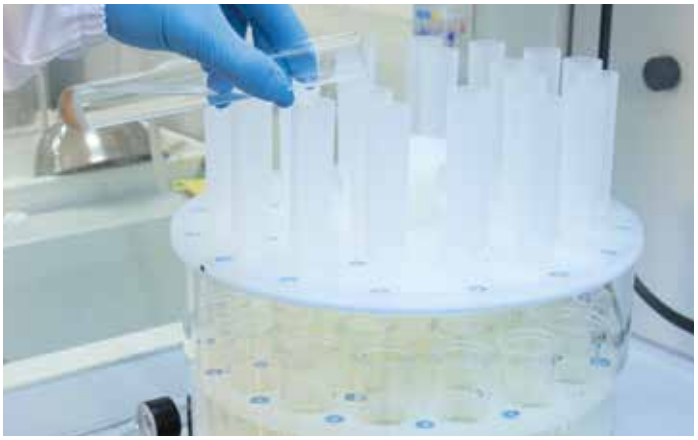

## USER INTERFACE

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.




## FAST AND SIMULTANEOUS FILTRATION

The Milestone Simultaneous Filtration System (SFS) is a compact and complete workstation to filter up to 24 samples simultaneously in a few minutes. Samples are filtered into standard evaporation tubes, using the Milestone disposable funnels, providing easier handling and reducing fume hood space.



# MILESTONE
## HELPING CHEMISTS

Established in 1988, Milestone is headquartered in Italy with its R&D and manufacturing centre in Germany and Switzerland and offices in the United States, China, Japan and Korea. We operate worldwide through a network of over 100 exclusive distributors, all providing our customers with 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 giving you the highest return on investment possible.

## ADDITIONAL MILESTONE SOLUTIONS FOR ENVIRONMENTAL ANALYSIS

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The Game Changer in Microwave Digestion

**ETHOS UP**

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Direct Mercury Analyzer

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