



**MILESTONE**  
H E L P I N G  
C H E M I S T S

# MILESTONE ETHOS X

Advanced Microwave Extraction System  
for Environmental Applications



# DESIGNED BY YOU. DEVELOPED FOR YOU.

Environmental laboratory professionals spoke, we listened. Your input guided our development of the ETHOS X and fastEX-24 rotor to specifically address the challenges of today's environmental laboratories. The Milestone ETHOS X microwave lab station in combination with our fastEX-24 rotor offers your lab the simultaneous extraction of 24 samples in 40 minutes with minimal solvent usage. Our unique Weflon™ material provides homogeneous heating and facilitates accurate contactless temperature monitoring of all vessels. Each vessel holds 100 mL disposable glass vials allowing you to extract up to 30 gram samples while eliminating memory effects and cleaning. The benefit: higher sample throughput and easier handling, resulting in reduced cost and faster turnaround time for your laboratory.

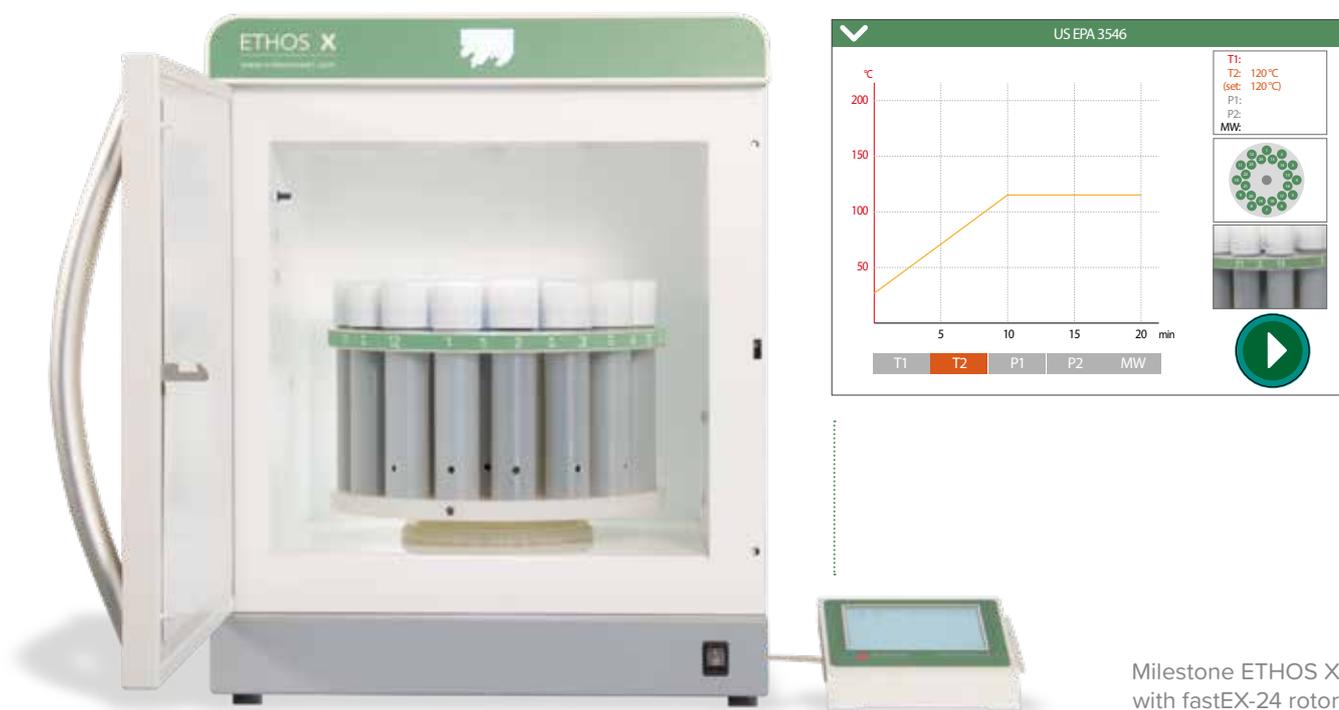
- High productivity, 24 samples in 40 minutes
- Low running cost, substantial reduction in solvent
- Ease of use, large volume disposable glass vials
- Larger sample amount, up to 30 grams
- Consistent and reproducible results
- Full compliance with US EPA Method 3546

## WHAT OUR USERS SAY

*“The handling of the fastEX-24 rotor is easy, saving time and labor, as well as glassware and reagents.”*

*“The unique design of the fastEX-24 rotor accommodates increased sample size allowing us the ability to achieve lower detection limits.”*

# MICROWAVE-ASSISTED EXTRACTION



Solvent extraction is the least evolved and most error-prone step in chromatographic analytical procedures. Many laboratories still use the Soxhlet method, that was developed in 1879! Microwave-assisted extraction uses closed vessels to heat the extraction solvent above its atmospheric boiling point. The elevated temperature of the solvent increases the solubility of the analyte of interest, leading to dramatically reduced extraction times. 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.

The ETHOS X microwave cavity has a volume in excess of 70 liters, and with 1900 Watts it's the most powerful microwave platform system available for solvent extraction. The ETHOS X is equipped with the most advanced contactless temperature sensor and controlled via a compact terminal with an easy-to-read, full-color, touchscreen display. The terminal runs an icon-driven, multi-language software with pre-loaded extraction methods. An entirely new instrument setup has been specifically developed to comply with the US EPA Method 3546 requirements. The fastEX-24 rotor consists of a 24-position carousel. Large pressure vessels made of the Milestone unique Weflon™, ensures fast and homogeneous heating, providing high reproducibility and complete recovery of the target compounds. At the core of the vessel is a disposable and inexpensive 100 mL glass vial, for unsurpassed ease of use and low running costs.

## EASE OF USE



Load the sample



Add the solvent



Insert the glass vial



Close the vessel

## LARGE SAMPLE AMOUNT IN DISPOSABLE GLASS VIALS

When determining organic pollutants, most environmental labs aim to achieve lower detection limits. The sample preparation technique plays a very important role in this challenge. Although new extraction technologies have been developed in recent years, they have not entirely matched the needs of environmental labs. The ETHOS X with fastEX-24 rotor extracts up to 30 grams of sample with minimal solvent volume, helping analysts to accomplish their tasks.

The Milestone fastEX-24 rotor uses disposable glass vials, eliminating the need for cleaning and the possibility of memory effect between different runs. The 100 mL vials can accommodate the extraction of a large sample amount. The easy to handle and affordable cost of the vials leads to high productivity at a very low running cost.



30 gram soil  
sample  
(actual size)

# COMPLIANCE



The US EPA Method 3546 is a procedure for extracting water insoluble or slightly water soluble organic compounds from soils, clays, sediments, sludges, and solid wastes. This method is applicable to the extraction of semi-volatile organic compounds, organophosphorus pesticides, organochlorine pesticides, chlorinated herbicides, phenoxyacid herbicides, substituted phenols, PCBs, and PCDDs/PCDFs.

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	Analysis
PCBs	EPA 8082
PAHs	EPA 8270, 8100
Semivolatile organics	EPA 8270
Phenols	EPA 8151
Chlorinated pesticides	EPA 8081
Organophosphorus pesticides	EPA 8141
Chlorinated herbicides	EPA 8141

The US EPA 3546 method is suitable for the above standard analytical procedure

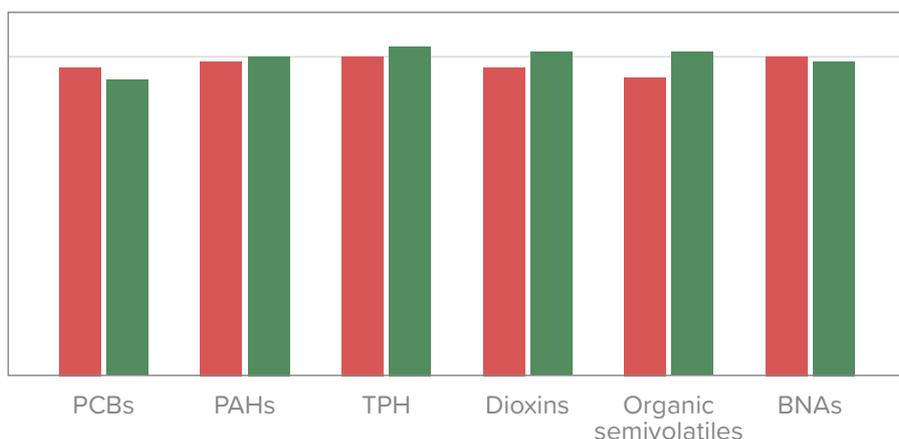
# CONSISTENCY AND RELIABILITY



Data quality and reliability are key for environmental labs. The ETHOS X with fastEX-24 rotor provides fast, accurate and precise analysis. The unique design of the fastEX-24 rotor with its large volume disposable glass vials eliminates cross contamination and memory effect, resulting in reproducible results.

## RECOVERY STUDY

Soxhlet ETHOS X



100%

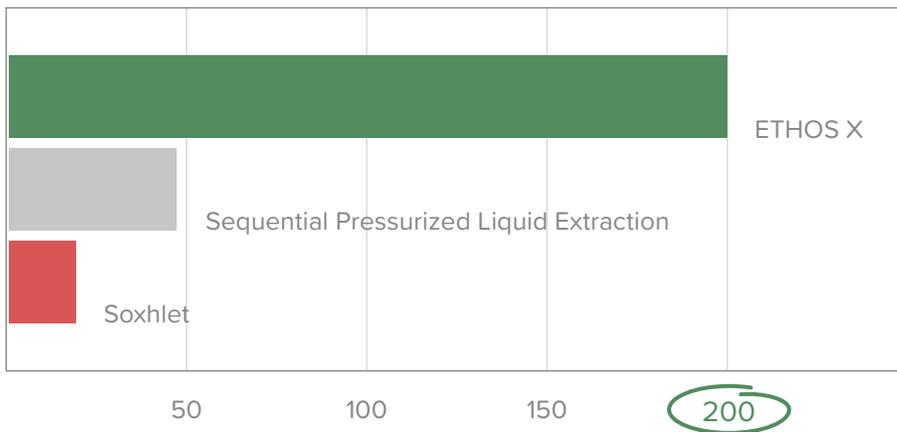
Milestone ETHOS X recovery study and comparison vs Soxhlet for various organic compounds.

# PRODUCTIVITY



The ETHOS X meets the demands for productivity required by modern environmental laboratories. While other technologies process sequentially one sample at the time, increasing the overall sample preparation time, the ETHOS X simultaneously processes 24 samples in 40 minutes!

## SAMPLES PER DAY



Productivity based on 8 hours working shift. 24 samples requiring 40 minutes with the ETHOS X, 240 minutes with Sequential Pressurized Liquid Extraction and multiple hours with Soxhlet.

# LOW RUNNING COST



With low solvent consumption and high productivity, the ETHOS X reduces the cost per analysis for the extraction of environmental pollutants. In addition, the Ethos X provides the flexibility to perform sample preparation for metals analysis on the AAS, ICP and ICP-MS. Two different applications with a single microwave platform!

# GREEN, GREENER, GREENEST



Microwave solvent extraction is a green process due to low solvent usage, high sample amount, lower energy consumption and the reduction of clean-up or waste disposal. The extraction process also takes place in a closed environment, eliminating user exposure to solvent vapors.

# TECHNICAL SPECIFICATIONS

## Milestone ETHOS X Advanced Microwave Extraction System for Environmental Applications

The complete system includes:

- Microwave cavity: 18/8 stainless steel housing; largest microwave cavity: 43 x 40 x 41 (H) cm (70.5 liters); inlet/outlet ports: upper flange 36 mm ID, plus additional ports on the side walls; chassis protected against corrosive media with polymer coating; door completely made of 18/8 stainless steel with multiple independent safety interlocks to prevent microwave emission in case of improper closure or misalignment.
- Built-in exhaust system located above the cavity and separated from electronics to prevent corrosion.
- Dual magnetron system with rotating diffuser for homogeneous microwave distribution in the cavity; two 950 Watt rated magnetrons, for a total of 1900 Watts; exclusive magnetron protection from reflected microwave power; continuous and PID-controlled microwave emission at all power levels.
- Built-in contact-less infrared temperature control, contact-less pressure control, magnetic stirrer (optional), software-controlled digital camera (with terminal 660).
- Safety standards: EN61010-1:2001; EN61010-2-010:2003; UL61010-1:2004; CAN/CSA-C22.2 No 61010-1:2004; CAN/CSA-C22.2 No 61010-2-010:2004; IEC 61010-2-010:2003; EN61326-1:2006.
- Terminal 660, touch screen; 6.5" TFT display; 640x480 VGA resolution with 64k colors; 5 USB ports, 1 RS-232 port, 1 LAN port, 2 video ports; terminal 480, touch screen; 4.3" TFT display; 480x272 VGA resolution with 16M colors.
- Icon-driven multi-language operating software (Chinese, English, French, German, Italian, Japanese, Polish, Portuguese, Russian, Spanish and Turkish) software allowing the user to edit, save and run an unlimited number of methods.
- fastEX-24 extraction rotor complete with 24 Weflon™ vessels (145 mL), self-regulating pressure valves and disposable glass vials (100 mL).
- Weight: ca. 84 kg.
- Dimensions: 54 x 64 x 69 (H) cm.
- Power supply: 230-240V/50 or 60Hz, 3.5 k Watt.

HELPING CHEMISTS – Milestone has been active since 1988 in the field of microwave sample preparation. With over 20000 instruments installed worldwide, we are the acknowledged industry leader in microwave technology. Milestone vision is to help chemists by providing the most technologically advanced instrumentation for research and quality control. Our products offer a wide range of applications, such as microwave acid digestion, solvent extraction, synthesis and ashing. Furthermore we manufacture products for acid purification and direct mercury determination in solid, liquid and gas samples. We offer our customers the highest level of application support, building up over the years a relationship based on trust and responsibility.

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MILESTONE Srl - Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy  
Tel: +39 035 573857 - Fax: +39 035 575498  
www.milestone srl - email: analytical@milestone srl

MILESTONE INC. - 25 Controls Drive - Shelton, CT 06484 - USA  
Tel: (203) 925-4240 - Toll-free: (866) 995-5100 - Fax: (203) 925-4241  
www.milestone sci - email: mwave@milestone sci

MILESTONE GENERAL K.K. - KSP, 3-2-1, Sakado - Takatsu-Ku,  
Kawasaki 213-0012 - Japan - Tel: +81 (0)44 850 3811 - Fax: +81 (0)44 819 3036  
www.milestone-general.com - email: info@milestone-general.com

MLS GmbH - Auenweg 37 D-88299 Leutkirch im Allgau - Germany  
Tel: +49 (0)7561 9818-0 - Fax: +49 (0)7561 9818-12  
www.mls-mikrowellen.de - email: mws@mls-mikrowellen.de