



ETHOS EZ

THE RIGHT CHOICE IN MICROWAVE SAMPLE PREPARATION



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Milestone has been active for two decades in the field of microwave sample preparation and, with more than thirteen thousand instruments installed worldwide, is the acknowledged industry leader in microwave technology.

Our commitment is to continuously provide the best instrumentation for microwave sample preparation in terms of safety, quality and performance.

Furthermore, we truly offer our customers the highest level of application support, building over the years a relationship based on trust and commitment.

ETHOS EZ, THE RIGHT CHOICE IN MICROWAVE SAMPLE PREPARATION

The ETHOS EZ fully embodies Milestone's philosophy in microwave sample preparation. Specifically designed for closed vessel acid digestion, it offers an integrated approach to microwave sample preparation, with full control of all reaction parameters. The ETHOS EZ is built from the ground up to offer the highest performance and the best safety features in the industry. A wide selection of rotors are available, allowing the ETHOS EZ to process any kind of samples, from easily digested samples such as wastewater or sludge, to the most challenging, like ceramics or refractory materials.

The ETHOS EZ encompasses Milestone's visionary concept of "Total Microwave Sample Preparation" and, with a comprehensive choice of accessories, it offers a complete first-class solution not only for acid digestion, but also for solvent extraction, evaporation and microwave fusion. Four major applications in one microwave system: the Milestone ETHOS EZ.



ETHOS EZ EASE OF USE

The Milestone ETHOS EZ combines the highest-level of technology with an unmatched ease of use. From the microwave hardware to the control terminal, from reaction sensors to the pressure vessels, everything is built to the highest standard, allowing the user to take full advantage of the system capabilities without the hassle of cumbersome operation, thus improving the overall sample preparation process productivity.

VESSEL LOADING

The ETHOS EZ door opens downward enabling the chemist to use it as working platform and facilitate the loading of the vessels into the microwave cavity. Each vessel is handled individually, so the user does not have to directly introduce bulky and heavy carousels into the microwave unit.



ETHOS EZ door

REACTION SENSORS

The ETHOS EZ is equipped with the most advanced reactions sensors for temperature and pressure control. Temperature is measured either with a snap-in direct sensor in a reference vessel, or via a contact-less high-sensitivity infrared sensor, which effectively measures and controls the temperature in all vessels.

A contact-less pressure sensor is also available; this sensor monitors and controls all vessels simultaneously, preventing any vessels from venting and subsequent loss of volatile compounds.

All sensors, in addition to providing precise and accurate measurements, are extremely easy to operate.



Infrared temperature sensor

PRESSURE VESSELS

A wide range of pressure vessels are available for the ETHOS EZ, accomodating all sample preparation requirements. All our vessels utilize a minimal number of components to minimize their assembly time, and are extremely simple to set-up. The Q-20 vessels, for instance, are made of just three components: a TFM cover, a high-purity vessel and a safety shield with built-in safety valve.



Q-20 vessel components

EASE OF USE

COMPACT CONTROL TERMINAL

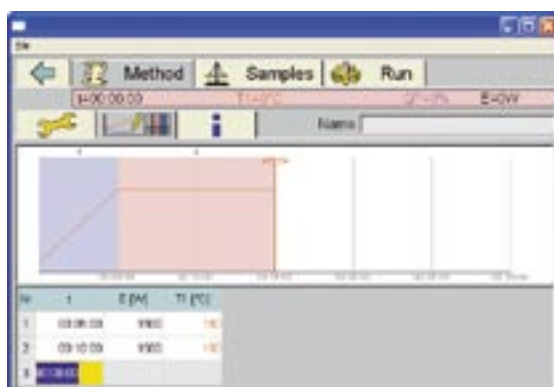
The ETHOS EZ is operated via a compact control terminal with easy-to-read, bright, full-colour, touch-screen display. The terminal is provided with 1 USB port for direct print-out of the microwave methods and runs, 2 ports for optional mouse and keyboard, and 3 RS-232 ports for other external devices.



Control terminal

EASYCONTROL SOFTWARE

The terminal runs Milestone's unique EasyCONTROL software, to provide simple, user-friendly control of the microwave sample preparation process with automatic, real-time monitoring and feedback-based control of multiple parameters. Simply recall a factory-stored method or create a new one; press 'START' and the system will automatically follow the user defined temperature or pressure profile, utilizing a sophisticated PID algorithm to regulate the microwave power.



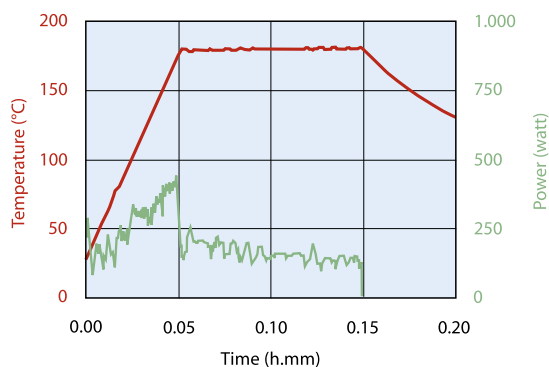
Microwave program editing

EASY DATA TRANSFER

Methods and runs are saved on a flash-card or on a USB pen-drive, directly readable by any PC. This capability offers virtually unlimited memory for storing all your sample preparation data. Furthermore, with Milestone's Windows-based EasyDOC software, it is possible to convert all sample preparation data into standard formats readable by any database or spreadsheet software (Excel, etc.).



Flash-card and USB pen-drive



Actual temperature profile



ETHOS EZ PRODUCTIVITY

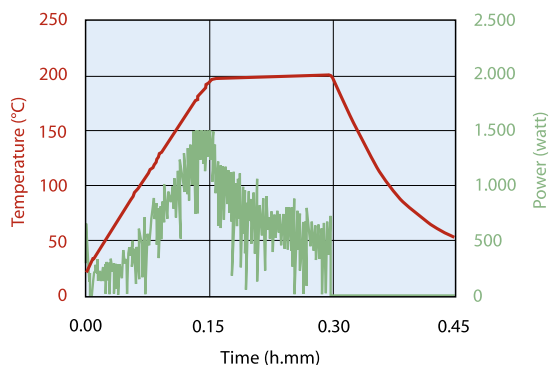
Microwave digestion has clearly become the benchmark technology in preparing samples for AAS, ICP and ICP-MS. One of the most obvious reasons is the time saving associated with microwave technology when compared to heating blocks or other techniques.

By providing the chemist with an easy to use microwave system from the hardware to the vessel technology, Milestone offers an integrated approach to enhance the productivity of your laboratory.

PRODUCTIVITY

FAST HEATING AND COOLING OF VESSELS

The ETHOS EZ is equipped with an installed microwave power of 1.200 watts. This enables very fast heating of high-throughput rotors. Fast cooling of vessels is as important as fast heating. A heavy-duty airflow system, placed above the ETHOS EZ microwave cavity, rapidly cools the pressure vessels at the completion of the program. An acid resistant flexible hose connects the exhaust fan to a fume hood, ensuring a safe working environment.

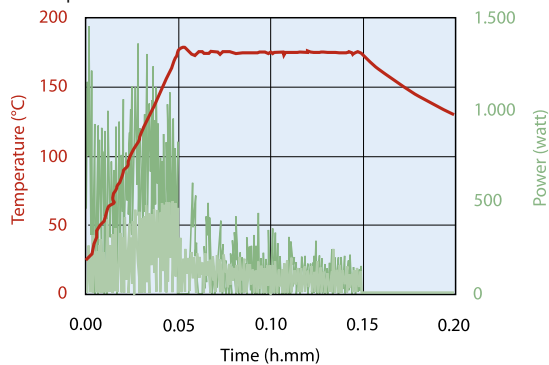


Fast heating and cooling

ONE METHOD FITS ALL

With the ETHOS EZ there is no need to adapt the digestion method to the number of samples being digested.

The software automatically regulates the microwave power accordingly, while the reaction temperature remains the same regardless of the number of samples. This assures a consistent quality of digestion and simplifies the use of the instrument, as the operator does not have to spend time in 'trial-and-error' method development.



Automatic power adjustment.

One sample (light green) vs. Multiple samples (green)

HIGH THROUGHPUT ROTORS

Milestone offers a comprehensive selection of vessels, operating from low to high-pressure, in carousels simultaneously holding 8 up to 41 vessels.



Multiprep-41 rotor

AUTOMATION

The new Milestone Automatic Capping Module ACM-100 is a step ahead toward automation in microwave digestion and it represents a perfect complement to the MULTIPREP-41, Q-20 and PRO rotors. The ACM-100 eliminates the bottleneck associated with the handling of multiple digestion vessels, thus dramatically improving the sample preparation throughput.

Furthermore, it improves the overall quality of digestion, as it assures constant and reproducible closing of the vessels.

Finally, the ACM-100 offers an increased safety of operation, as the operator is not exposed to acid vapours during the opening of the vessels.



Milestone ACM-100

ETHOS EZ hardware
+ 'vent-and-reseal' vessels
+ contact-less pressure control
+ contact-less temperature control
+ Easycontrol software

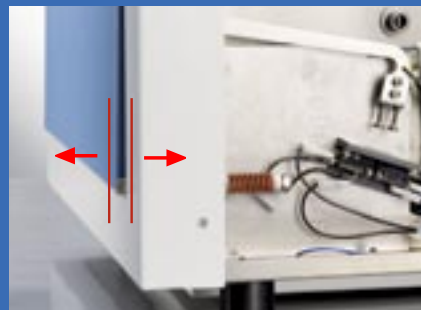
= highest safety of operation

ETHOS EZ SAFETY AND CONTROL

Our ETHOS EZ is the safest microwave digestion system currently available. Increased safety is due to a combination of factors: the microwave hardware, full control of all digestion parameters and extensive application knowledge.

MICROWAVE HARDWARE

The chassis of the ETHOS EZ is made of corrosion-resistant stainless steel; the cavity and the door are plasma-coated with PTFE to protect the unit. Milestone's warranty covers the cavity coating against corrosion for 5 years! Additionally, the ETHOS EZ features a door with an innovative opening and self-resealing mechanism. The door is mounted on spring-loaded steel bars. If for any reason there is a sudden over-pressurization of the cavity, it opens slightly for rapid and safe release of the overpressure and microwave power is instantaneously cut off. Immediately afterward, the door is pulled back by the spring, resealing the cavity. This is the same, ingenious principle of self-resealing employed in the Milestone pressure vessels!



ETHOS EZ door springs

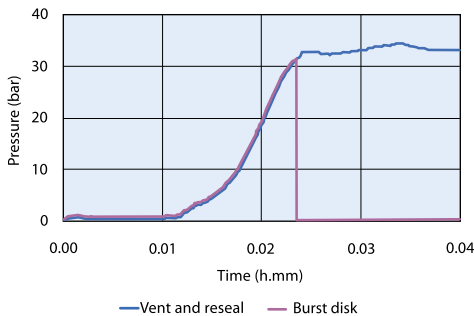
SAFETY AND CONTROL

'VENT-AND-RESEAL' VESSELS

The 'vent-and-reseal' vessels are the foundation of Milestone's leadership in microwave digestion technology. Continuously enhanced, this patented (US Patent 5,270,010) technology provides the operator with unsurpassed safety and performance capabilities. While other devices use membranes or burst disks that render a vessel useless after venting, the Milestone system releases only the excess pressure from the vessel. This ensures that there is no stress to the door of the microwave system, as it could happen in the case of a vessel's bursting.



'Vent-and-reseal' technology



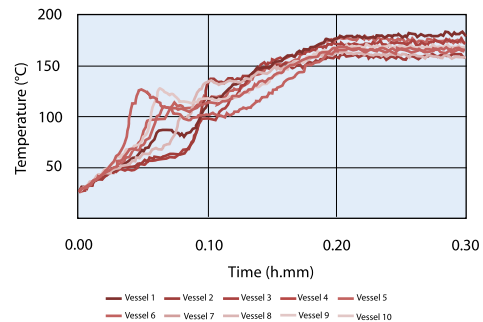
'Vent-and-reseal' vs. Burst disk technology

CONTACT-LESS PRESSURE CONTROL IN ALL VESSELS

The ETHOS EZ offers the possibility to control the pressure in all vessels via a contact-less sensor; the sensor, in combination with the 'vent-and-reseal' technology and the EasyCONTROL software, ensures complete and safe digestions without any loss of volatile compounds, and it perfectly complements the ETHOS EZ pressure-responsive door, resulting in the safest microwave system available today.

CONTACT-LESS TEMPERATURE CONTROL IN ALL VESSELS

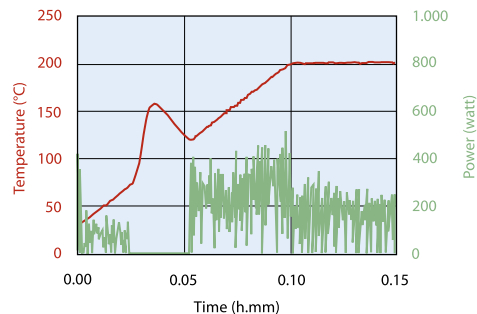
The 'TEMP-SURE' feature allows for accurate and precise temperature control in all vessels. This unique state-of-the-art system includes a direct temperature control device and an infrared sensor, both interfaced to a microprocessor-controlled rotor positioning system. As a result, the actual temperature profiles of all vessels are shown on the display of the control terminal. This is a clear benefit for the full control and safety of the sample preparation process.



Temperature control in all vessels

BETTER CONTROL OF EXOTHERMAL REACTIONS

With the EasyCONTROL software, the digestion temperature is controlled during the complete course of the run, and not just at a set point. This allows better control of exothermic reactions.



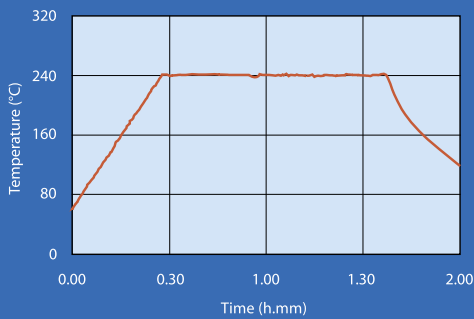
Digestion of 1 gram of dry leaves with nitric acid. Notice that when the sample decomposition takes place the microwave power is automatically reduced to control the reaction.

This is a unique safety feature of the ETHOS EZ.

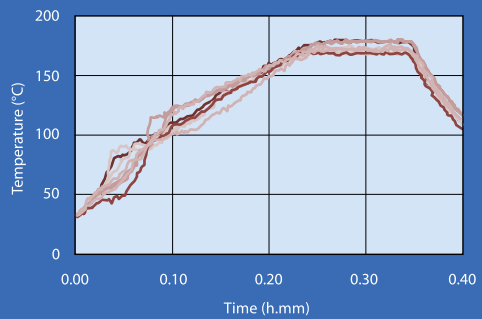


ETHOS EZ PERFORMANCE

Milestone patented (US Patent 5,270,010) rotors provide the chemist with unsurpassed performance capabilities in closed vessel microwave digestion.



Acid digestion of Silicon Carbide with the NOVA-8 rotor



Acid digestion of various food samples with the Q-20 rotor

PERFORMANCE

HIGH PRESSURE



This high strength rotor body holds up to 10 digestion vessels made of high purity TFM, with a volume of 100 ml. This rotor ensures difficult organic and inorganic refractory materials.

HIGH PURITY



The Q-20 rotor holds 20 high-purity quartz vessels and offers superior performances, especially for ultra-trace analysis, with unmatched ease of use and full control of all digestion parameters in all vessels.

Minimal quantities of acid are needed, lowering the analytical blank. Just 3 mls of nitric acid are sufficient to digest 250 mgs of organics!

The Q-20 allows for the complete digestion of a variety of organic samples, such as foods and feeds, plants, polymers, pharmaceuticals, clinical, biologicals and oils.

HIGH VERSATILITY



The PRO is a very versatile rotor, with the ability to hold 16-24 vessels is suitable for easy organic samples or environmental applications, according to the US EPA method 3051A. It offers very easy handling and rapid cooling capabilities.

HIGH TEMPERATURE



The NOVA-8 rotor holds 8 TFM vessels with a volume of 75 mls, and allows the digestion of ceramics and refractory materials, these samples often pose a challenge to users, as the very high temperatures and pressures required to digest them may result in damaging conventional pressure vessels or shortening their lifetime.

The Milestone NOVA-8 rotor is especially designed to work at sustained high temperature up to 300°C, allowing for a safe and complete digestion of the most difficult matrices

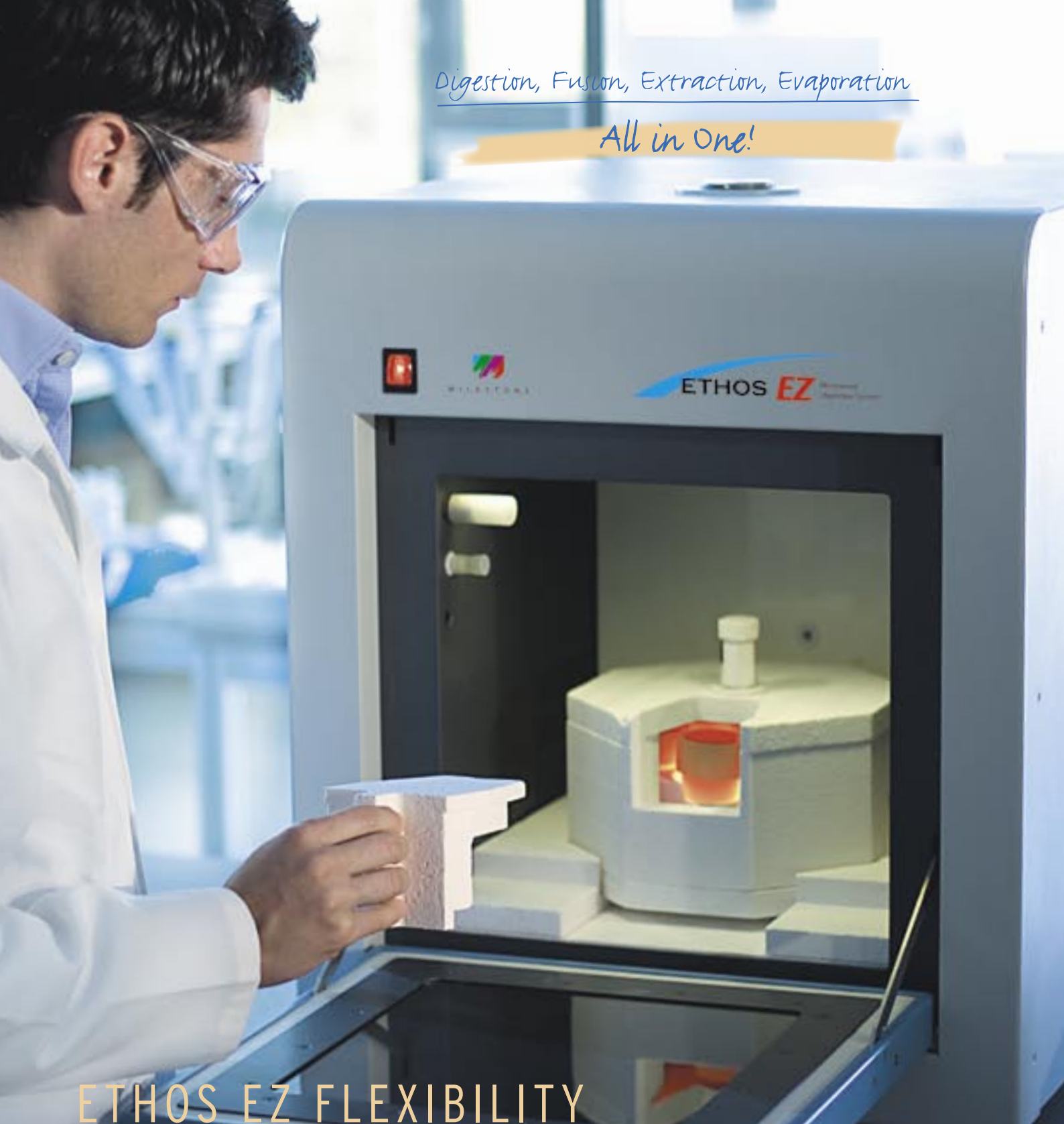
HIGH THROUGHPUT



The MULTIPREP-41 is a very high throughput rotor. The rotor has the ability to hold up to 41 TFM or PFA vessels, and can perform easy digestions or leaching-type reactions on a variety of samples, such as soils, sediments, wastewater etc.

Digestion, Fusion, Extraction, Evaporation

All in One!



ETHOS EZ FLEXIBILITY

Milestone was the first company to introduce the concept of 'Total Microwave Sample Preparation'.

This approach enables chemists to perform every sample preparation step associated with AAS, ICP and ICP-MS analysis in a single microwave system.

This significantly reduces overall sample preparation time and eliminates the need for laboratories to invest in multiple conventional instruments, such as vacuum drying ovens, heating blocks, etc.

The ETHOS EZ further develops and expands this concept, allowing the user to switch from closed vessel digestion to open vessel digestion, acid evaporation, solvent extraction, and even sample fusion in just a few seconds!

FLEXIBILITY

FUSION

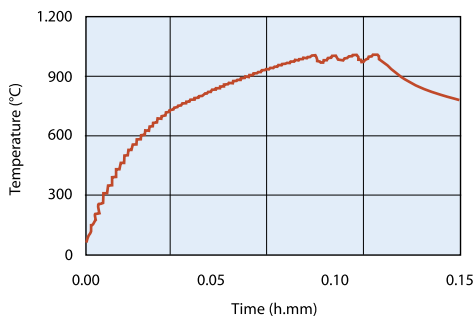


MultiFAST device

The new MultiFAST enables chemists to perform fusions in the ETHOS EZ. A variety of difficult samples, such as cements, ores, slag, sediments, soils, rocks, ceramics, pigments, and glasses, quartz can be successfully prepared for XRF, AA and ICP analysis.

The MultiFAST consists of a muffle furnace with a rotating carousel, which accommodates four silicon carbide heating elements that contain the actual fusion crucibles. The crucibles are rapidly heated by microwave. As they rotate, an optimal and homogeneous temperature is ensured across all crucibles.

Moreover, an external contact-less infrared temperature sensor enables precise control for all samples.



MultiFAST heating rate

Typical MULTIFAST sample preparation procedure for XRF analysis:

Sample size	1,5 g
Flux	7,5 g of 80% LiBO ₂ and 20% Li ₂ B ₄ O ₇
Temperature	900°C
Time	Less than 10 minutes

VACUUM EVAPORATION



MMR rotor

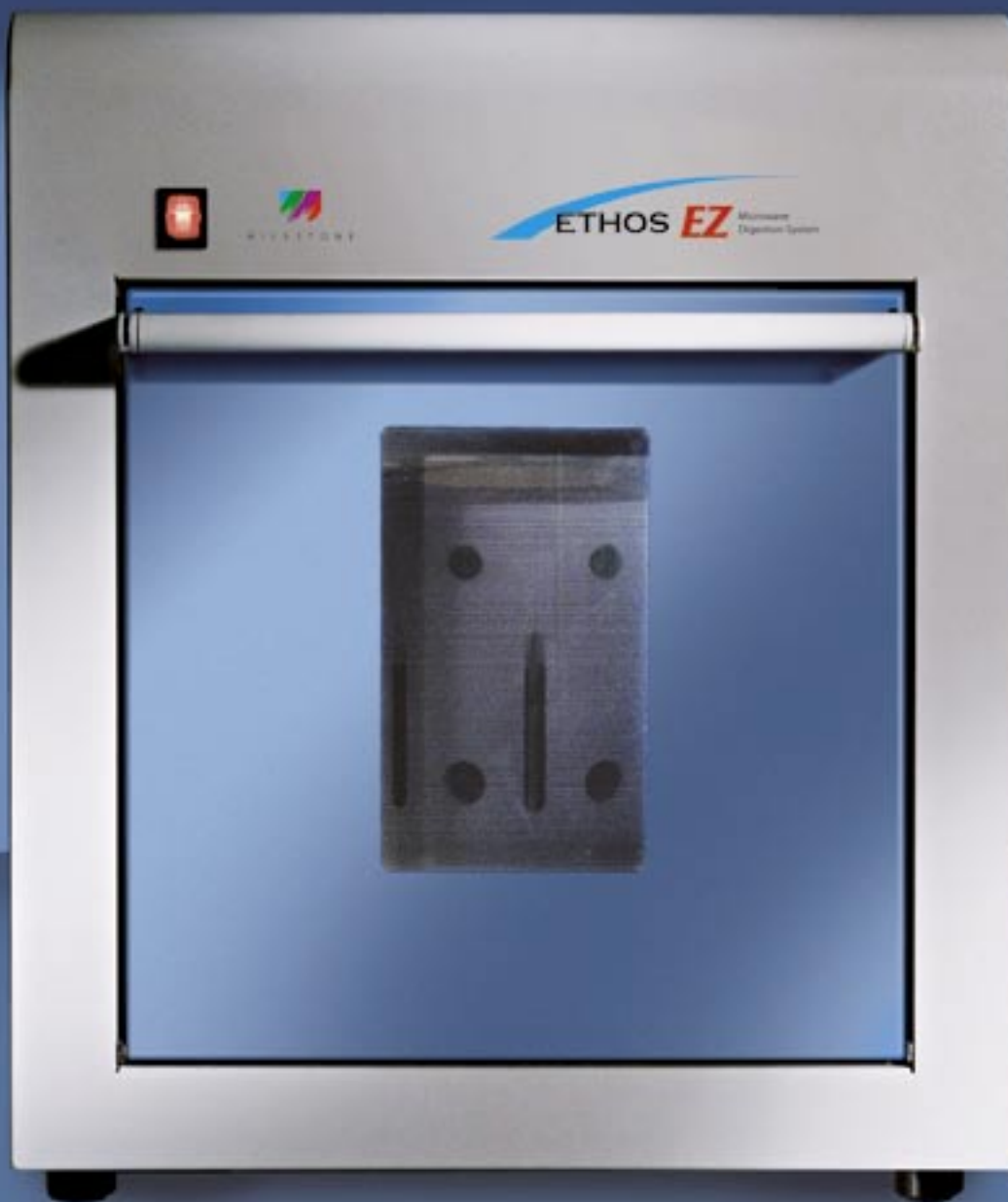
With Milestone's unique vacuum evaporation technology, the ETHOS EZ turns into a true microwave evaporator, allowing the user to carry out safe and complete evaporation of acids and organic solvents. No sample transfer is required as evaporation takes place in the same vessels previously used for digestion/extraction.

OPEN VESSEL DIGESTION



MOD-8 rotor

Milestone's exclusive MOD package converts the ETHOS EZ to a fully automated microwave open vessel digestion system. This system to rapidly and safely digests multiple large amounts of organic samples, such as food, feed, pharmaceuticals, polymers, oils, etc.



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