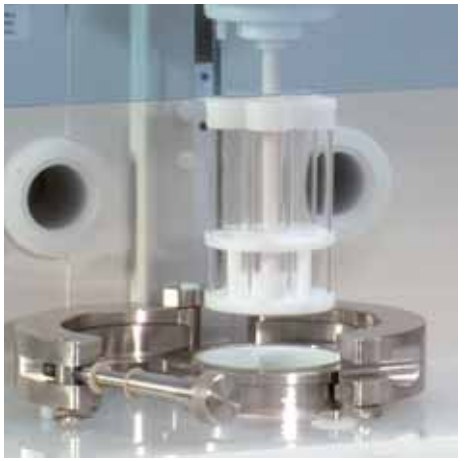
MILESTONE

HELPING CHEMISTS

UltraWAVE

Transforming Microwave Digestion



MILESTONE
HELPING CHEMISTS

Since 1988, Milestone has been leading innovation in microwave sample preparation, and with more than 15,000 instruments installed worldwide, is the acknowledged industry leader in microwave technology.
We are committed to designing and manufacturing the best instrumentation for microwave sample preparation; best in safety, quality and performance.
And we provide our customers with the highest levels of both applications and service support.
Over the past 20 years, we have built customer relationships based on trust and commitment.

ETHOS EZ

UltraCLAVE

A History of Innovation in Microwave Digestion

Technical developments and new technologies from Milestone have transformed the capabilities of microwave digestion instrumentation over the years.
Here are just a few examples of our "firsts"...

1989 Introduced the first high pressure vessels for microwave digestion.
1991 Introduced and patented "vent-and-reseal" vessel technology.
1996 Introduced and patented the self-resealing movable safety microwave door.
1997 Introduced PID (Proportional Integral Derivative) temperature and pressure control in microwave digestion.
2004 First Single Reaction Chamber (SRC) microwave digestion system (UltraCLAVE).

Milestone is the only company to produce a complete range of microwave digestion instruments and technologies.

ETHOS EZ
Closed Vessel Digestion System

UltraCLAVE
Single Reaction Chamber Digestion System

and now…
UltraWAVE Benchtop Single Reaction Chamber Digestion System

Transforming Microwave Digestion

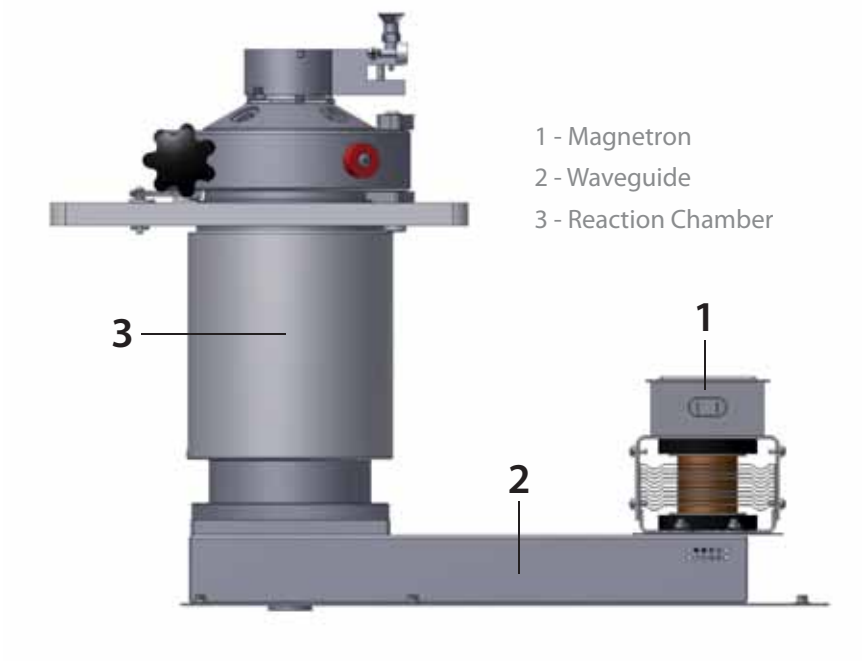
Milestone's unique SRC technology, first developed with the UltraCLAVE, overcomes the limitations of traditional microwave sample preparation.
At the heart of the system is a large sample chamber that is pre-pressurized with inert gas and heated with microwave energy. The chamber serves both as a microwave cavity and a reaction vessel.
Employing the same SRC technology as the UltraCLAVE, the UltraWAVE offers the same great benefits, but in a smaller benchtop instrument, making it accessible to every lab.
With higher performance, higher sample throughput, improved workflow, plus lower labor and consumables costs when compared with conventional closed vessel systems, the UltraWAVE is transforming microwave digestion.
And not only microwave digestion: its higher sample weight capability, greater digestion power, outstanding throughput and ease of operation means UltraWAVE can replace open vessel digestion, high pressure ashing and even block digestion in many applications.

UltraWAVE Key Benefits

- › Greater Ease of Use
- › Increased Productivity
- › Lower Operating Costs
- › Higher Performance

SRC Design and Operation

At the heart of the UltraWAVE is a Teflon lined, 1L stainless steel reaction chamber, which is also the microwave cavity.
This allows the design of the1500W microwave source to be perfectly matched to the cavity shape for optimum microwave distribution and fast, even heating.
Samples are weighed into vials and placed in a rack, which is lowered into the reaction chamber.
The chamber is sealed and pre-pressurized with inert gas, which acts as a "cover" over the samples, preventing cross contamination.
Unlike closed vessel digestion, different sample matrices can be digested together, and the chamber is water cooled, which makes cool down time very fast.



UltraWAVE Schematic

Safety

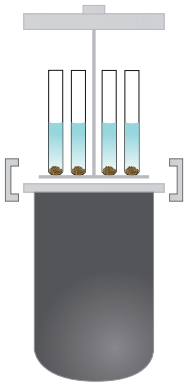
Like all Milestone products, the UltraWAVE has been designed with operator safety of paramount importance.
A thick acrylic shield surrounds the work area, which lowers into position automatically as the chamber is closed.
A run can not be started unless the chamber clamp is in position, and the clamp cannot be released until the chamber is cool, and pressure has been released.
The PID controller monitors pressure, digestion and chamber temperature 20 times/sec, adjusting microwave power instantaneously to control even highly exothermic reactions.

Performance and Control

The UltraWAVE is an ultra high performance system, operating up to 199 bar pressure and 300°C, and ensuring complete digestion of even the most difficult samples.
And unlike closed vessel digestion, every sample is under direct pressure and temperature control; no need to rely on indirect control such as infrared temperature sensors.
This assures complete control of the digestion process in every sample.
No need to use a reference sample, and no venting of vessels due to over pressure.
The UltraWAVE reaches temperature faster, cools faster, and is capable of higher pressure and temperature than any closed vessel system.

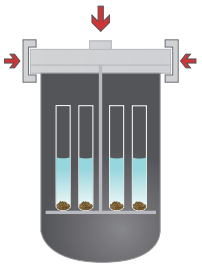
Digestion Sequence

This diagram shows how a digestion is performed in the UltraWAVE.



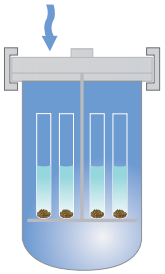
1

Sample rack is lowered automatically into microwave chamber



2

Chamber clamp is secured by the operator. Interlocks prevent operation without clamp in place

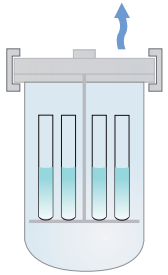


3

Chamber is pre-pressurized with inert gas to prevent sample boiling. Cross contamination is eliminated

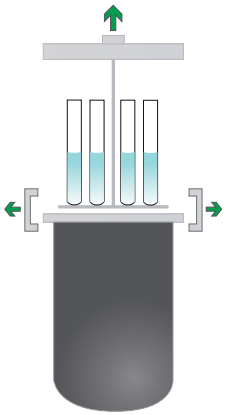
4

Microwave energy is applied. All samples under same temperature and pressure conditions



5

Very fast cooling step due to water cooling of chamber. Chamber is vented and acid vapors extracted



6

Clamp is released and sample rack automatically rises from chamber

Racks and Vials

Available sample rack configurations include 4, 5 and 15 position, plus a 22 position rack for microsamples.
Vials are available in glass (disposable), quartz or TFM, and are fitted with Teflon caps, loose fitting to ensure pressure equalization.
Numbered rack trays give the operator an easy visual check of vial number.
UltraWAVE sample racks fit easily on a balance, so samples can be weighed directly into vials already loaded into a rack.
Unlike closed vessel digestion, no vessel assembly or disassembly is required, and with disposable vials, no cleaning step is needed, greatly increasing productivity.

Samples after digestion

EasyCONTROL Software

The UltraWAVE is operated via an industrial grade control terminal featuring a full-color 6.5" touch screen display.
The terminal runs Milestone's renowned EasyCONTROL software, common to all our digestion instruments.
EasyCONTROL enables simple and intuitive, but extremely flexible and powerful control over the digestion process.

UltraWAVE Control Terminal

Digestion method setup could not be simpler: set target temperature, ramp time and hold time.
Press 'Start', and the system automatically follows the temperature program, continuously varying the microwave output via a sophisticated PID controller.

EasyCONTROL Software

Unlike other digestion systems, the operator is not required to set the power level - UltraWAVE's PID controller automatically applies the require microwave power to follow the desired temperature profile regardless of sample weight or number of samples in the run.
EasyCONTROL has full audit trail capability plus multi-level user access security for compliant environments: each operator has a personal password to access the software.
EasyCONTROL can generate sample run reports, combining the microwave program with sample weights and reagent volumes.
Sample weight can be imported automatically into the run data file by connecting a balance to the terminal via a serial port.
Run data is stored on a flash drive or USB memory stick and can be transferred to a PC with optional EasyDOC software.

UltraWAVE Key Benefits

Greater Ease of Use

Compared to closed vessel digestion, the UltraWAVE is significantly easier to use and workflow is dramatically improved.
No assembly/disassembly of vessels is required, and no vessel cleaning (with disposable glass vials).
Direct temperature and pressure control of every sample ensures complete control of the digestion process.
Any combination of sample types can be digested simultaneously - no need to batch samples into identical types.
No method development is needed (the same method can be used for almost every sample type) and no need to use different rotors for different sample types.
And for the first time, reference standards (any matrix) can be digested alongside samples, enabling true in-run digestion QC.

Increased Productivity

Compared to closed vessel digestion, labor costs are significantly lower because no vessel assembly/disassembly is required, vessel cleaning is eliminated with glass vials, and method development is virtually eliminated.
There are also major savings on consumables costs, which can be significant for high throughput labs using closed vessel digestion.

Lower Operating Costs

The UltraWAVE has higher sample throughput than closed vessel digestion, even where closed vessel systems are used with high capacity rotors, due to quicker sample loading/unloading and shorter cool down time.
And since there is no need to batch samples into identical types for digestion, workflow is significantly improved.

Higher Performance

Capable of operating up to 199 bar pressure and 300°C, the UltraWAVE enables complete digestions for virtually every sample type, outperforming any other microwave digestion system.
The high pressure capability, and powerful microwave source enables higher sample weights to be digested.
For example up to 2g of infant formula can be digested, 2-3 times higher than is possible with a high pressure rotor with closed vessel digestion, and very useful to labs at the limit of ICP-OES detection.
Blanks are significantly lower than with closed vessel digestion, since less solution transfer occurs, quartz vials can be used and digestion acid volumes are lower.

UltraWAVE Sample Vials

UltraWAVE Applications

Environmental

Volatile analytes are not lost during digestion using the UltraWAVE.
Environmental labs that have traditionally used block digestion are now finding they can recover volatile analytes successfully with UltraWAVE.

Food and Feed

The ability to digest higher sample weights than any closed vessel system allows UltraWAVE to digest up to 2g of sample, replacing open vessel digestion systems and dry ashing in busy food labs.

Consumer products testing

With the UltraWAVE, consumer products testing labs can batch many different sample types together for simultaneous digestion, greatly improving the digestion workflow.

Clinical

The ability to digest different sample types in a single batch, no loss of volatiles and very low digest acid volume makes UltraWAVE the perfect partner for ICP-MS in clinical labs.

Pharmaceuticals

In pharmaceutical testing, unknown, high organic content samples necessitate the use of high pressure vessels with closed vessel digestion.
The UltraWAVE can handle pharmaceutical samples with ease.

Materials testing

When testing materials for ROHS directive compliance, the UltraWAVE can digest the entire range of sample types subject to regulation.
Its ability to digest mixed batches greatly increases productivity.

MILESTONE
HELPING CHEMISTS

MILESTONE Srl - Via Fatebenefratelli, 1/5 - 24010 Sorisole (BG) - Italy - Tel: +39 035 573857 - Fax: +39 035 575498
www.milestonesrl.com - email: analytical@milestonesrl.com
UNI EN ISO 9001: 2008 CERTIFIED - Registration N° 0513907

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

UltraWAVE-US/00/2011

UltraWAVE

Microwave Digestion System

Technical Specifications

MILESTONE
HELPING CHEMISTS

Hardware

- High pressure single reaction chamber (SRC) in stainless steel.
- Chamber volume 990 ml with 900 ml TFM liner.
- SRC design enables the same temperature and pressure to be achieved in all samples simultaneously.
- Auto-lift mechanism for automated loading of the sample rack into the SRC.
- SRC securely closed by double interlocked stainless steel clamps.
- Sensors ensure the correct positioning of the SRC cover during automatic opening and closing of the SRC.
- High microwave power (1500W) for fast heating.
- Microwave energy optimized to the shape of the SRC for even energy distribution (no sample rotation is needed) and maximum efficiency.
- Thick acrylic shield with automated lift/close for maximum operator safety.
- Integrated twin exhaust system extracts acid fumes away during chamber opening.
- Pre-pressurization of the chamber with an inert gas to prevent sample boiling and eliminate risk of cross-contamination.
- Automated pressure release at the completion of the microwave program and cooling step.
- SRC is water cooled for fast cool down step and increased sample throughput.
- Failsafe mechanism to safely release pressure inside the cabinet in the case of an overpressure situation (over 199 bar).
- Analog manometer for easy reading of SRC pressure from across the lab.
- Safety valve enables manual release of pressure after a digestion cycle, in case of power failure.

Temperature and Pressure Control

- Temperature sensor to directly monitor and control the temperature in the SRC and in all vials simultaneously.
- Operating temperature up to 300°C.
- Pressure transducer to directly monitor and control the pressure in the SRC and in all vials simultaneously.
- Operating pressure up to 199 bar.
- Built-in temperature sensor to monitor and control the external temperature of the chamber, preventing overheating.
- Built-in sensors to monitor magnetron and microwave antenna temperatures.

Control Terminal

- Industrial grade touch-screen controller with high resolution 6.5" screen and 65000 color display.
- 1 USB port for printer, 2 PS2 ports for mouse and keyboard, 3 RJ 45 ports for external devices.
- Methods and runs can be saved on a PC-compatible removable flash-card or USB pen-drive.

Other Features

- Capability to process different sample types and different digestion chemistries within in the same run, and at the same temperature and pressure conditions.
- Disposable glass vials can be used, eliminating the vial cleaning step.
- Capability to digest samples in glass, quartz or PTFE-TFM vials - even within the same run.
- Vials fitted with simple, loose fitting caps - vessel assembly/disassembly is eliminated.
- Increased sample weight capability compared to closed vessel digestion
- Minimum acid volume 2-4mL - lower reagent blanks.
- Digested sample can be stored in the vial - no transfer error or additional contamination risk due to transfer.

Rack Configurations

Number of Vials	Vial Material	Vial Volume (ml)
4	Glass (disposable)	70
	PTFE/TFM	70
5	Glass (disposable)	35
		40
	Quartz	25
		40
	PTFE/TFM	25
15	Glass (disposable)	15
	Quartz	10
		15
	PTFE/TFM	10
22	Glass (disposable)	10
	Quartz	10
	PTFE/TFM	7

Specifications are subject to change without notice.