



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



Milestone Product Line

Digestion
Clean Chemistry
Extraction
Ashing
Synthesis
Mercury

Milestone's waves of innovations



100% Milestone

Milestone has been active since 1988 in the field of advanced microwave sample preparation.

With more than 15.000 instruments installed worldwide covering large and small research institutions, as well as universities and industrial laboratories, we are the acknowledged industry leader in microwave technology.

Milestone vision is to help chemists by providing the most technologically advanced microwave instrumentation for research and quality control.

By listening to our customers, we have established a history of developing unique solutions to real world problems in analytical laboratories around the world.

Our products offer a wide range of applications, such as microwave acid digestion, acid purification, microwave solvent extraction and ashing, mercury determination, and microwave assisted synthesis.

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

Milestone is operative all over the world through a network of very reliable partners; USA headquarter is located in Shelton, Connecticut.

The presence of Milestone in Japan is assured by Milestone General KK, near Tokyo, and in Korea by Milestone Korea, located in Seoul.

All these branches have sales and technical assistance departments, as well as applications laboratories supporting our customers.

Besides this, Milestone is present through over 50 exclusive distributors, who guarantee everywhere high standards of quality and assistance.

Milestone is not a conventional company. Milestone does not intend to become one.

Digestion	Clean Chemistry	Extraction	Ashing	Synthesis	Mercury
ETHOS One	SubPUR	START E	PYRO	StartSYNTH	DMA-80
START D	DuoPUR	NEOS	PYRO XL	MicroSYNTH	DMA-80 L
UltraWAVE	TraceCLEAN	NEOS-GR	PYRO SA	RotoSYNTH	
UltraCLAVE					

ETHOS One

High Performance Microwave Digestion System

Specifically designed for closed vessel acid digestion, the ETHOS One can process any kind of samples, with full control of all reaction parameters and built-in "Digestion Quality Assurance".

Furthermore, Milestone's visionary concept of Total Microwave Sample Preparation, finds in the ETHOS One its highest expression.

With the proper choice of accessory, the ETHOS One turns into a first-class instrument for microwave open vessel acid digestion, sample drying, solution evaporation, and even fusion, solvent extraction or protein hydrolysis.

- Ease of use
- Elevated productivity
- High safety standards
- Full operation control
- High performance
- Wide range of applications



START D

Microwave Digestion System

With the START D, Milestone makes microwave digestion easy, safe, and affordable.

With its wide selection of rotors, the START D can process any kind of samples, from the relatively easy environmental, such as wastewater or sludge, to the most challenging, such as ceramics or refractory materials.

- Elevated performance
- State-of-the-art user interface
- Advanced reaction sensors
- Advanced vessel technology



UltraWAVE

Single Reaction Chamber Microwave Digestion System

Milestone's unique Single Reaction Chamber (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.

- Greater ease of use
- Increased productivity
- Lower operating costs
- Higher performance



UltraCLAVE

Simultaneous, Automated Microwave Digestion System

The UltraCLAVE is a truly revolutionary system for microwave enhanced reactions. Thanks to its unique design, the UltraCLAVE allows the simultaneous processing of up to 77 (!) samples, all under identical conditions, or for the complete digestion of extremely large sample size, in the order of 100+ grams.

With a working temperature up to and beyond 280°C, and pressure up to 200 bar, the UltraCLAVE is really a class by its own.

- Highest sample amount
- Highest sample throughput
- Highest temperature and pressure
- Same conditions for all samples
- Full automation: minimal required labor
- Minimal running cost
- Full documentation



SubPUR and DuoPUR

Sub-boiling Acid Purification Systems

Make your own ultrapure acids!

Many laboratories purchase expensive high purity acids for trace elemental. There is, however, an alternative: Milestone has developed the SubPUR and the DuoPUR, sub-boiling distillation systems which allows laboratories to make their own high purity acids at dramatically reduced costs.

- Up to 90% cost saving of ultra-pure acids by purifying low cost reagent grade acids
- High productivity, up to 3 liters in 8 hours
- Continuous supply of fresh high purity acids
- "On-demand" acid purification
- Re-purification of contaminated acids and single or double distillation upon on requirements



TraceCLEAN

Ultratrace Cleaning of Digestion Vessels

Cleaning various accessories used in trace analysis work is a critically important laboratory routine.

Traditional cleaning methods require soaking items in hot acids, often for several hours.

Furthermore, generally effective, large volumes of acid are consumed and need to be changed regularly.

Milestone's new TraceCLEAN is an automated, closed, acid reflux system that thoroughly and safely cleans laboratory's accessories for trace analysis.

- Unattended cleaning of all TFM, PFA, glass, and quartz ultra-trace accessories, including microwave digestion vessels and ICP/ICP-MS accessories
- Only ultra-pure, acid vapors come in contact with the surface of the items to be cleaned
- Clean components do not remain in contact with the cleaning acids after the surface contamination is removed
- No airborne contamination
- No operator exposure to acid vapors thanks to the built-in exhaust/cooling
- Minimized handling of freshly cleaned items



START E

Microwave Solvent Extraction System

Milestone's START E extraction lab-station is a high performance microwave-accelerated system with the most advanced process control and safety features currently available.

The START E system was created to give analysts an extraction platform just as technologically advanced as GC, GC-MS, HPLC, and other analytical techniques.

- **Speed:** a fraction of the time is needed
- **Economy:** lower solvent usage reduces the costs of solvent purchase and disposal
- **Effectiveness:** higher analyte recoveries
- **Consistency:** precise, software-based control of all reaction parameters ensures method reproducibility
- **Simplicity:** use polar or non-polar solvents; no need to modify your existing chemistry



NEOS

Essential Oil Solvent-Free Microwave Extraction System

The Milestone NEOS performs solvent-free microwave extraction of essential oil in plant material.

The method involves placing the sample in the microwave reactor, without any added solvent or water.

Once the essential oils have been extracted they can be analyzed directly by GC-MS without any preliminary clean-up or solvent exchange steps.

- **No solvents, green chemistry**
- **Shorter extraction time (minutes)**
- **Recovery of volatile compounds**
- **Less work-up**
- **Higher purity of extracts**



NEOS-GR

Solvent-free Microwave/Gravity Extraction System

The new Milestone NEOS-GR is based on an original combination of microwave heating and earth gravity at atmospheric pressure.

The NEOS-GR is the result of a partnership between Milestone and the Université d'Avignon et des Pays de Vaucluse, France, which also led to the grant of the European patent EP 1 955 749 A1.

The direct interaction of microwaves with the water present in the fresh plant material favors the release of essential oils.

- **No solvents, green chemistry**
- **Shorter extraction time (minutes)**
- **Recovery of high boiling point compounds**
- **Less work-up**
- **Higher purity of extracts**



Ashing

PYRO

Microwave Ashing System

The determination of ash content is an important test procedure, performed in thousands of laboratory each day, for process and quality control purposes.

Ashing tests are also carried out on polymers, pharmaceuticals, food and feed samples, as a prerequisite in analytical procedures.

Microwave ashing is therefore a breakthrough for quality control and rapid sample preparation.

The PYRO is a highly efficient alternative to conventional muffle furnaces.

The PYRO dramatically reduces ashing times, from hours to minutes.

- Reduction of ashing times
- Reduction of operating costs
- High sample throughput
- Comfortable working conditions
- Cleaner processing of difficult samples



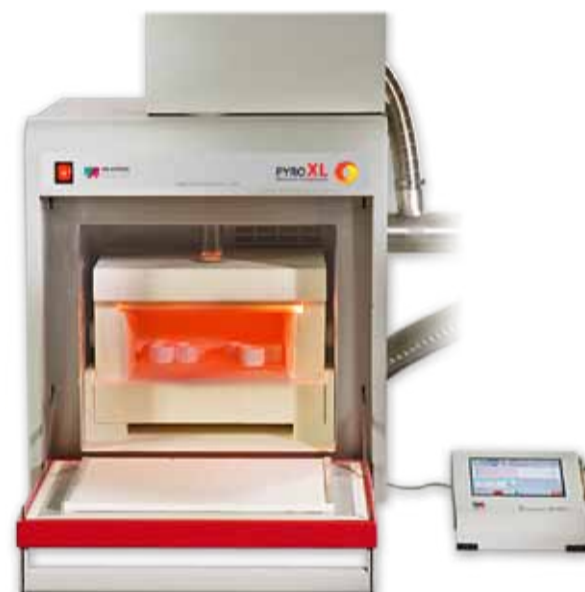
PYRO XL

Microwave Ashing System for Extra Large Sample Amounts

Samples such as plastics, polymers, lubricants and many others need to be processed in large amounts, due to their inherent heterogeneity and to the low content of ashes.

For this reason, Milestone has developed the PYRO XL, which allows the ashing of large quantities (50 grams and up) of multiple samples.

- Large sample amounts
- Fast: from room temperature to 800 degrees in approximately 30 minutes!
- Easy to use
- High throughput
- Cost effective



PYRO SA

Microwave Sulfate Ashing System

Sulfate ashing is an important application particularly within the pharmaceutical R&D laboratories.

The PYRO SA is equipped with the sulphate ashing module (especially engineered for sulfate ashing procedures) and the VAC-1000 acid scrubber.

Analysts can add H_2SO_4 to samples and place crucibles directly into the microwave muffle furnace without a preliminary charring step.

This eliminates cumbersome and time-consuming operating procedures.



StartSYNTH

Microwave Synthesis Labstation

The StartSYNTH is a new microwave system which combines sophisticated design and high technology with ease of use and safe operation.

The StartSYNTH is equipped with the most advanced sensors for accurate control and reproducibility of all reaction parameters.

Only Milestone's StartSYNTH platform offers a unique application flexibility.

- Reaction optimization
- Large batch reactions
- Parallel format scale-up



MicroSYNTH

Advanced Microwave Synthesis Labstation

Milestone's state-of-the-art MicroSYNTH is the most innovative microwave synthesis platform available on the market.

The MicroSYNTH offers unmatched flexibility of operation; it allows operations in both open and closed vessels and chemical reactions can be optimized in small volumes and then taken to larger scale within the same microwave unit.

The MicroSYNTH offers such excellent scalability because of its multimode design and its inherent safety.

The microwave field is homogeneously diffused throughout the entire cavity by a specifically designed mode stirrer.

As a result, chemists can achieve uniform results in a wide range of vessels and can process multiple reactions simultaneously or explore large reaction volumes.

Precise reaction monitoring and control, with an intuitive, easy-to-use software interface, provides exact reproducibility and complete documentation.



RotoSYNTH

Rotative Solid-Phase Microwave Reactor

Milestone innovative RotoSYNTH combines all the 'traditional' advantages of microwave-enhanced synthesis with the unique capability of physically rotating the oblique reaction vessel in which the reaction takes place.

It enables to achieve very homogenous bulk heating of heterogeneous reaction mixtures.

Coupling this effect with microwave irradiation, it is possible to obtain very homogeneous temperature distribution.

Furthermore, the RotoSYNTH system represents an excellent platform for method optimization and for scale-up, as it can host various other accessories for sealed or reflux microwave synthesis.

- Homogeneous heating of solid material
- Efficient processing of slurries and 'thick' reaction media
- Fast removal of volatile side-products
- Full control of all reaction parameters
- High flexibility of operation



DMA-80

Direct Mercury Analyzer in Solids, Liquids and Gases

Milestone's DMA-80 is a direct mercury analyzer which uses the principle of thermal decomposition, amalgamation and atomic absorption.

The DMA-80 can analyze solids, liquids and gases with equal precision.

Analysis takes only 5 minutes per sample and does not require any sample preparation.

The typical bottleneck in the analytical laboratory is eliminated and analysis time is reduced to only 5 minutes per sample, and at a fraction of the cost typically associated with traditional mercury techniques, such as CV-AAS, ICP-AES or ICP-MS.

All mercury is released from the sample through thermal decomposition.

This eliminates the need for any sample preparation and, subsequently, purchasing, handling and disposing of hazardous chemicals.

Typical applications that the DMA-80 is used for include environmental, geochemical, petrochemical, food and feed, clinical and polymer samples.

The DMA-80 is fully compliant with US EPA method 7473 and with ASTM method D-6722-01.

All you need to do is to weigh your sample, load it onto the built-in auto-sampler and press 'start'.

The DMA-80 is so simple to use that it can also be operated in the field, not only in the analytical laboratory.

The DMA-80 has been shown to save laboratories more than 70% in costs when compared to traditional mercury analysis techniques like CV-AAS.



DMA-80L

Direct Mercury Analysis for Liquids

The new Milestone DMA-80L is designed to perform fast, precise and extremely sensitive determination of mercury from 0.01 to 1000 ng in water-based samples and digestates.

With water samples, a detection limit of 0.1 ppt can be achieved!

The DMA-80L incorporates an atomic absorption spectrometer which is an absolute novelty, as it delivers three Mercury signals at different sensitivity for each analysis.

The large dynamic measuring range allows the determination of mercury in a very wide span of samples, from water to acidic solution resulting from the digestion of solids with high mercury content.

Typical samples for the DMA-80L are: drinking water, surface water, ground water and digestates of grains, fish, meat, baby food, sediments, soil etc.

The entire working process, including chemical conversion of the solution, formation of atomic mercury as cold vapor, enrichment by selective amalgamation and final atomization with multiple signal collection and evaluation, lasts less than 2 minutes!



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