MARS 6™

Microwave Digestion System

MARS 6 For Digestion

The MARS™ 6 is a microwave acid digestion system that produces clear digestate from samples for elemental analysis by ICP, ICP-MS, or AA. Rocks, plants, soil, foods, pharmaceuticals, plastics, metals, and more can be digested easily, using preloaded methods. For over 30 years, lab technicians have been using MARS systems for sample preparation. With the latest updates to the MARS 6, the process is even easier.

How it Works

Microwave acid digestion is a technique to dissolve metals, bound within a sample matrix, into liquid. This is achieved by exposing a sample to a strong acid, in a closed vessel and raising the temperature and pressure through microwave irradiation. Both the speed of thermal decomposition of the sample, and the solubility of heavy metals in solution are increased. Once these heavy metals are in solution, they can be quantified through elemental techniques. The MARS 6 reduces sample prep time by more than 70%, as compared to traditional techniques.

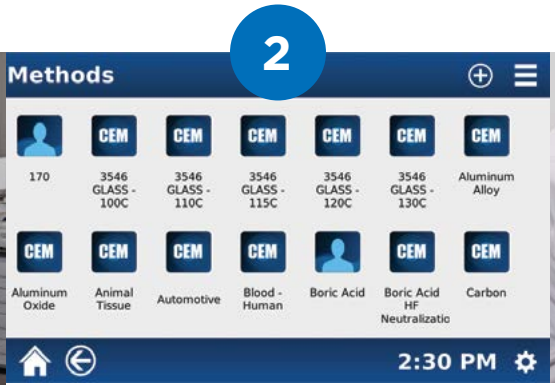
ONE TOUCH TECHNOLOGY

Preinstalled methods, are one touch away.

By selecting the One Touch™ icon on the MARS 6 touchscreen, you'll be able to choose the sample type from the preinstalled methods. Your method includes the recipe for digestion, including: sample size, acid type, and acid volume. From there, it will automatically detect the type of vessel you are using, count the vessels, adjust the power accordingly, and perform the digestion for you. It couldn't be easier.

As Easy as...

Load your Samples



Select your Sample Method

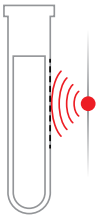
Press "Start"

iWave®

Light Emitting Technology™ (LET)

Better control means better results.

iWave is a contactless, in-situ temperature technology that measures the sample temperature of each vessel in real-time. There is no need for a control vessel, fiber-optic probes, or wires. This new innovation utilizes Light Emitting Technology (LET) that determines the temperature of the actual sample, rather than the vessel.



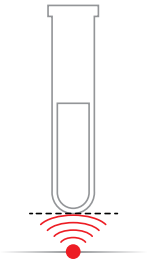
Ok

(non-iWave)
IR sensor from side

Accuracy

Convenience

The temperature is measured from the side at a considerable distance between inner and outer rows. The vessel must be filled to a minimum volume (typically 10 mL) in order to be able to measure the signal.



Good

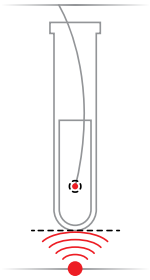
(non-iWave)
IR sensor from below

Accuracy

Convenience

The temperature is measured from the bottom, in close proximity to the vessel. This provides a more consistent signal and the minimum volume in the vessel can be greatly reduced.

IR sensors provide good sensitivity for EPA and other easy-to-digest materials prepared at moderate temperatures.



Better

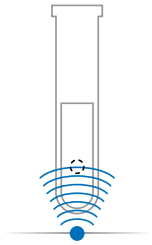
(non-iWave)
IR sensor with fiber-optic probe

Accuracy

Convenience

A probe is submerged, which allows the sample temperature to be measured from the inside of the vessel. This is very accurate, but not very convenient to set up.

A single probe is used in a control vessel and all other vessels have to be calibrated against the control vessel.



Best

iWave

Accuracy

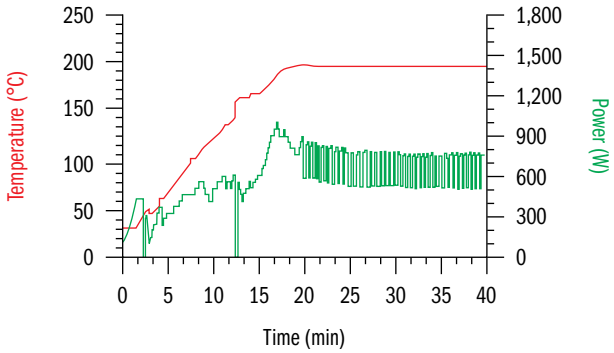
Convenience

iWave is as accurate as an internal probe because it measures the sample and solution directly inside the vessel.

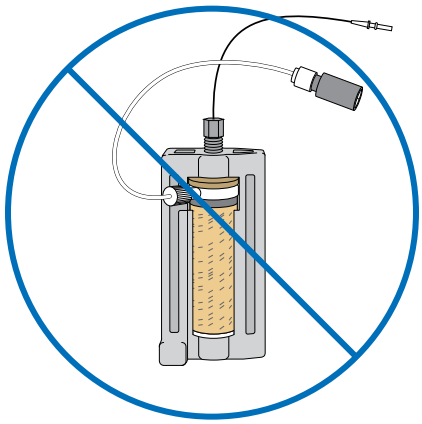
It's like having a fiber-optic probe in every vessel. Every vessel is now a control vessel.

Achieve the accuracy of fiber-optic, with the ease of contactless sensor technology.

Accurate temperature measurement and control is the critical factor in microwave digestion. Achieving precise temperatures reproducibly allows for the digestion conditions to be met and samples to be completely digested time after time.

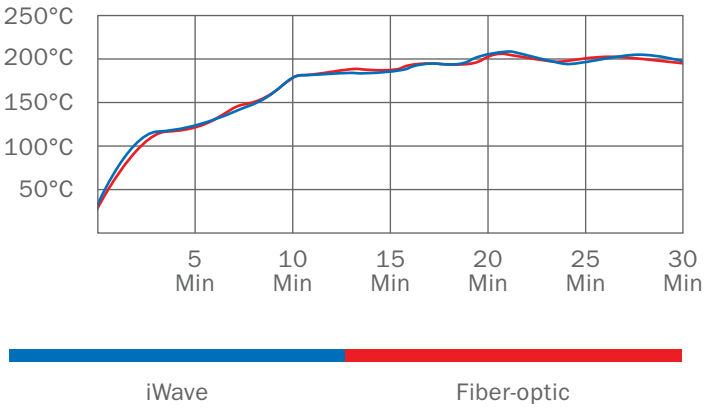


iWave sensors allow for fine power control, as shown in this graph. Temperatures can then be held tighter and digestions are more reproducible.



Probes can be a thing of the past.

Assembling control vessels and making connections are a thing of the past. No more cumbersome assembly of control vessels. No more connecting probes to the microwave. Simply slide the turntable into the cavity and press start.



iWave is as accurate as internal temperature probes.

The data is in. When compared to the industry standard of fiber-optic temperature control, iWave is just as accurate. You get the exact temperature of every sample with precision and simplicity.

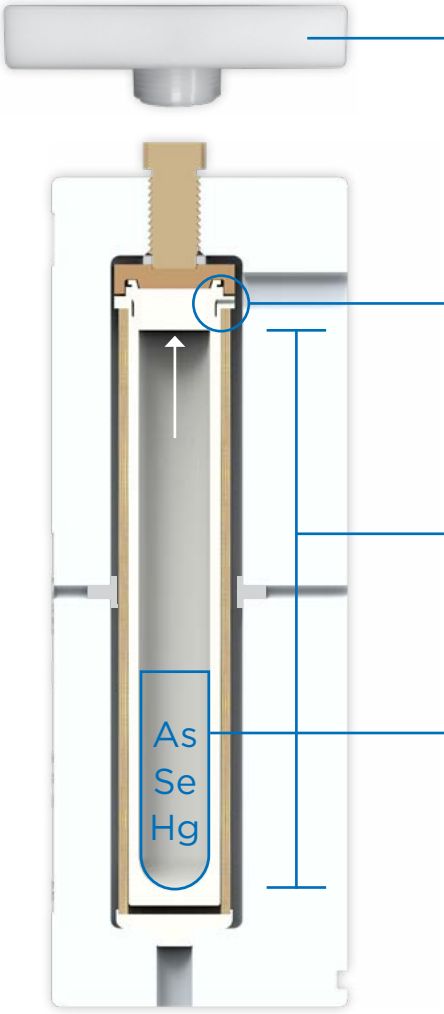
Traditional temperature and pressure control options are still available.

For certain applications, fiber-optic, IR, and internal pressure controls are either more cost-effective or necessary to operate certain vessel types. All MARS 6 units are capable of fiber-optic, IR, and internal pressure control. Consult your CEM representative to determine what best meets your requirements.

iPREP®

The most advanced digestion vessels ever made.

iPrep can digest up to 2x more sample per run, and has higher operating parameters than any other vessel. Larger samples ensure homogeneity and increase limits of detection, a plus for any lab.



Hand Torque Tool

There's no need to use a heavy wrench to assemble iPrep vessels. Our custom-fit hand torque tool makes it easy to properly assemble the iPrep vessels, while reducing hand fatigue. One click is all it takes to apply the correct amount of torque, everytime; making it imposible to overtighten or undertighten the vessels.

Dual-Seal Advantage

The high temperature and pressure conditions afforded by this seal and vessel design provide for the complete digestion of difficult organics, such as PET, bunker oil, organic dyes, toner, thermoplastics, and many other difficult-to-digest materials.

2X Capacity

In addition, its large 110 mL volume allows for larger sample sizes, as compared to other high-performance vessels.

Elemental Integrity

The dual-seal function provides for unmatched control of the byproducts from digestions such as CO_2 and NO_x fumes. These are precisely vented outside the vessel, while maintaining the full integrity of all elements, even volatile analytes such as As, Se, and Hg.

MARSXpress™

The easiest-to-use, high-throughput vessel on the market, this patented, three-piece vessel assembles in seconds. The open turntable design and composite sleeves allow for quick cooling. MARSXpress, vessels have a self-regulating pressure control, to eliminate the risk of over pressurization.

EasyPrep Plus™

This high-temperature, high-pressure reaction vessel is simple-to-use. EasyPrep vessels have fewer pieces to assemble and do not require membranes or springs for reliable pressure control. EasyPrep style vessels provide high temperature and pressure conditions for difficult matrices.

	MARSXpress TFM	**MARSXpress PFA**	**MARSXpress Plus**	**MARSXpress Plus** with DuoTemp™	**EasyPrep & EasyPrep Plus**	**iPrep** for iWave
Pressure	Medium				High	Very High
Throughput	High	High	High	High	Moderate	Moderate
Samples	Digests wide range of standard materials				Digests a wide range of standard materials	Digests the widest range of samples at highest sample weights
Main Features	• Simple three-part assembly • Open architecture promotes quick cooling				Can be used with any CEM control option	• 2x sample size • no probes needed • easy-to-use
Temperature Control	IR, iWave	IR, iWave	IR, iWave	IR, fiber-optic, iWave	fiber-optic, iWave	iWave
Vessels	40	40	24	24	12	16
Liner	TFM	PFA	TFM/PFA	TFM	TFM	TFM
Inserts	N/A				quartz & Teflon®	Teflon®
Volume	55 mL 75 mL	10 mL 20 mL 55 mL 75 mL	110 mL	110 mL	100 mL	110 mL
Typical Application	EPA methods, environmental, food, pet food, feeds, fertilizers, filters, pharmaceutical, nutraceutical, vitamins, tissue, paint chips, clinical, fertilizers, some polymers and edible oils				All MARSXpress samples plus, geological, ceramics, catalysts, precious metals, catalysts, RoHS materials, coal, slags, oils, polymers	All EasyPrep samples plus bunker Oil, PET, flame retardants, and larger sample sizes

Acid Distillation System

Make your own ultrapure acids or water for critical analytical applications, reduce background analyte interference, and save money.

- System pays for itself in less than 3 months
- Clean acids mean clean blanks
- Distill up to 40 mL per hour

Vessel Inserts

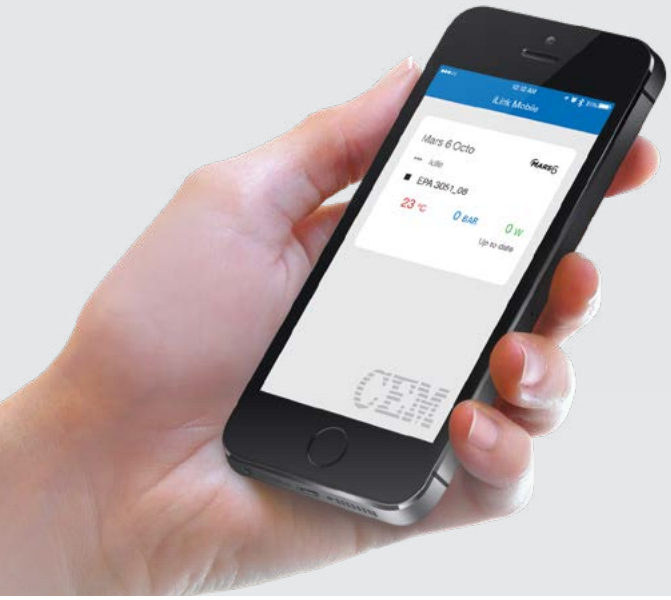
Offered in high purity quartz and Teflon®. Only CEM controls the temperature inside the insert, not the solution in the secondary vessel. This provides a more accurate and reproducible digestion.

- Use less acid volume
- Lower dilution factor
- Lower analytical banks

Disposable Teflon® Liners

The Teflon liner protects the vessel from batch-to-batch contamination without washing vessels between runs. Disposable liners are the perfect accessory for high-throughput labs running USEPA 3051A and 3015A methodology. They can also be used for any digestion application run at or below 180° C for 30 minutes or less.

Note: iWave® Temperature Sensing required. Contact CEM to upgrade.



Monitor and control your MARS 6 from your mobile device.

With the iLink® app, you can monitor your MARS 6 and get results on your mobile device. You'll be free to move about the lab, and free to focus on other tasks.

Get it from Microsoft | GET IT ON Google Play | Download on the App Store

How it works

iLink is your 24/7 connection to CEM. Directly connect to CEM from the iLink home screen. Download manuals, application notes, and reference papers at the touch of a button. You are always connected to CEM support with iLink.

Home Screen Advantage

Easily view the most important stats on the home screen such as power, pressure, temperature, and run status.

Run Multiple MARS 6 systems

Control and monitor multiple MARS 6 systems easily from your mobile device. Functions like Remote Start, Stop, Pause, and Run make it simple.

Documentation

Create lab reports with individual vessel statistics, such as Sample ID, Reagents Used, Mass, Volume, Description, and even photos.

MicroVap™

Reduce your acid volume with the MicroVap accessory. The only system that automatically shuts off when final volume is reached. No more guessing. Eliminates boric acid neutralization step when using HF.

AutoCal™

Simple and fast NIST traceable calibration source for iWave and IR sensors. Calibrate sensors at temperatures up to 175 °C.

MARSXpress Capping Station

Provides for rapid and automated capping and uncapping of MARSXpress vessels.

Anti-Static Ionizer

Perfect tool for weighing materials into Teflon® vessels. This is especially useful for powdered samples and for laboratories with low humidity.

Key Features of MARS 6

Construction

Steel Cavity

A solid steel cavity construction, using industry leading 316 stainless steel for durability.

Acid Resistant Shell

A high impact, acid resistant polymer shell that is corrosion proof.

Spring-Mounted Door

A heavy duty spring mounted door that will automatically relieve any pressure from a vessel event.

Hardware & Software

Compliant Software

Software is 21 CFR Part 11 compliant for electronic records and signatures.

Data Storage

The 8 GB of storage provides more than enough data storage for the lifetime of the system.

Ports

- 5 USB ports
- 1 USB-B port
- 2 Ethernet Ports
- 1 RS-232 Port (ensures future compatibility)

Safety Protocols

Temperature Control

The MARS 6 automatically limits the temperature to a safe range, and adjusts, as needed.

Auto Shut-off

The PowerMax™ Monitor will shut down the system if full power is applied over a specified time to prevent runaway reactions.

Reactiguard™

The Reactiguard cavity-sensing device automatically turns off the system if a vessel event occurs.

Ease-of-Use

Training Videos

On-demand training videos are available for viewing on the MARS 6 Display.

Touchscreen

7-inch glass capacitance, high definition display provides onboard control (no need for external controller or computer).

Vessel Recognition

MARS 6 counts the vessels prior to starting in order to calculate the precise heating conditions required.

We Simplify Science

cem.com

Over 50,000 systems sold worldwide

CEM has been an ISO-certified facility since 1994

All systems serviced & supported by experts with an average of 15 years of experience

CEM invests 11% of annual revenue into R&D, the result... 11 R&D 100 awards

IQ/OQ/PQ Validation by certified CEM Technicians

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