

# DISCOVER SP-D

MICROWAVE DIGESTION MADE SIMPLE



**CEM**

# Microwave Digestion – Made Simple

The Discover SP-D is more than the latest technology for microwave digestion: it is a new concept in sample preparation. Discover SP-D is a sequential, pressurized microwave digestion system that processes samples in 10 minutes or less, including cool down. There are no complicated, heavy vessels, no chillers required, and no need to batch samples. For Discover SP-D, simplicity is an integral part of the system, with every aspect of the instrument designed to make it virtually effortless.

## Quick Set Up

The Discover SP-D requires only a single plug-in connection and house air. It does not require costly chillers, nitrogen, or special power connections in order to operate. The system can typically be set up and operational in under 30 minutes.

## Easy Operation



With CEM's patented snap-on cap technology, a technician weighs a sample into the vessel, adds the appropriate acid(s), snaps on a cap and places it into the Discover SP-D. Programming is intuitive and the system features a large library of pre-loaded methods. The system requires no clamps or torque wrenches to operate.

## Faster Results

Using Focused™ Microwave Technology and enhanced cooling, most sample types are digested in 10 minutes or less — including cool down. It is the perfect solution for laboratories that receive "rush" samples for analysis.



## Load it and Leave It

Add an automation deck and your SP-D system will run unattended, even overnight. This permits technicians to work on other tasks while the SP-D continues to prepare samples. Imagine the productivity this provides for your laboratory.

## Every Sample is Unique and Controlled

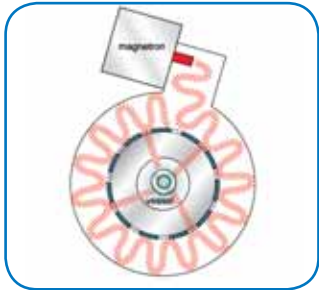
Each sample can have its own method allowing mixed samples and acid types to be run in sequence. No more waiting for samples to be received so they can be batched together. In addition, the temperature, pressure, and power parameters are captured for every digest and can be graphed for verification.



## Flexibility

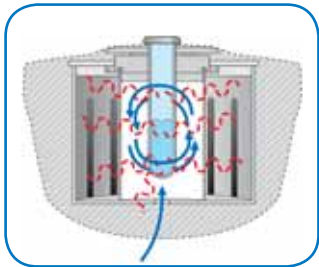
The Discover SP-D also offers flexibility in the range of sample sizes that it can process. The system can utilize 10- and 35-mL Pyrex® or quartz vessels. For larger samples up to 2 g, the new Discover SP-D 80 features an 80-mL quartz vessel.

## How Does It Work?



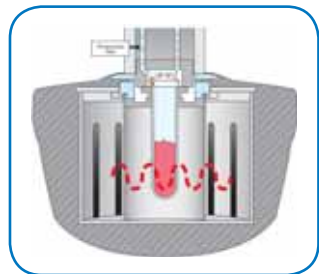
### Precise & Efficient Energy Delivery

The Discover SP-D utilizes CEM's patented Focused™ Microwave cavity, a self-tuning, single-mode design that produces a highly defined, extremely intense microwave field that is very reproducible. This cavity design intensifies the coupling of the microwave energy with acids and enables the system to process samples much faster than other microwave digestion systems, without the need for turntables or diffusers.



### Faster Digestions, Rapid Cooling

CEM's patented PowerMAX™ feature makes it possible for the Discover SP-D to introduce a maximum amount of energy to the sample while simultaneously cooling it. This drives the reaction to completion much faster, while rapidly accelerates cooling times, allowing the Discover SP-D to process individual samples faster than any other microwave system available.



### Pressure Control without Loss of Analytes

Lose the excess pressure, but keep your analytes of interest. CEM's patented ActiVent® Technology automatically measures pressure and controls venting of the sample vial to prevent loss of elements, including volatiles, such as mercury and arsenic.

## It Doesn't Get Any Easier Than This!

Each sample vessel is run under full pressure and temperature control. Different samples can be run sequentially with different reagents and methodologies.

### 1 LOAD YOUR SAMPLE.



### 2 SNAP ON THE CAP.



### 3 CHOOSE YOUR METHOD.



**In 10 minutes, your sample is ready to be diluted and analyzed.**





## What Would You Like to Digest?

A wide variety of applications have been developed for the Discover SP-D series. For a complete list, please visit us online at [www.cem.com](http://www.cem.com) and browse through our Applications library. In general, larger sample sizes and higher temperature samples are more suitable for the Discover S-PD 80.

- Air Fillers
- Aluminum
- Aluminum Oxide
- Animal Tissue
- Aspirin
- Bacon
- Banana Leaves
- Beer
- Bone
- Calcium Carbonate
- Cement
- Ceramic
- Cereal
- Cheese
- Citrus Leaves
- Clay
- Coal Ash
- Coffee
- Copper
- EPA 3051
- EPA 3052
- Fish Tissue
- Fertilizer
- Folic Acid
- Gold
- HDPE
- Infant Formula
- Kelp
- Magnesium Oxide
- Motor Oil
- Multi-vitamins
- Nylon
- Paint Chips
- Pharmaceuticals
- Peanut Butter
- Platinum
- Poly propylene
- Riboflavin
- RoHS
- Sand
- Sediment
- Sludge
- Sodium Aluminum Silicate
- Soil
- Talc
- Titanium Alloy
- Tuna
- Zinc Sulfate
- And more...



### Conostan Oil Results

	As 188.980	Se 196.026
Sample 1	47.31	48.08
Sample 2	52.96	55.42
Sample 3	53.6	55.22
True Value	50	50
Average	51.3	52.9
% Recovery	102.6	106
STD DEV	3.46	4.18
%RSD	0.0338	0.0394

Using the patented ActiVent Technology, 0.3 g of Conostan oil was digested. As demonstrated in the table above, the Discover SP-D 80 is able to provide a complete digest with cool down in only 10 minutes.

**Note:** Venting is preset and automatically controlled to prevent any element loss.

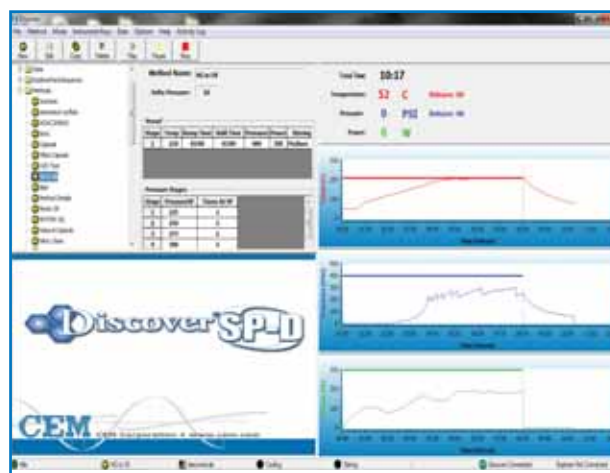
Which Discover SP-D is right for my lab?



Sample Type	Target Temperature °C	Sample Size 10/35-mL Vessel	Sample Size 80-mL Vessel
Pharmaceuticals	210	0.25 g	0.50 g
Food Materials	200	0.5 g	2.0+ g
Plant/Animal Tissue	200	0.25 g	0.5 g
Plastic/Polymer	210 - 230	0.2 g	0.5 g
Oil	200 - 230	0.2 g	0.5 g
Al <sub>2</sub> O <sub>3</sub>	240	N/A	0.25 g
Ceramics	240 - 260	N/A	0.25 g
USEPA	160 - 175	N/A	0.5 g or 50 mL

### Discover SP-D for Mercury Analysis

Mercury is a naturally occurring element that is found in air, water, and soil. It exists in several forms as elemental or metallic mercury, inorganic mercury compounds, and organic mercury compounds. Exposure to mercury can harm vital organs and the immune system. The Discover SP-D provides for fast and easy sample preparation for the analysis of mercury. A 0.4 gram sample of standard reference material (HGOMS) mineral oil was prepared in just ten minutes, including cool down. The SP-D provides superior temperature control and the snap-on cap offers the security of knowing that you have not lost any volatile mercury.



HGOMS	Hg-ppm
Sample 1	53.4
Duplicate	52.5
True Value	50
Average	52.95
% Recovery	106
SD	0.64
%RSD	1.2

### Mercury in Mineral Oil Results

Samples were prepared at CEM Corporation and were analyzed by a third party certified testing laboratory. Samples were analyzed using US EPA Method 1631 E (Cold Vapor Atomic Fluorescence Spectrometry).

# 10 MINUTE DIGESTIONS

## Discover Innovative Features

The new Discover SP-D 80 expands the sample capability of the SP-D series while retaining all of the popular features of the 35-mL system.

### Individual Control of Every Sample

No need to batch similar samples  
Runs any sample and acid matrix

### Automated Sample Handling

Load it and leave it — Runs completely unattended, even overnight, to free lab personnel for other tasks

### Fast Throughput

A sample every 10 minutes including cool down

### Large Sample Sizes

Up to 2 g or 50 mL

### Temperature and Pressure Control of Every Sample

All samples under full control for maximum safety and the most reproducible results

### 5-Minute Cooling Without a Chiller

### Easy-to-Use Synergy-D Software

Electronic documentation of every sample  
Administrative controls  
CFR compliant



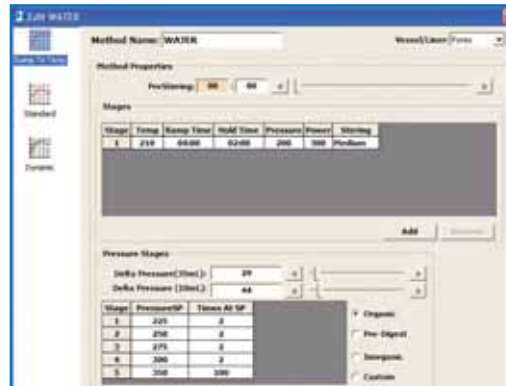
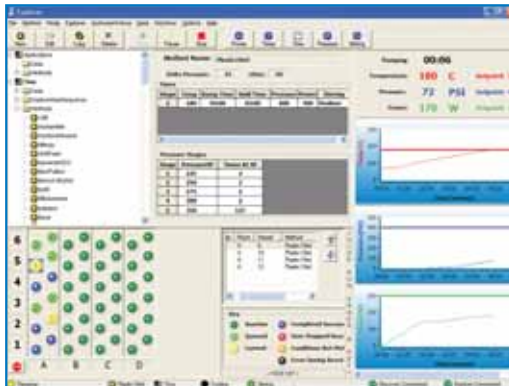
# Software, Vessels & Accessories



## Synergy-D Software

CEM's Synergy-D software is easy to use, yet powerful and flexible.

- Real-time display of temperature, pressure, and microwave power
- Pre-installed methods for many sample types
- Sample queues that mix methods and sample types in a single run
- Customizable sample reports
- Method creator to customize methods
- Administrative and standard user controls
- Hot keys to modify temperature, pressure, and time during a run
- 21 CFR Part 11 compliant software



## Vessels & Accessories

- 10- and 35-mL vessels available in Pyrex® or quartz
- 80-mL vessel available in quartz
- Snap-on caps available for all vessels
- Teflon® liners available for all vessels (Required when using hydrofluoric acid)
- Stir bars available in 2 sizes (Required for running digestions)



## NIST Traceable Calibration Device

ensures accurate temperature measurement and complies with the requirements of GLP/cGMP, ISO, and IQ/OQ/PQ documentation.

## INSTRUMENT SPECIFICATIONS

<b>Power Output</b>	300 Watt magnetron
<b>Power Requirements</b>	100 - 120 VAC, 50 Hz 200 - 240 VAC, 60 Hz
<b>Pressure</b>	Monitor and control up to 500 psi (34 bar) ActiVent® Self-Venting Technology included for pressure relief during or after reaction
<b>Temperature</b>	Up to 240 °C control range Up to 260 °C control range (Discover SP-D 80 only)
<b>Air Cooling</b>	Min 30 psi/2 bar (3cfm flow) user-supplied for simultaneous cooling (PowerMAX) and rapid cool down
<b>Automation</b>	24-position (Discover SP-D 80 only) 48-position [up to 48 (10-mL) vials or 24 (35-mL) vials] 72-position [up to 72 (10-mL) vials or 36 (35-mL) vials]
<b>Stirring</b>	Electromagnetic variable speed
<b>Patents</b>	6,607,920 6,713,739 6,966,226 7,550,560 6,649,889 6,886,406 7,141,769 7,563,865 6,753,617 6,917,023 7,144,739 Worldwide Patents Pending



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Pyrex® is a registered trademark of Dow Corning.  
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