

# DISCOVER SP

Microwave Synthesis Technology

# Discover<sup>®</sup>

# SP



# CEM

## INNOVATIVE ENGINEERING FOR SIMPLE OPERATION

Discover SP is engineered for superior performance. Intuitive software and quick programming make Discover SP the easiest to operate microwave synthesis system you'll ever use.

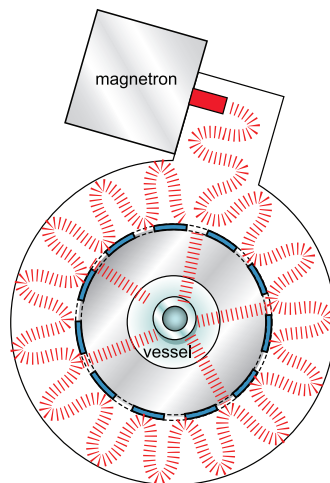
**THE BEST-SELLING MICROWAVE SYNTHESIS PLATFORM** takes another leap forward with Discover SP. This new system has all of the features for which the Discover series is known, plus an enhanced heating capability, and CEM's new ActiVent Technology, all in one compact simple-to-operate system. As the most advanced technology designed for microwave synthesis, the Discover SP provides superior flexibility with easily interchangeable accessories that enable you to customize a system so you can do your chemistry, your way.

## ENERGY EFFICIENT

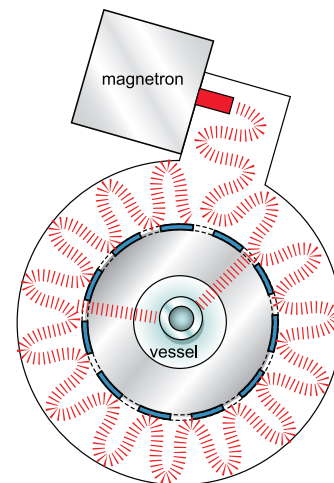
### Why use more power than you really need?

Our patented cavity design compensates for:

- The changing chemical properties of the reaction and allows the optimum amount of microwave energy to reach the reaction to ensure safe heating
- Various working volumes, ranging from 0.2 to 75 mL, to remain optimally tuned



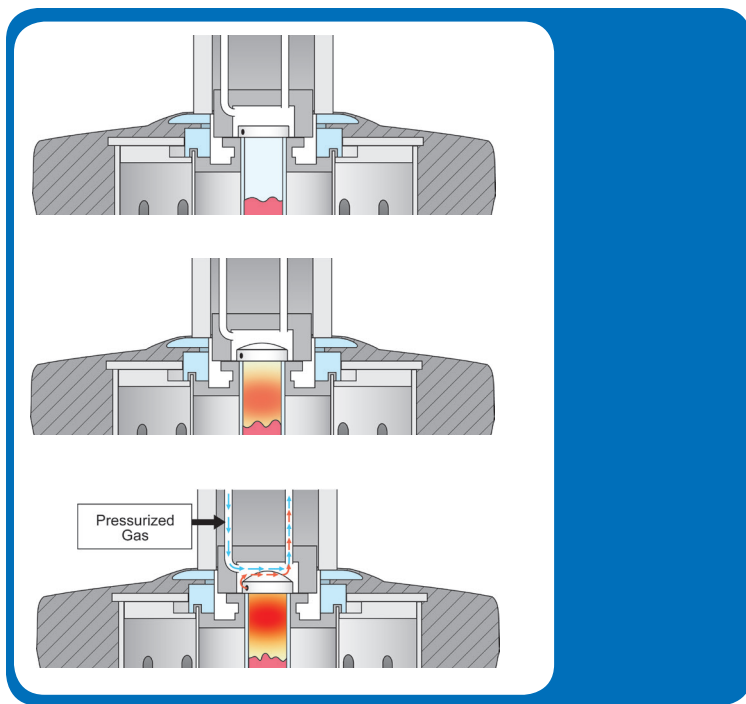
Less Polar and/or Ionic Sample



More Polar and/or Ionic Sample







### ActiVent™ Technology

**Control your reaction in more ways than ever before.**

CEM's patented ActiVent™ Technology is the latest advance in automated pressure control and the safest way to perform pressurized reactions. The ActiVent pressure control system was designed to work exclusively with ActiVent vessels and caps to give you greater flexibility in pressure control and optimum results.

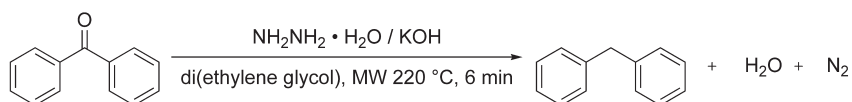
#### Vent as your reaction progresses or after it is complete

- Perform high temperature/high pressure reactions using either parameter to safely and effectively control the reaction without venting.
- Automatically program the system to release a gaseous byproduct as it forms.
- Ultimate programmability for your reaction. Any material that is released is vented safely through exhaust tubing to a location specified by you.

#### Vent more effectively during a reaction

- Release unexpected pressure quickly and safely, allowing the reaction to proceed to completion.
- Safely remove unneeded gaseous by-products and help shift the equilibrium of your reaction to generate more product, quickly.
- Perform the reaction in a completely sealed environment.
- ActiVent safely releases the pressure after the reaction is complete without user intervention.

Wolff-Kishner Reduction



**It's your choice. Your chemistry, your way.**

## SUPERIOR DESIGN FOR SIMPLE OPERATION

CEM's patented ActiVent caps for pressure vessels offer a secure seal without the need for crimping tools.

## DISCOVER SP INNOVATIVE FEATURES

### Self-Tuning Cavity

takes all of the guesswork out of ensuring that your reaction is positioned correctly every time, no matter which vessel you use. As the reaction progresses, the microwave energy distribution adjusts automatically for changing chemical properties to optimally heat the reaction.

### Focused Microwave Cavity

is the core of the Discover System. Built around the largest single mode cavity available, the Discover System's circular waveguide efficiently uses up to 300 W of power.

### Volume Independent IR Temperature Sensor

provides the simplest means to measure the temperature in a reaction in a non-invasive manner. No need for multiple reaction vessels or large minimum volumes with the IR mounted on the bottom.

### ActiVent™ Pressure Device

Programmable reaction venting to relieve gaseous by-products and reduce vial failures.

### Simple Integrated Attenuator Design

allows full access to the Discover cavity to simplify cleaning process and provide the ultimate flexibility in vessel selection.

### 300-mL Cavity

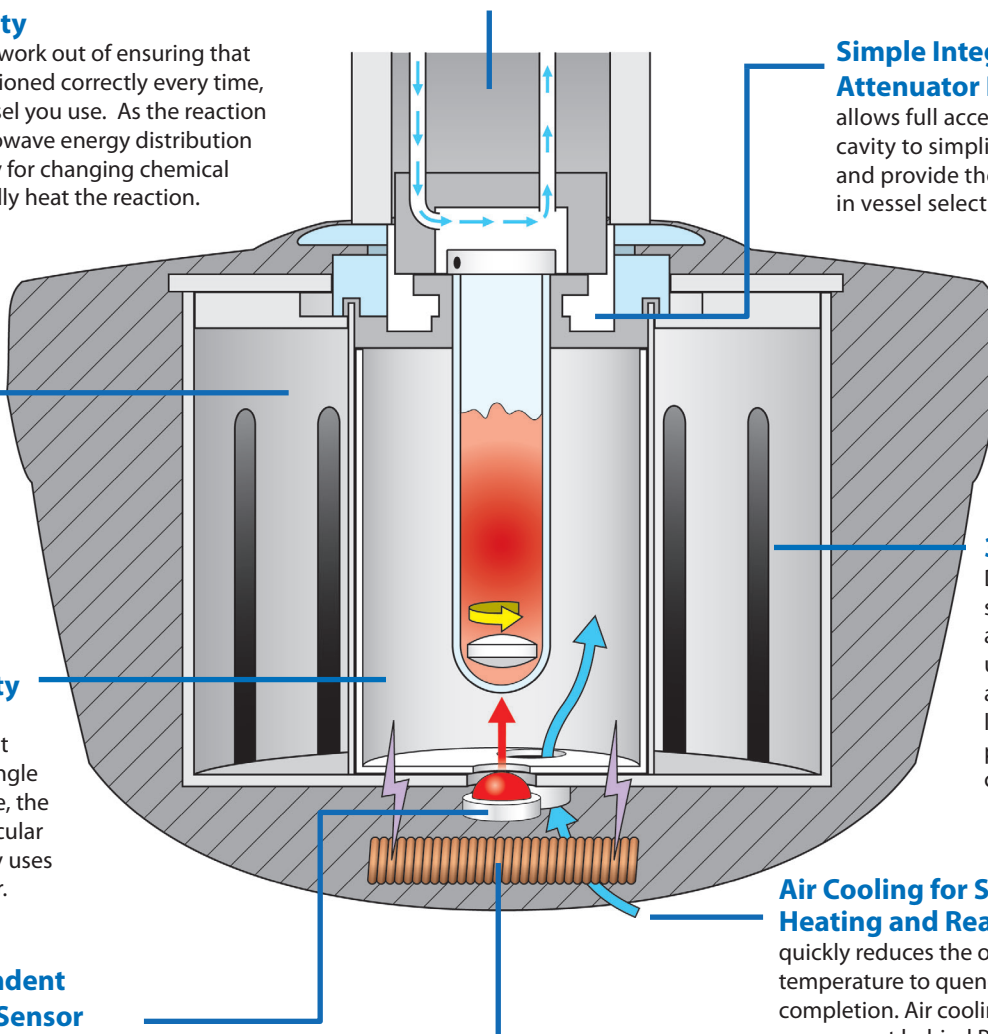
Discover has the largest single-mode cavity available, providing unprecedented access and vessel flexibility. It is lined with a spill cup to protect the IR and make clean up easy.

### Air Cooling for Simultaneous Heating and Reaction Quenching

quickly reduces the overall reaction temperature to quench the reaction upon completion. Air cooling is also the critical component behind PowerMAX™ Technology.

### Electromagnetic Stirring

to ensure maximum agitation for your reaction mixture. Adjust the speed to guarantee your sample mixes each and every time.



### PowerMAX™ Simultaneous Cooling

CEM's patented PowerMAX technology uses compressed gas to cool the reactant mixture while simultaneously applying more energy than would normally be used. Reactions proceed much more quickly than normal and do not have time to form side products. This technology is ideal for reactions that require a substantial amount of energy, but may be temperature-sensitive.

### Durable Design

An advanced membrane design and specially formulated coating protects parts from solvents and reagents.

### Easiest to Clean

Discover SP is designed with a removable spill cup, as well as a drain tray for easy clean up. There's nothing to disassemble, just clean out the cup and the tray and you're ready to run another reaction.

## EASIEST-TO-USE VESSELS

YOU CAN'T GET ANY EASIER THAN  
CEM'S ActiVent™ CAPS.

NO TOOLS REQUIRED



Perform either **pressurized reactions** in 10, 35, or 80 mL vials or **non-pressurized reactions** in standard laboratory glassware up to 125 mL round-bottom flask. Continuous flow vessels are also available.



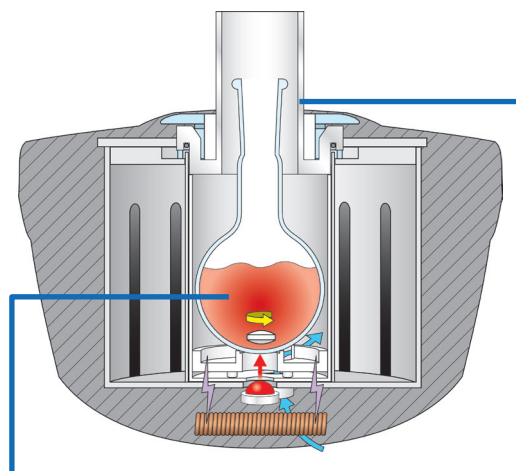
10 mL

35 mL

80 mL

## OPEN VESSEL REACTIONS

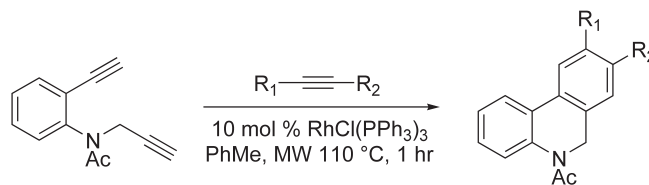
Discover SP is the only single-mode microwave synthesis system capable of also performing open vessel reactions using standard laboratory glassware and condensers. Discover SP accepts up to a 125 mL round-bottom flask and allows reagent addition and overhead stirring. It can be used with or without a reflux condenser. Temperature can be measured using either the built-in IR sensor or the optional Fiber Optic Temperature Control.



Use round-bottom  
flasks up to 125 mL

Open Vessel  
Attenuator

[2+2+2] Cyclotrimerization



Sripada, L.; Teske, J.A.; Deiters, A. *Org. Biomol. Chem.* 2008, 6, 263-265.  
Youg, D.D.; Deiters, A. *Angew. Chem., Int. Ed.* 2007, 9, 735-738.

### Advantages of Open Vessel:

- Use standard glassware
- Work on a larger scale
- No risk of pressure build-up
- Easy access to reaction for reagent addition or reaction sampling
- Use of overhead stirring for viscous mixtures



## EXPLORER SP AUTOMATION

Optimize your reactions and expand the capabilities of your laboratory without expanding your lab space. Explorer modules for the Discover SP platform provide fully automated reaction handling capabilities and are an ideal solution to support small groups of chemists as a shared resource.

### Explorer 12 Hybrid

All of the benefits of a large format autosampler within the footprint of the world's smallest manual reactor. This 12-position autosampler accommodates both the 10 and 35 mL vessels and is the best value of any autosampler commercially available.



### Explorer 48, 72, & 96

CEM manufactures autosamplers to accommodate both 10 and 35 mL sealed vessels. Run either size or a combination of both easily. Intelligent rack design allows the autosampler to recognize the vessel type without user input and the integrated robotics ensure that switching between 10 mL and 35 mL reaction vessels occurs seamlessly, freeing your time for other things.

	10-mL Vessels	35-mL Vessels
Explorer 12	Up to 12	Up to 6
Explorer 48	Up to 48	Up to 24
Explorer 72	Up to 72	Up to 36
Explorer 96	Up to 96	Up to 48

**Mix and match reaction vessel sizes for the ultimate in flexible reaction setup.**

## CoolMate™

The CoolMate™ is the only commercially available microwave system designed to perform reactions at sub-ambient temperatures. Reactions such as lithiation, carbohydrate synthesis, and other temperature-sensitive chemistries can now benefit from the use of microwave energy. Use the power of microwave energy to accelerate reactions even at temperatures as low as -80 °C.

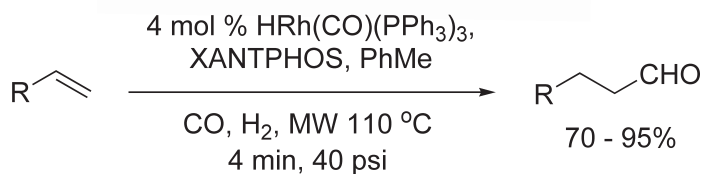


## ACCESSORIES

**Fiber Optic Temperature Control** provides the most precise temperature measurement available by directly measuring the temperature inside the reaction vessel. It can be used with 10 mL reaction vessels designed for this purpose, as well as with the 80 mL vessel. Other accessories, including the CoolMate™ and Gas Addition Kit use this type of temperature measurement.

## Gas Addition

The Gas Addition accessory is the only system specially designed for reactions with gaseous reagents. Perform hydrogenations, carbonylations, or other reactions with gaseous reagents or simply use the vessel to ensure an inert atmosphere during microwave irradiation. This system allows you to purge the reaction vessel and back-fill it with a gas. During the reaction, the gas source is completely shut off from the microwave, thereby ensuring your safety at all times.

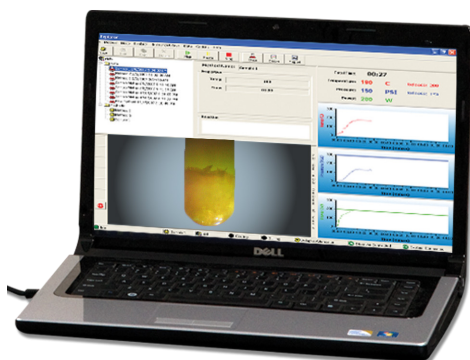


Petricci, E.; Mann, A.; Schoenfelder, A.; Rota, A.; Taddei, M. *Org. Lett.* 2006, 8, 3725 – 3727.

## Camera

The optional Integrated Camera allows you to see the changes occurring during your reaction. It's the perfect tool for documentation and publication support.

- Plug-n-play design
- Fully adjustable with high quality images
- Compact
- Simple to use



## SPECIFICATIONS

<b>HEATING RATE</b>	2-6 °C/second
<b>TEMPERATURE</b>	-80 to 300 °C
<b>PRESSURE</b>	0-30 bar (0-435 psi) ActiVent Self-Venting Technology included for pressure relief during or after reaction
<b>REFLUX REACTION COMPLIANT</b>	Open vessel option included for reflux reactions
<b>POWER</b>	0-300 W
<b>TEMPERATURE MEASUREMENT</b>	Infrared for volume-independent non-invasive temperature measurement. Fiber optic probe for direct feedback
<b>OPERATING VOLUME</b>	0.2 – 75 mL atmospheric 0.2 – 50 mL pressurized
<b>REACTION AGITATION</b>	Electromagnetic stirring with adjustable speeds
<b>AIR COOLING</b>	≥25 psi (20 L/min flow) user-supplied For Simultaneous Cooling (PowerMAX) and reaction quenching
<b>AUTOMATION</b>	12-position [up to 12 (10 mL) vessels or 6 (35 mL) vessels] 48-position [up to 48 (10 mL) vessels or 24 (35 mL) vessels] 72-position [up to 72 (10 mL) vessels or 36 (35 mL) vessels] 96-position [up to 96 (10 mL) vessels or 48 (35 mL) vessels]
<b>AVAILABLE ACCESSORIES</b>	Camera CoolMate Sub-Ambient Microwave System Gas Addition kit Flow Cell Peptide Synthesis Module Enzymatic Digest
<b>WEIGHT</b>	38 lbs. (17.3 kg)
<b>DIMENSIONS</b>	14.2"W x 16.9"D x 11.2"H (36.1 cm x 42.9 cm x 28.4 cm)



CEM has been an ISO-certified facility since 1994.

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