A NEW CATEGORY OF AUTOMATED MICROWAVE DIGESTION

NovaWAVE

INCREASE THROUGHPUT - DIGEST UP TO 168 SAMPLES
MIXED SAMPLES IN THE SAME RUN OR CREATE INDIVIDUAL METHOD PER VESSEL
– COMPLETE FLEXIBILITY AT YOUR FINGERTIPS
MULTIPLE SAFETY FEATURES – PROTECTION FROM “RUNAWAY” SAMPLES
**NovaWAVE** is a new, fully automated, sample digestion tunnel employing 12 dynamically created microwave minicavities to simultaneously process 12 samples in Quartz or Fluoropolymer vessels. **NovaWAVE** is available in two models:

**Model SA**: A Stand Alone **NovaWAVE** Microwave Tunnel Digestion System with all available software and operational parameters including the flexibility of unique, individual method assignments for each sample in a 12 sample rack. For labs with limited samples, the Model SA is the instrument of choice. Speed and flexibility are built-in with the capability of running a rack of samples with individual sample temperature programs. Simultaneously, digest water and soil samples in the same rack with an optimized digestion program employed for each sample. Model SA can be upgraded at any time to a full Model FA through the acquisition of the Transporter and additional racks, vessels and Fluoropolymer caps.

**Model FA**: A Fully Automated **NovaWAVE** Microwave Tunnel Digestion System with all the software and operational parameters employed in the Model SA; plus the Transporter, Auto-Cooling and Auto-Venting Stations to complete the automation. The Model FA provides unattended, automatic processing of up to 14 racks totalling 168 samples. Racks can be left on the Transporter after processing, as in an after-hours run, or removed immediately for sample analysis once the rack leaves the Auto-Venting Station.

Laboratories with a large number of samples can enjoy the same method flexibility as the Model SA throughout the entire 14 racks of 168 samples. Sample vessels are placed in racks which are moved under software control into the microwave tunnel. Dynamically, 12 microwave mini cavities are formed and energy is delivered to each mini cavity according to the digestion method selected. On exiting the tunnel, the rack proceeds to the Cooling Station and a second rack enters the tunnel to begin its digestion sequence. Once digestions in the second rack are completed, it moves to the Cooling Station with the first rack moving to the Auto-Venting Station. Here, vessels are safely vented automatically when they reach a pre-assigned temperature pre-set in the method.

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**THROUGHPUT**

High sample throughput with the **NovaWAVE** FA is achieved through unique design and full automation. Racks can be prepared with 12 vessels of weighed samples in less than a minute through conveniences and automation built into the rack design. Post digestion, samples are cooled and vented external to the tunnel maximizing the time the tunnel is available for additional samples. Samples are simultaneously digested, cooled, and vented automatically as others are being analyzed providing a continuous, uninterrupted production from sample weighing to analysis. Using calibrated vessels, a sample stays with its tube from weighing until analysis eliminating sample transfer time and potential sample I.D. errors.

Assuming a 1 minute weighing time, a 10 minute digestion time, a 1 minute normalization time, and a 1.5 minute analysis time, 276 samples can be processed from weighing, through the **NovaWAVE**, and analyzed by ICP-AES or MS in an 8 hour shift. In addition, 168 samples can be loaded at the end of the day, digested over night, ready for further processing in the morning.

- Use a new or stored method for each sample
- Process up to twice as many samples per day compared to conventional microwave digestion systems
- Control temperature of each sample independently
- Digest 12 samples simultaneously in 10 minutes or less
- Digest, cool and vent 168 samples completely automatically - no human intervention
- Independent and unique sample digestion tunnel, auto-cooling and auto-venting stations
OPERATION, CONTROL AND FEEDBACK

The NovaWAVE Digestion System is operated through the intuitive and informative touch screen interface. Operating parameters and method selection are programmed through simple, single touch entries and drop down menus.

Security, data and method integrity are achieved through password protected, multi-level access which allows for different permissions for operators, administrators, and service personnel.

The operation starts when a rack of 12 samples enters the tunnel and is identified by the rack reader. This information is transferred automatically to the controller which then assigns the appropriate digestion method to each sample or rack as requested in the program. Power is directed to each sample through individual sample mini cavities in response to the pre-set temperature profile programmed in the method. Each sample temperature is monitored by its respective IR sensor providing feedback to the controller which instructs each mini cavity solid state, power supply module to direct more or less energy as required. Microwave power is continuously variable providing seamless, precise temperature control to each sample independently. A dynamic, visual display of all 12 sample temperatures is provided.

METHODS

The most popular EPA and DIN Methods are pre-installed in the NovaWAVE software package. Operators can edit, copy and add new methods through the user friendly, color touch screen. Methods can be created, changed or modified while samples are in the digestion process adding to process efficiency and improving sample throughput.

Different types of samples may require different methods. To provide maximum flexibility in optimizing methods, multiple “Time to Temperature” and “Time at Temperature” plus “Direct to Temperature” profiles can be included in each method. Methods can be assigned in 3 ways: CYCLE: All samples in a run of up to 14 racks can be assigned the same method. RACK: All samples in an individual rack can be assigned the same method. SAMPLE: Each individual sample in a rack can be assigned a different method.

The software provides automated method switching from rack to rack, or sample to sample using an unlimited number of user-created or pre-installed methods which are assigned to either individual samples or all samples in the rack. When rack identification is made in the tunnel, the information is transmitted to the Run file which then automatically assigns the appropriate method to the individual sample, or all samples, in the rack.
RACK and VESSELS

Racks can accommodate:
- 12 calibrated Quartz Vessels, 50 or 75 ml, or
- 12 Fluoropolymer vessels, 50 or 75 ml

Calibrated Quartz Vessels can be used throughout the sample preparation process (digestion, normalization, analysis) avoiding labor, time and potential contamination in transferring samples. Compared to Fluoropolymer, Quartz Vessels are more economical, last longer and contribute less potential cross contamination. Fluoropolymer vessels are essential when using HF.
RACK SET UP IS ACCOMPLISHED IN 5 SIMPLE STEPS IN UNDER A MINUTE:

1. Insert 1 to 12 vessels into a rack base
2. Place a Fluoropolymer Cap on each vessel
3. Place the Fluoropolymer Cap liner on each vessel.
4. Insert the Safety Cap Plate on the 10 uprights to rest on the Teflon® Caps
5. Slide the Safety Locking Plate forward securing the vessels
6. Adjust the Safety Caps to touch the Fluoropolymer Caps

The rack is ready for processing!

The functionality of the NovaWAVE vessels and rack save considerable time compared to other systems and enhance the total sample throughput time through automation while dramatically reducing operator involvement.
SAFETY and PROTECTION

Safety features for both operator and instrument have been employed throughout.

Safety Caps, positioned above each vessel, are set at a predetermined pressure safeguarding against vessel over-pressurization. During a digestion, should the internal pressure in a vessel reach the pre-set value, the Safety Cap releases and the vessel will vent automatically. To prolong their useful life, most exposed instrument and accessory components are Fluoropolymer coated or manufactured with materials resistant to corrosion and acid attack. All pressurized containers and components involved in pressure vessels have been pressure tested and are rated 3.5 - 4 times greater than their prescribed use.

SAFETY FEATURES INCLUDE:

- Safety Cap over-pressure detection with auto-venting
- Automatic power shutdown of a mini cavity when a vessel is not present
- In the event of tube breakage, power is shutdown to the mini cavity in milliseconds
- In the event of a “runaway” sample, over temperature protection is assured with automatic power shutdown to the mini cavity
- Safety messages and auto shut down for mechanical occurrences such as blocked doors, etc.

COMMUNICATION

Sample identification can be uploaded directly to the Rack file via a PC connection or directly linked bar code reader. Sample ID’s can be matched with the quartz vessel bar codes if appropriate vessels have been selected.

Reports can be downloaded to a USB flash drive or through the system’s Ethernet port to a laboratory computer or LIMS for data processing and storage.

SAMPLE DIGESTION REPORTS INCLUDE FOR EACH SAMPLE:

- Rack and Sample I.D.
- Digestion method used
- Sample Weight or Volume
- Temperature vs. time profile
- Maximum temperature achieved

The Ethernet and USB ports can also be used for remote diagnostics and software upgrades.
SPECIFICATIONS

Electrical Requirements
200-240VAC, 50-60Hz, 25A.
Detachable power cord, I.E.C.
and UL approved.

Microwave Energy
2.45 GHz;
12 x 2 50 W;
Continuous linear power levels delivered to 12
microwave minicavities under software control
using IR temperature sensor feedback.
Maximum controllable temperature of up to 200 °C.

Overall Instrument Dimensions
(Width x Height x Depth)
Stand Alone with wings:
57.5” x 29.5” x 24.4”
(145cm x 75cm x 62cm)
Fully Automated: 64.5” x 29.5” x 31.0”
(164cm x 75cm x 79cm)

Weight
Stand Alone: 148 lb (67 kg)
Fully Automated: 254 lb (115 kg)

CERTIFICATIONS:

APPLICATION NOTES LIBRARY

Are you digesting environmental, metallurgical, food, plant
or oils samples in your laboratory and not obtaining good
results? Our Applications Specialist may answer your
questions and provide insight on how to increase sample
throughput, optimize recovery levels or improve your
methodologies. At SCP SCIENCE we are dedicated to
finding a solution to your sample digestion needs.

A growing library of NovaWAVE application notes is becoming
available. Each of the notes demonstrates the ease of use and
effectiveness of NovaWAVE. Recent application notes include:

- The Digestion of Bovine Liver
- The Digestion of Polypropylene Plastic
- The Digestion of Soil Samples
- The Digestion of Lead in Paint
- The Digestion of Peach Leaves
- The Digestion of CONOSTAN oil based S-21 Standard

Contact your local Sales Representative or Distributor for more information.
Two ways to purchase a NovaWAVE:

**NovaWAVE SA**
Stand alone Microwave Tunnel Digestion System with software and hardware to digest 12 samples simultaneously. Racks, Vessels and Fluoropolymer cap liners are ordered separately.

**NovaWAVE FA**
Fully Automated Microwave Tunnel Digestion System with software and hardware to digest up to 168 samples automatically in a single run; includes the Model SA, Transporter with a capacity of up to 14 Racks, Auto-Cooling and Auto-Venting Stations. Racks, vessels and Fluoropolymer caps ordered separately.

**NovaWAVE** can be purchased as a Stand Alone SA and converted at any time to a Fully Automated FA model by purchasing the Transporter Accessory and additional racks, vessels, Fluoropolymer cap liners and Fluoropolymer caps.

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### ORDERING INFORMATION

**DESCRIPTION** | **QTY** | **CATALOG NO.**
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**NovaWAVE** Stand Alone (SA) Microwave Tunnel System, complete with entry/exit platforms | Each | 010-600-001

**NovaWAVE** Fully Automated (FA) system complete with Transporter, Auto-Cooling and Auto-Venting stations | Each | 010-600-002

Transporter with Auto-Cooling and Auto-Venting stations (required to upgrade model SA to FA) | Each | 010-600-003

Rack Complete, 50 ml, Quartz, SA | Each | 010-600-055

Rack Complete, 75 ml, Quartz, SA | Each | 010-600-075

Rack Complete, 50 ml, Teflon®, SA | Each | 010-600-057

Rack Complete, 75 ml, Teflon®, SA | Each | 010-600-077

Rack Complete, 50 ml, Quartz, FA | Each | 010-600-155

Rack Complete, 75 ml, Quartz, FA | Each | 010-600-175

Rack Complete, 50 ml, Teflon®, FA | Each | 010-600-157

Rack Complete, 75 ml, Teflon®, FA | Each | 010-600-177

Quartz vessel, 50 ml, calibrated (Pk/6) | 010-600-051

Quartz vessel, 75 ml, calibrated (Pk/6) | 010-600-071

Teflon® PFA vessel, 50 ml (Pk/6) | 010-600-053

Teflon® PFA vessel, 75 ml (Pk/6) | 010-600-073

Support Sleeves for 50 ml Teflon® vessels (Pk/6) | 010-600-054

Support Sleeves for 75 ml Teflon® vessels (Pk/6) | 010-600-074

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### ORDERING INFORMATION

**DESCRIPTION** | **QTY** | **CATALOG NO.**
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PFA Teflon® caps for Quartz vessels (Pk/6) | 010-600-028

PFA Teflon® caps for PFA Teflon® vessels (Pk/6) | 010-600-027

Teflon® Liner with Plunger (Pk/6) | 010-600-020

Spacer Rack (14 positions less the number of racks ordered equal the number of spacer racks required) | Each | 010-600-017

Barcode reader | Each | 010-600-034

**NovaWAVE** and **MiniWAVE** Exhaust Hose Assembly 2.5 in. (65 mm) | 10 ft | 010-600-081

**NovaWAVE** Transfer Rack Stand | 1 | 010-600-040

Mixing Cap for Microwave vessel | 1 | 010-600-100

Venting Tool for **NovaWAVE** SA and **MiniWAVE** Safety Pressure Caps | 1 | 010-600-070

Weighing Support for Quartz vessel | 1 | 010-600-110

Weighing Support for Teflon® vessel | 1 | 010-600-115

**DigiFILTERs** Evaluation Kit | 1 | N/A