System Specifications

Emission and Safety Approvals
U.S. and Canada Emissions & Safety
Complies with FCC part 18 (47 CFR part 18 Industrial, Scientific and Medical Equipment)
US: ETL* approved to UL standard 3101 (laboratory equipment)
Canada: ETL** approved to standard CAN/CSA C22.2 No. 1010.1 (laboratory equipment)

European Community Emissions & Safety
Conforms to EC standard EN 55011 (Emissions for Industrial, Scientific, and Medical Equipment)
Conforms to EC standard EN50082-2 (Electromagnetic Compatibility – Part 1)
Conforms to EC standard IEC 1010-1
(Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1)

Temperature Capabilities
High Temperature Furnace . . . . . .1200 °C
High Capacity Furnace . . . . . .1000 °C

Electrical Ratings . . . . . .208-230 VAC, 60 Hz, 10 amps
220-240 VAC, 50 Hz, 10 amps
Universal tap switch allows electrical voltage to be switched from 208 to 230V, or 220 to 240V

Power Output . . . . . .1350 watts ± 50 watts (at nominal line voltage)

Magnetron Frequency . . . . . .2455 MHz

Exhaust Capabilities . . . . . .Phoenix: 130 CFM
Phoenix AirWave: 130 CFM (adjustable)

Balance Interface . . . . . .RS-232, 9-pin serial interface

Printer Port . . . . . .25-pin parallel

Computer Interface . . . . . .RS-232, 9-pin serial interface
(PC software to interface and collect data must be supplied by the user)

Overall Instrument Dimensions
Phoenix . . . . . .46.2(W) x 65.4(D) x 49.8(H) cm
18.2(W) x 25.75(D) x 19.6(H) in

Phoenix AirWave . . . . . .56.9(W) x 76.3(D) x 50.3(H) cm
22.2(W) x 29.75(D) x 25.7(H) in

Furnace Chamber Volume
High Temperature Furnace . . . . . .1.8 liters (112.5 in3)
High Capacity Furnace . . . . . .5.0 liters (263.4 in3)

Furnace Chamber Dimensions
High Temperature Furnace . . . . . .21.0(W) x 11.6(D) x 7.6(H) cm
8.25(W) x 4.5(D) x 3.0(H) in

High Capacity Furnace . . . . . .24.61(W) x 16.84(D) x 10.41 cm
9.69(W) x 6.63(D) x 4.1(H) in

Unit Weight . . . . . .44.2 kg (97.5 lbs)

U.S Patent 5,066,843 and other foreign patents.
*ETL and UL are equivalent nationally recognized testing laboratories.
**ETL is an approved testing laboratory by the standards council of Canada.

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ISO 9001:2000 certifies that the CEM quality management system meets internationally accepted standards.

B004.1

Phoenix

Microwave Muffle Furnace

Organic & Inorganic Ashing

Loss on Ignition

Residue on Ignition

Fusion

Heat treating

Drying

Wax burn-outs

Melting

Bonding

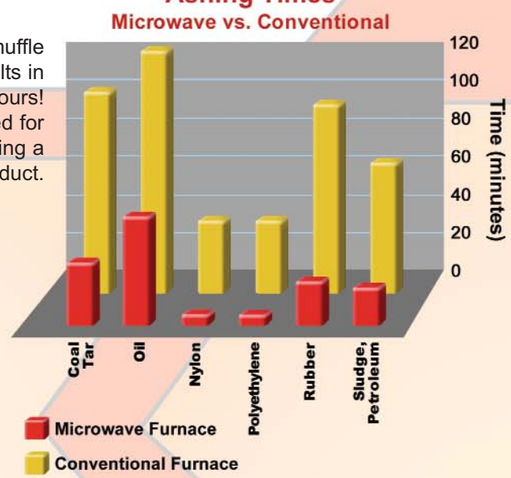
High temperature reactions

Reduce analysis times from hours to minutes!

Many diverse industries from food to petroleum products use muffle furnaces to ash product for analysis.

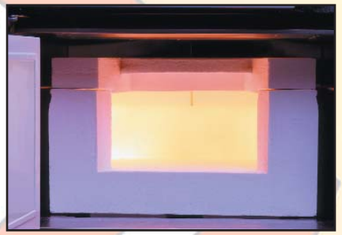
Ash samples in as little as 5 minutes!

Phoenix™ microwave muffle furnaces provide results in minutes instead of hours! Ashing can now be used for process control, ensuring a higher quality product.



Any crucible used in a conventional muffle furnace can be used in the Phoenix, even metal!

Phoenix muffle furnaces perform high temperature applications up to 97% faster than conventional designs.



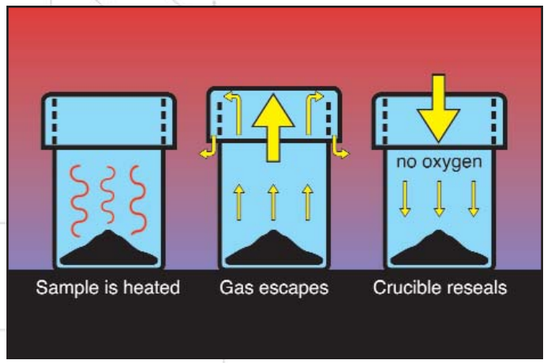
Phoenix microwave-powered muffle furnaces are available in configurations to fit any ashing need. They are fast, accurate and easy-to-use.

Reduce analysis time by as much as 98% with CEM Quartz Fiber Crucibles!

Patented Quartz Fiber Crucibles

CEM's unique quartz fiber silica crucibles dramatically reduce ashing times and cool in seconds. The quartz fiber material allows oxygen to circulate around the sample speeding combustion.

- *Speed sample oxidation using a flow-through advanced material design*
- *Withstand temperatures up to 1000 °C*
- *Disposable*
- *Safe (Cool in seconds, no need for dessication, eliminate the risk of burns from handling crucibles*
- *Unbreakable*
- *Available in 20, 50, or 100-mL sizes*



Self-Sealing Quartz Crucibles

For oxygen-free ashing, self-sealing quartz crucibles are available. Ideal for carbon black determination in polyethylene and polypropylene.

Accessories for the Phoenix Ashing Systems

Calibration Source Instrument (NIST traceable)

The calibration source instrument and built-in system software allow rapid calibration of the temperature control circuitry of the Phoenix Ashing Systems. A NIST traceable certificate of calibration is supplied with the instrument.

Digital Thermometer

Verify the programmed temperature by connecting the digital thermometer to the reference thermocouple.

Balance

The 100 g balance with 0.0001 g sensitivity for sample weighing communicates directly with any Phoenix via a RS-232 port.

Printer

Documenting analysis data is convenient using a multicolor printer available from CEM.

The Phoenix Advantage

Fast

- Results in minutes
- Rapid pre-heating
- Rapid and continous air exchange promotes fast and complete oxidation

Accurate

- Satisfies standard methods that require electrically heated furnaces
- Temperature control in 1 °C increments
- Built-in calibration software

Easy

- Programmable warm-up and shut down
- Enter and store up to 20 methods
- Programmable temperature control

Safe

- Reduces exposure to fumes and heat
- Automatic door interlocks
- Over-temperature and thermocouple failure safeguards
- Built-in system diagnostics

Phoenix meets the requirements of ASTM & USP Standard Methods

ASTM D5630-94	Ash content of thermoplastics
ASTM D1506-99	Carbon black ash content
USP 281	Residue on Ignition (Sulfated Ash)
USP 733	Loss on Ignition

Programmable Temperature Control

Temperatures up to 1200 °C can be programmed on any Phoenix System. Methods may be stored with individual ramp, dwell, and hold times.

CEM's exclusive, NIST traceable, Dual Thermocouple allows constant measurement of the furnace chamber temperature. Temperature calibration time and date are recorded in computer memory for display and/or printout.

There are two furnace sizes available for the Phoenix Systems...

The High Temperature 1200 °C furnace will hold up to 8 (25-mL) crucibles.

The High Capacity 1000 °C furnace holds up to 15 (25-mL) crucibles and is ideal for the laboratory needing greater throughput.

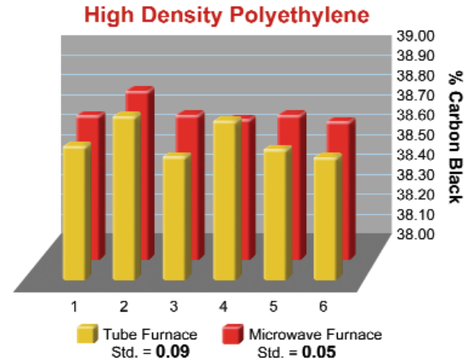
Typical Ashing Times

Material Being Ashed	Conventional (Minutes)	Microwave (Minutes)	Time Savings (%)
Butyl Rubber	90	20	78
Carbon Black	960	90	91
Cat Food (canned)	300	10	97
Coal	240	40	83
Egg (dried yolks)	240	20	92
Graphite Powder	240	35	85
Kaolin	120	30	75
Lactose	960	35	96
Paper	60	10	83
Polyester (filled)	480	15	97
Polyethylene (unfilled)	30	5	83
Polyethylene (% carbon black)	30	7	77
Polypropylene	30	5	83
Poultry (feed)	120	10	92
Pulp (market)	180	10	94
Silicon Carbide Mix	120	10	92
Sludge (municipal)	60	15	75
Sludge (petroleum)	60	35	42
Stearates	90	5	94
TiO_2	60	10	83

Phoenix AirWave

The Phoenix AirWave utilizes a patented fanless exhaust system to quickly and safely ash samples and remove large quantities of volatile by-products.

- Ash volatile organics, diesel, and jet fuel without a Bunsen burner
- Volume reduction of large samples in minutes by high-speed evaporation
- Increased airflow accelerates oxidation of samples
- Convenient-to-use, easy-to-clean
- Carbon black without nitrogen atmosphere or quartz tubes



The Phoenix AirWave™ meets the most demanding requirements of large organic samples with ease. It eliminates volume reduction/carbonization on hot plates or Bunsen burners.

Phoenix with Sulfated Ashing Option

Ash pharmaceutical raw materials, excipients, and finished products in minutes. The system meets ISO 14000 regulations for nitric acid and sulphur dioxide.

- Meets requirements for USP 281 Residue on Ignition & USP 733 Loss on Ignition
- Built-in serial and parallel ports provide full documentation of method, completion date, time, and calibration