



# Phoenix BLACK™

Microwave Muffle Furnace





## Rapid and simple ash analysis.

Ash samples with unmatched speed and safety with the Phoenix BLACK™. With an onboard touchscreen interface, you'll save time and simplify your workflow. Two powerful magnetrons heat the cavity, which allows for exceptional temperature control and lightning fast ramp times. Make rapid adjustments to reduce out-of-specification products and improve your process control.



## Fast

Ash samples up to 97% faster than with traditional muffle furnaces.

Go directly from the furnace to the balance with no desiccation step.

Ramp to temperature in minutes.

One-step ashing — complete pre-ash inside furnace without the need for a Bunsen burner.



## Safe

Active ventilation keeps the lab free from soot and odors.

NIST-traceable thermocouple ensures accurate temperature control.

Quartz fiber crucibles cool to the touch in seconds.

Integrated sensors hold cavity door open when furnace door is removed.



## Easy to Use

Easy-to-program methods with automatic start time and temperature ramps.

Pair with balance and printer for automatic results — no more manual calculations.

IQ/OQ/PQ service available for turnkey validation and audit traceability.

Automated sulfated ashing — simply place samples in the furnace and press Start.



## Meets Industry Requirements for Muffle Furnaces

The Phoenix BLACK satisfies requirements for methods that specify “electrically heated” furnaces, and also methods that specify “microwave heated” furnaces.

Temperature verification and temperature calibration for ISO and GLP practices are quickly and easily performed with optional accessories, including NIST traceable dual thermocouples and calibration source instruments.

### Most Common Methods

- ASTM D874-92 — Sulfated Ash content of Lubricating Oils
- ASTM D5630-94 — Ash content of Thermoplastics
- IP 501 — Fuel oil sample prep by Ashing
- USP 281 — Residue on Ignition (ROI)/Sulfated Ash
- USP 733 — Loss on Ignition (LOI)
- Various AOAC, FDA, ISO, and DIN methods
- And More ...

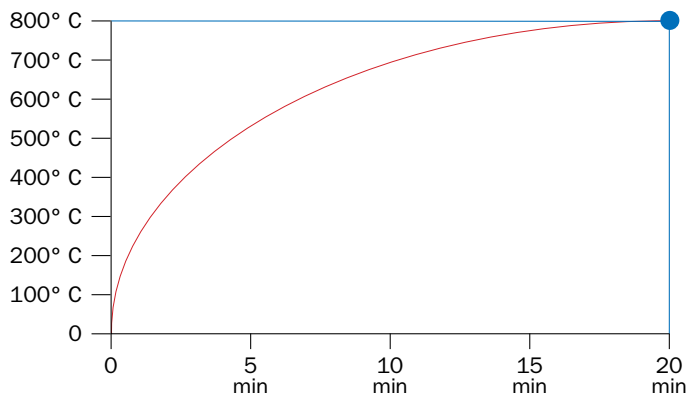
# Phoenix BLACK vs. other muffle furnaces.

## Automatic Pre-Ashing

Unlike other muffle furnaces, there's no need to pre-ash over a Bunsen burner. You'll have the ability to control temperature at various stages. You can simply put your sample in the cavity and start ashing.

The Phoenix BLACK can reduce ashing times to minutes, allowing time for the results to be used for improving process control (Figure 1). You now have time to make adjustments to your process, ensuring a higher quality product and less rework.

**Figure 1:** Typical Temperature Ramping of Phoenix BLACK



## Programmable Temperature Control

The Phoenix BLACK will maintain a uniform temperature throughout the furnace. It is the only microwave muffle furnace that has its heating element surrounding the cavity within the walls of the furnace. This provides greater temperature stability.

Programmable and automatic temperature controls are standard. For more control, the NIST-traceable dual thermocouple measures air temperature in the furnace center, allowing simultaneous, independent measurement of the furnace chamber temperature. The NIST-traceable Calibration Source Instrument calibrates the temperature controller with a time stamp. This helps with preparing documentation for audits.

**NOTE:** IQ/OQ/PQ services are available for installation and annual maintenance.

## Reduce Ashing Time from Hours to Minutes

A Phoenix BLACK will reduce ashing times from hours to minutes when compared to traditional muffle furnaces.

Material	Conventional (hours)	Phoenix BLACK (minutes)	Time Savings (percent)
Butyl Rubber	1.5	20	78
Carbon Black	16	90	91
Cat Food	5	10	97
Coal	48	40	83
Egg (dried yolk)	48	20	92
Graphite Powder	48	35	85
Kaolin	2	30	75
Lactose	16	35	96
Paper	1	10	83
Polyester	8	15	97
Polyethylene (unfilled)	0.5	5	83
Polyethylene (% carbon black)	0.5	7	77
Polypropylene	0.5	5	83
Poultry (feed)	2	10	92
Pulp	3	10	94
Silicon Carbide Mix	2	10	92
Sludge (municipal)	1	15	75
Sludge (petroleum)	1	35	42
Stearates	1.5	5	94
TiO <sub>2</sub>	1	10	83

## Bone Analysis in Less Than 15 Minutes

Get a fast, accurate, and direct bone content analysis without titrations and back calculations. Save money and increase production yields by running closer to target.

- Fast, direct method
- More accurate than titration
- No chemicals
- Automatically calculates results

Sample	% Bone	AOAC Bone	Difference
1	0.77	0.83	-0.06
2	0.70	0.76	-0.06
3	0.80	0.62	0.18
4	0.86	0.51	0.35
5	0.59	0.55	0.04
6	0.64	0.56	0.08
7	0.79	0.50	0.29
8	0.50	0.50	0
9	0.83	0.85	-0.02
10	0.85	0.88	-0.03

Bone Content Results: Mechanically Separated Chicken (MSC)

# How to Ash Samples

1



Tare crucible and weigh sample.

2



Select method.

3



Place in muffle furnace.

4



Press **Start**.

5



Weigh crucible with ash, to obtain the final result.





Run - Quick Test

Time 1:28  
Temperature (°C) 556

Status: Dwell at 550

Pause

Stop



556°C

11:11 AM

01/24/2024

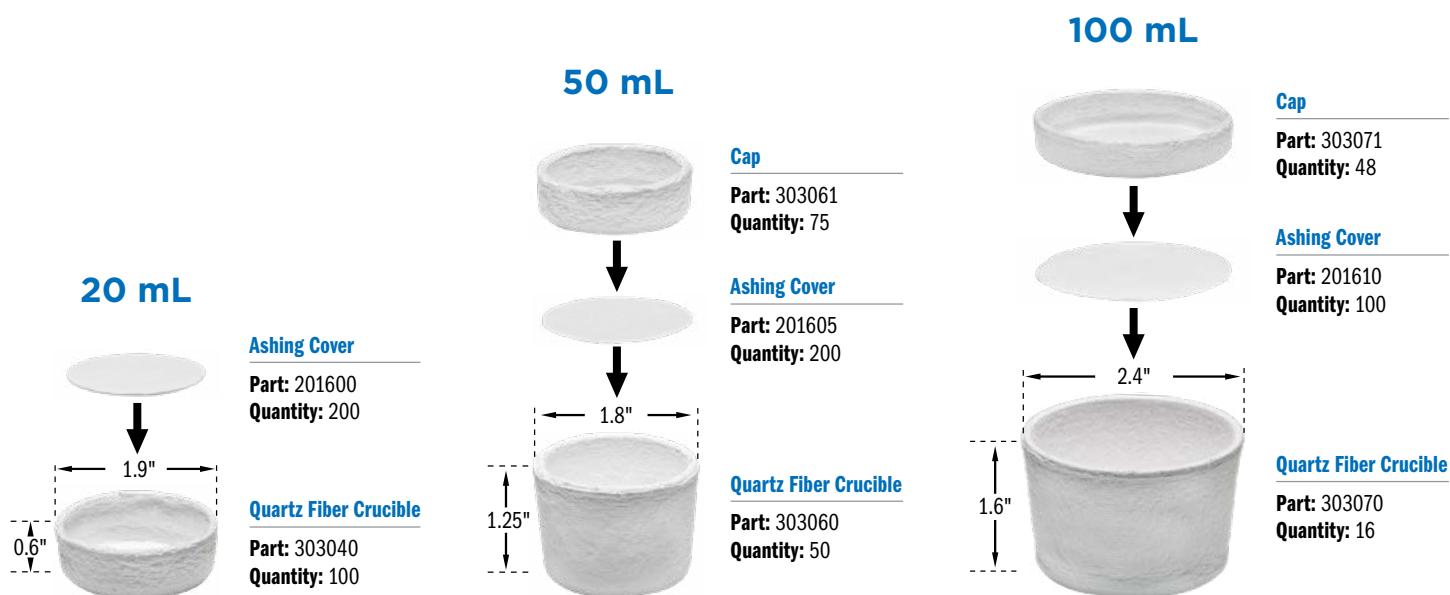
PhoenixBLACK  
Microwave Muffle Furnace

# Faster ashing crucibles that cool in seconds.

## Quartz-Fiber Crucibles

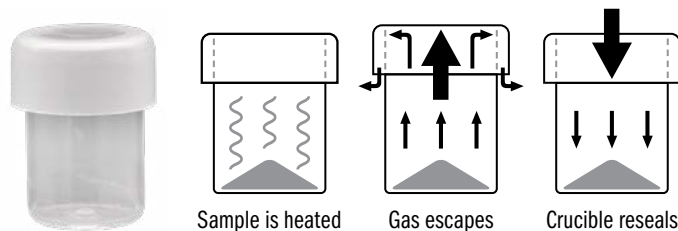
The Phoenix BLACK microwave muffle furnace can use any crucible that may be used in a conventional muffle furnace (including platinum), but it's hard to beat our patented, quartz-fiber crucibles for speed, convenience, and safety. The quartz-fiber material allows oxygen to circulate around the sample, dramatically reducing ashing times. Plus, it cools in seconds, eliminating crucible burns.

- Increases rate of sample oxidation
- Safe and unbreakable
- Does not require dessication
- Available in 20, 50, or 100 mL sizes
- Quartz-fiber crucible caps are available for 50 or 100 mL crucibles
  - Ideal for low ash samples and samples with high organic content
  - Contains the sample when ignition occurs
  - Reduces contamination
  - Improves accuracy on ROI and LOI determinations



## Self-Sealing Quartz Crucibles

For oxygen-free ashing, self-sealing quartz crucibles are available. Ideal for applications such as carbon black determination in polymer samples.





### Cooling Fan

The furnace cooling fan rapidly reduces heat to the starting temperature.



### 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 BLACK. An NIST-traceable certificate of calibration is supplied with the instrument.



### Balance

Analytical grade 110 g or 210 g balance with 0.1 mg sensitivity.



### Dual-Element Thermocouple (NIST-traceable)

The type K Dual-Element Thermocouple contains two thermocouples in one sheath. While one thermocouple controls the operating temperature, the second thermocouple can be connected to a digital thermometer to verify the accuracy of the controlling thermocouple. It is NIST-traceable with a certificate of calibration.



### Crucible Marking Pen

Pen with heat-proof ink that will not fade during ashing.



### Stainless Steel Tongs (18 inch)

Tongs for inserting and removing crucibles from the furnace.

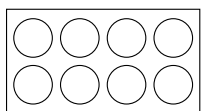




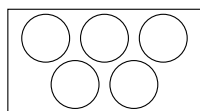
## Easily swap out furnace inserts.

### High-Temperature Furnace Insert

- Heats up to 1200 °C
- Holds up to 8 (20/50 mL) or 5 (100 mL) Quartz Fiber Crucibles



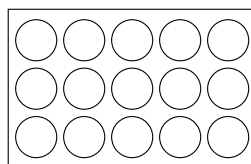
20/50 mL crucibles



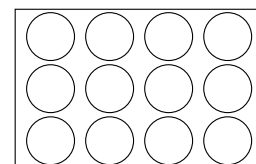
100 mL crucibles

### High-Capacity Furnace Insert

- Heats up to 1000 °C
- Holds up to 15 (20/50 mL) or 12 (100 mL) Quartz Fiber Crucibles



20/50 mL crucibles



100 mL crucibles

## Workstation

Transform your Phoenix BLACK into a workstation for automatic calculation, storage and transfer of results. This will assist you in complying with CFR 11 Part 21, ISO and other QC requirements.



## Sulfated Ashing

This vapor scrubbing system can safely remove harmful fumes from the furnace cavity and neutralize any residual acid exhausted (sulfur dioxide and nitric acid). The configuration meets ISO 14000 regulations and all requirements for USP 281 (ROI) & USP 733 (LOI). The sulfated ash system can be disconnected in less than five minutes without the use of tools. The quartz furnace ceiling assures sample purity. USB data output provides CFR 21 part 11 compliance for output of data, method details and date of completion.



## AirWave

The AirWave provides increased airflow for high organic sample ashing. This meets the most demanding requirements of large organic samples with ease.

Eliminates volume reduction/carbonization on hot plate or Bunsen burners and provide accurate carbon black results in a fraction of the time it takes conventional furnaces. The reproducibility is excellent, making the use of nitrogen atmosphere or quartz tubes unnecessary.





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