



Since 1982, we've provided laboratory and production equipment to organizations spanning material science and engineering, mechanical and chemical engineering, extraction and processing, biotechnology, heavy industry, education, government, and healthcare.



# HIGH VACUUM MUFFLE FURNACE

Muffle furnaces are the most cost-effective option for thermal treatment.

Their space-efficient chambers accommodate big or bulky samples at a relatively low cost—especially compared to tube furnaces.

But that squared-off interior isn't conducive to inert gas saturation. Due to non-crossing streamlines, merely flushing the chamber is not guaranteed to remove all (or even enough) oxygen-rich air.

That presents a problem for large yet oxidation-prone materials. Typically, the only solution is a larger, and dramatically more expensive, tube furnace.

To bridge the gap between cost-effectiveness and atmospheric control, we've introduced a **high vacuum** version of our trusted **muffle furnace**.

# VACUUM LEVELS & PUMPS

Three vacuum levels are widely used in laboratory heat treatment:

- **Rough** vacuums range from just below atmospheric pressure down to 1 mbar. They're easily created with a single-stage rotary vane pump.
- **Medium** vacuums fall between 1 and 10<sup>-3</sup> mbar. This level requires a two-stage rotary vane pump, wherein the second pump more or less multiplies the vacuum created by the first.
- **High** vacuums are on the order of 10<sup>-3</sup> to 10<sup>-7</sup> mbar. They need both a two-stage rotary vane pump and a turbomolecular or diffusion pump. The former acts as a "pre-vacuum" for the latter.



**Our standard high vacuum system comprises a diffusion pump and a 312 L/min dual stage rotary vane pump capable of 10<sup>-6</sup> torr.**

In our customers' experience, that's sufficient for virtually all uses of a muffle furnace. Ultra and extreme high vacuums (< 10<sup>-7</sup> mbar) are technically feasible, but not generally helpful for thermal treatment.

Note that **dry scroll** and **turbomolecular** pumps are available in place of the standard rotary vane and diffusion pumps. Choose the former if your samples need to avoid any risk of oil contamination.

## WHY USE A QUARTZ CHAMBER?

Ceramic chambers carry a slight risk of dust contamination (or even dust combustion, albeit rare).

Our quartz chamber high vacuum muffle furnace provides cleanroom-like conditions:

- Completely unreactive.
- Free of dust or other potential contaminants.
- Extended heating element lifespan.
- Usable up to ~1200° C.

That's an ideal environment for particularly delicate samples, such as semiconductor materials or battery components.

Visit our quartz chamber muffle furnace guide to learn more about the design and applications of the chamber itself.

# CONFIGURING YOUR HIGH VACUUM MUFFLE FURNACE

Our high vacuum muffle furnace range is available with:

- Maximum temperature of 1200°, 1500°, or 1800° C.
- Temperature-specific heating elements of Kanthal® A-1, Sic, or MoSi2.
- Chamber volume of 1.5–31 L.
- **Turn-key** inert gas management package with high vacuum pump, recirculating chiller, digital mass flow controller, and back pressure regulator.

Beyond the standard set of options, we can accommodate almost any materials, capacity, or other custom specs that your lab requires.

For more information on order or working with our high vacuum muffle furnaces, please contact our team today.





## A BRIEF HISTORY OF SH SCIENTIFIC



### Call Us

+1 503-850-8670



### Email

jbang@labandfurnace.com



### U.S. Headquarter

12725 SW Millikan Way  
Beaverton, OR 97005

## Serving North America Since 2013

In 2018, after particularly rapid growth in the American education and public sectors, we founded a US head office in Portland, Oregon. Whether you're visiting us on behalf of a major institution, a small lab, or anything in between, we're honored that you're considering SH Scientific as a potential partner. We look forward to a lasting relationship in support of your innovation and discovery.

