

# Particle Quench Furnace Setup

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## Before starting

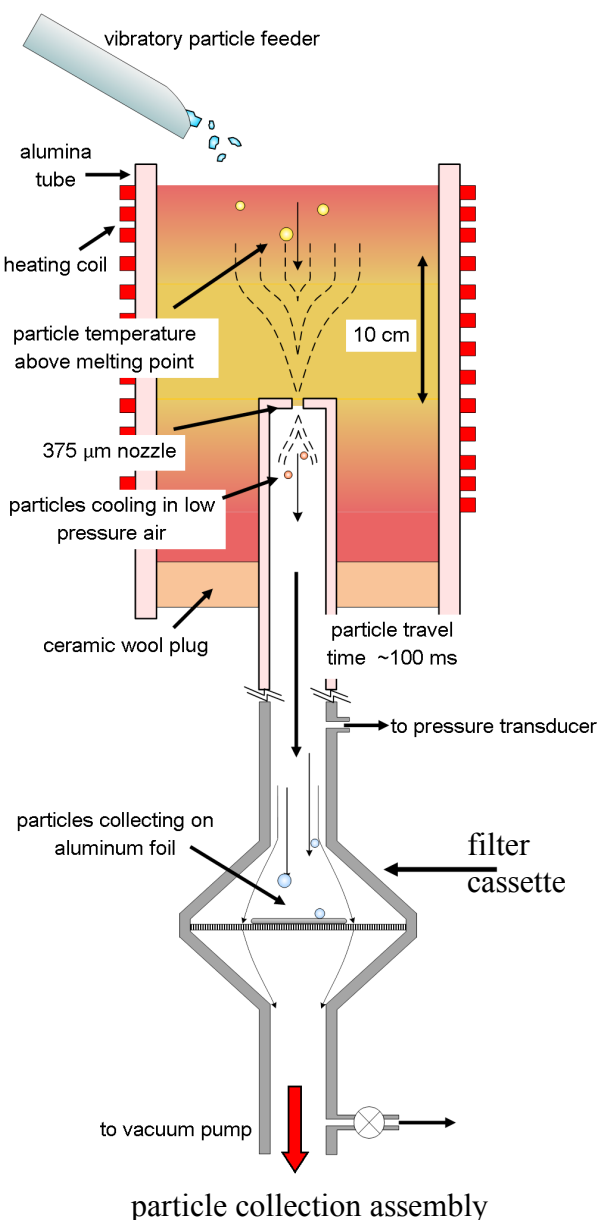
**Be sure to wear PPE (personal protective equipment) such as eye protection and lab coat upon entering the lab.**

**Do not touch the furnace while it is hot.**

**Do not interfere with the furnace's electrical connections.**

## To start up the furnace

1. Set the variac dial to zero, and its switch to "off"
2. Connect the furnace power cord to the variac, and connect the variac to an outlet
3. Set the variac dial to 50%, and flip the switch of the variac to "120 V"
4. Wait at least 30 min, then turn the variac dial by 10 units.
5. Continue to increase the variac power in steps of 10 units/30 min.
6. When the target is reached, let the furnace stabilize for at least 45 min.
7. Do not increase the power beyond 75 %, it will damage the furnace.
8. Do not idle the furnace at high temperature. If no longer needed, turn it off.



## To mount the collection medium (filter/Al foil)

1. Make sure the vacuum hose is disconnected from the particle collection assembly
2. Remove the filter cassette from the bottom of the particle collection assembly
3. Open the filter cassette, insert the filter medium, and close it using a wrench. If using Al foil, make sure the diameter of the foil is smaller than the filter support mesh.
4. Attach the filter cassette to the particle collection assembly
5. Attach the vacuum hose to the particle collection assembly
6. Carefully look into the top of the furnace to verify that the collection assembly is horizontally centered. Use a hand mirror if needed.

## **To run the experiment when the furnace is hot**

1. Open the bypass valve at the vacuum pump
2. Turn on the power supply to the vacuum gauge, and the volt meter
3. Turn on the vacuum pump
4. Slowly close the bypass valve until the target vacuum (as measured by the volt meter) is reached. Verify that the vacuum has stabilized
5. Load a small amount of powder into the particle feeder
6. Connect the particle feeder to a power outlet
7. Stand next to the furnace, hold the feeder above the top of the furnace, and turn the feeder on. Hold it at such an angle that the powder slowly falls off the tip of the feeder.
8. Reload the feeder as needed, then unplug it when done.

## **To recover the collection medium (filter/Al foil)**

1. This can be performed while the furnace is hot, if further experiments are needed. If not, then turn off the furnace first.
2. Disconnect the vacuum hose from the collection assembly.
3. Remove the filter cassette from the bottom of the particle collection assembly
4. Open the filter cassette, and remove the filter medium. Store it in a protective case.
5. Follow the filter mounting steps above if more experiments are needed.

## **To turn off the furnace**

1. Set the variac switch to "off", and the dial to zero
2. Disconnect the furnace power cord from the variac, and the variac from the outlet
3. Do not remove the ceramic collection tube from the furnace until it is cold.
4. Make sure vacuum pump, power supply for the transducer, and the voltmeter are turned off.