



Physical Hazards/Equipment Standard Operating Procedure

This is a recommended template for a physical hazard or equipment SOP. All work involving particularly hazardous equipment or physical processes requires the completion of Section 6.

Procedure Name		Muffle Furnace Operation			
Procedure Author					
Name of Responsible Person					
Location to be Performed					
Creation Date		Review Date(s)		Revision Date(s)	
1.	THIS STANDARD OPERATING PROCEDURE (SOP) IS FOR A:				
<input type="checkbox"/> Specific laboratory procedure or experiment <ul style="list-style-type: none"> • Examples: Projectile experiments, Tensile strength testing <input type="checkbox"/> Generic laboratory procedure that covers several processes <ul style="list-style-type: none"> • Examples: heavy equipment, field work <input checked="" type="checkbox"/> Generic use of a specific piece of equipment or variety of equipment with similar hazards <ul style="list-style-type: none"> • Examples: Drill press, grinders, equipment with pinch points, electrical work 					
2.	DESCRIPTION: <i>Briefly describe the process or the equipment that will be used.</i>				
The muffle furnace is used to measure ash content (inorganic content) of organic materials.					
3.	RISK IDENTIFICATION: <i>Identify potential safety hazards.</i>				
<input type="checkbox"/> Electrical Hazard and/or High voltage <input type="checkbox"/> Sharp Edges <input type="checkbox"/> Pinch Hazard (Belt Drives and Pinch Points) <input type="checkbox"/> Crush Hazard (Heavy Equipment) <input type="checkbox"/> Ambient Temp Greater than 90F or Less than 60F <input type="checkbox"/> Projectiles (Flying Debris) <input type="checkbox"/> Inhalation (Particulate Matter) <input checked="" type="checkbox"/> Hot Work (Welding or Cutting) <input type="checkbox"/> Loud Noses (Greater than 85dB) <input type="checkbox"/> Working at Height <input type="checkbox"/> Working in Confined Spaces <input type="checkbox"/> Systems Under Pressure or Vacuum <input type="checkbox"/> Lasers and/or Radiation Producing Devices <input type="checkbox"/> Asphyxiation <input type="checkbox"/> Magnetic Fields <input type="checkbox"/> Cryogenes <input type="checkbox"/> Other Chemicals (<i>must accompany a Chemical SOP</i>) <input type="checkbox"/> Other: Click or tap here to enter text.					
Notes: Click or tap here to enter text.					



<p>4.</p>	<p>WHAT ENGINEERING CONTROLS WILL BE USED TO MINIMIZE EXPOSURES TO THESE HAZARDS? <i>select all that apply</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> Clean Room <input type="checkbox"/> Shielding <input type="checkbox"/> Grounding/Bonding <input type="checkbox"/> Belt Guards <input type="checkbox"/> Sheaths/Blade Guards <input type="checkbox"/> Dust Extractor <input type="checkbox"/> Cooling Fans <input type="checkbox"/> Exhaust Fans <input type="checkbox"/> Safety Ladders <input type="checkbox"/> Interlock Systems <input type="checkbox"/> Alarms <input checked="" type="checkbox"/> Other: Fume hood, tongs
<p>5.</p>	<p>WHAT PERSONAL PROTECTIVE EQUIPMENT IS REQUIRED TO MINIMIZE THESE HAZARDS? <i>select all that apply</i></p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Safety Glasses <input type="checkbox"/> Lab Coat <input type="checkbox"/> N95 Dust Mask <input type="checkbox"/> Cooling Vest <input type="checkbox"/> Cut Resistant Gloves <input type="checkbox"/> Cut Resistant Apron <input type="checkbox"/> Face Shield <input type="checkbox"/> Safety Toe Boots <input type="checkbox"/> Insulating Gloves <input type="checkbox"/> Bonding Strap <input type="checkbox"/> Welding Mask and Apron <input type="checkbox"/> Hearing Protection <input type="checkbox"/> Fall Protection <input type="checkbox"/> Hard Hat <input type="checkbox"/> Personal Radiation Alarm <input checked="" type="checkbox"/> Other: heat gloves
<p>6.</p>	<p>STEP-BY-STEP OPERATING PROCEDURE</p> <p><i>Provide a sequential description of work, including details such as equipment storage locations, identify the designated work area(s), and when special safety equipment is to be utilized. Include all process conditions. Pictures and schematics are recommended for complex setups or equipment. Highlight the steps with the highest hazards.</i></p> <ol style="list-style-type: none"> 1. Only use ceramic crucibles as vessels for the muffle furnace. 2. Measure and record the crucible weight.



	<ol style="list-style-type: none"> 3. Tare the balance and add approximately 2 grams of your sample to the crucible. Record the exact weight. 4. Cover small particle samples with perforated aluminum foil to prevent sample loss in the form of ash. 5. Place the crucibles in the furnace (while off) and draw a diagram of where your samples are placed in the furnace before running the machine. Marker labels on the crucibles will burn off in the furnace. 6. <u>Ensure that the fume hood that holds the muffle furnace is on and working.</u> 7. Turn on the furnace using the main switch on the front of the device. 8. Leave the furnace at 550C, which is what most of the protocols require <ol style="list-style-type: none"> a. If your protocol require a different temperature, change it using the arrow buttons next to the main switch on the front of the device. 9. Check the furnace 30 minutes after turning it on. If the temperature exceeds 550C, turn off the main switch, wait 15 seconds, then turn it on again. 10. Check the furnace again in 30 minutes and repeat this process if the furnace exceeds 550 significantly. 11. Turn off the furnace at your procedure's designated time. 12. <u>Do not open the door for at least 30 minutes.</u> The best method is to leave your samples to cool over night without opening the door. <u>If removing the samples after 30 minutes, use heat gloves and tongs to handle the crucibles.</u> Allow the samples to cool completely in a desiccator. 13. Measure and record the weight of the crucibles with the ashed sample.
<p>7.</p>	<p>EMERGENCY PROCEDURES <i>Indicate how spills, personnel exposure/injury, extreme weather events, and other accidents should be handled and by whom.</i></p> <p>Seek immediate care for major burns, which:</p> <ul style="list-style-type: none"> • Are deep • Cause the skin to be dry and leathery • May appear charred or have patches of white, brown or black • Are larger than 3 inches (about 8 centimeters) in diameter or cover the hands, feet, face, groin, buttocks or a major joint <p>Until emergency help arrives:</p> <ul style="list-style-type: none"> • Protect the burned person from further harm. For electrical burns, make sure the power source is off before you approach the burned person. • Make certain that the person burned is breathing. If needed, begin rescue breathing if you know how. • Remove jewelry, belts and other restrictive items, especially from around burned areas and the neck. Burned areas swell rapidly. • Cover the area of the burn. Use a cool, moist bandage or a clean cloth. • Don't immerse large severe burns in water. Doing so could cause a serious loss of body heat (hypothermia). • Elevate the burned area. Raise the wound above heart level, if possible.



- Watch for signs of shock. Signs and symptoms include fainting, pale complexion or breathing in a notably shallow fashion.

For minor burns:

- Cool the burn. Hold the burned area under cool (not cold) running water or apply a cool, wet compress until the pain eases.
- Remove rings or other tight items from the burned area. Try to do this quickly and gently, before the area swells.
- Don't break blisters. Fluid-filled blisters protect against infection. If a blister breaks, clean the area with water (mild soap is optional).
- Apply burn cream. Once a burn is completely cooled, apply burn cream found in the first aid kit.

SOURCE: <https://www.mayoclinic.org/first-aid/first-aid-burns/basics/art-20056649>

Emergency contact numbers:

Lab manager	xxx-xxx-xxxx
Building Manager	xxx-xxx-xxxx
Principal Investigator	xxx-xxx-xxxx
Poison Control Center	800-222-1222
Emergency	911
EHS	352-392-1591