STANDARD OPERATING PROCEDURE CUPELLATION GAS FURNACE



Fig. 1 CUPELLATION GAS FURNACE



Fig. 2 BURNER CONTROL CIRCUIT BOARD



Fig. 3 REAR CONNECTIONS - AIR AND GAS VALVES

OBJECTIVE

This Standard Operating Procedure (SOP) is specifically designed for the safe operation of the equipment. The equipment operator must read through the procedure thoroughly and should fully understand it before operating or otherwise consult senior laboratory personnel for any clarifications prior to the operation.

HAZARDS

- Very HOT surfaces High furnace temperature causes the furnace 'FIRE BRICKS' to absorb very high heat to maintain the set temperature. Heat resistant safety gears MUST be worn to minimise server skin burns
- Very humid environment Open windows to allow fresh air into the furnace room to cool down the hot air
- Flammable liquid gas (LPG) Operator(s) to take every precautionary measure to ensure that there is NO gas leakages on the gas supply lines from the Liquid Propane Gas (LPG) cylinder
- Noise Medium noise level created by the machine could induce stress or hearing impairment over an extended period of exposure

SAFETY – Personal Protective equipment (PPE)

The following safety gears must be worn when operating the cupellation gas furnace;

- Heat resistant overall clothing covering the feet
- Heat resistant face shield
- Heat resistant hand gloves
- Safety glasses
- Safety boots

APPARATUS AND MATERIALS REQUIRED

- Cupel thong
- Cupels
- Work bench
- Compressed air supply
- LPG (liquefied propane gas)

REAGENTS

• Fussed Lead buttons from fusion smelt

STANDARD OPERATING PROCEDURE (SOP)

Pre-start checks

- 1. Ensure that the work environment is clear of any obstructions that may cause safety hazard concerns in the work area
- 2. Ensure that the furnace floor is clean and smooth
- 3. Check gas and compressed air valves are free to operate
- 4. Check LPG 45 kg gas cylinder valve is not leaking any gas
- 5. Ensure that all safety gears (PPE) all set and prepared ready to use

OPERATION OF THE CUPELLATION FURNACE

- 6. Turn 'ON' the liquid propane gas (LPG) valve at the top of the (45 kg) gas cylinder by TURNING ANTI CLOCKWISE
- 7. Switch 'ON' the air compressor
- 8. Switch 'ON' the main power supply on the wall socket
- 9. Turn 'ON' the air and gas lines valves located at the rear (refer to Fig. 3)
- 10. Press the 'RESET' button located at the back of the control panel (refer to Fig. 3)
- 11. Turn on the power 'ON' button by flipping it down on the control panel (refer to Fig. 2). It will automatically initialize the furnace settings and proceed to 'IGNITE' the flame
- 12. If the flame is not ignited REPEAT steps 6 10 or otherwise proceed to step 13
- 13. Press the 'PUSH ON/OFF' burner switch to ignite the flame (refer to Fig. 2)
- 14. Once the flame is switched on, flip the 'HIGH/LOW' burner lever to LOW (refer to Fig. 2)
- 15. Set the operating temperature by pressing the 'UP/DOWN' arrow keys on the control panel to set your desired set temperature (refer to Fig.2)
- 16. Open the furnace door by pressing the pneumatic control arm foot pad with your foot (refer to Fig. 1)
- 17. Load the cupels with lead buttons prepared from the fusion smelt into the heating chamber
- 18. Once the furnace is loaded press the pneumatic arm control foot pad again to close the furnace door

- 19. Leave pressure at 'LOW FLAME' until the temperature reaches 200 degrees centigrade
- 20. Switch to 'HIGH 'on the burner flame control board by pressing the PUSH BUTTON (see Fig. 2)
- 21. Check the lead button "periodically" to monitor the lead oxidation
- 22. Once the lead buttons are totally oxidized switch off the flame
- 23. Get into your appropriate 'SAFETY GEAR'
- 24. Press the pneumatic arm control foot pad to open the furnace door
- 25. Remove the cupels and place them on the concrete floor to cool down
- 26. Close the furnace door by stepping on the pneumatic foot pad
- 27. Turn 'OFF' all compressed air and Liquid Propane Gas valves (refer to Fig. 3)
- 28. Turn OFF the air compressor
- 29. Close the main LPG valve on the gas cylinder
- 30. Do housekeeping around the work area before leaving