UNC CHARLOTTE
Department of Engineering Technology

LABORATORY SAFETY ANALYSIS

OPERATING THE PARR BOMB CALORIMETER

Location: Smith 129

Required Training: The Parr Bomb Calorimeter is designed and intended for use by properly trained and experienced operators. If you are not familiar with the proper and safe operation of this device, do not use until proper training and knowledge have been obtained.

Required Personal Protective Equipment (PPE): Safety glasses, pipette for dispensing liquid chemicals

Reference Materials: Manufacturer's safety rules and operating instructions and Appendix A - Charging the Oxygen Bomb of this document.

PHOTOS	TASK	HAZARDS	CONTROLS
	Wear clear safety glasses with side shields.	Chemical exposure, compressed gas	• Students are required to provide their own safety glasses. • See laboratory instructor or laboratory manager if you do not have safety glasses before proceeding to use equipment.
	Inspect safety glasses for cracks, scratches or other damage. Ensure the ANSI standard Z87.1 is stamped into the side of glasses. If necessary inspect dust mask or face mask.	Chemical exposure, compressed gas	• If defects are found report this to your lab instructor before using.
	Put on PPE	Chemical exposure, compressed gas	• Always wear safety glasses. • Wear leather gloves whenever putting samples into or removing samples from the furnace. • Always wear closed toed shoes to avoid burns from dropped samples. • Handle samples only with long handled tongs.
	Inspect work area, walk around apparatus looking for debris and ensure proper lighting.	Slips, trips & falls, struck by	• Keep the work area around the bomb calorimeter free from water, oil and liquid chemicals used in the calorimeter.

	Visually inspect the power cords for the stirrer motor and ignition module	Electrical shock	• If the cord or electrical connection is damaged or worn **DO NOT** use the equipment. Report the problem to the laboratory instructor or laboratory manager immediately.
	Fill the internal water bucket	Spills, slips ,trips, falls	• Use caution when filling the water bucket. Clean up any spills before proceeding.
	Insert the ignition fuse	Electrical Hazards	• Do not make electrical connections from the bomb to the ignition module until the bomb is fused, fueled, assembled and charged.
	Weigh the fuel sample	Chemical hazards, chemical burns	• Always wear safety glasses when handling chemical fuels. • Always use the pipette to dispense the chemical to be tested. • Use only the approved sample containers supplied with the calorimeter
	Assemble the bomb.	Chemical hazards, chemical spills	• Ensure that fuse wire is in contact with the fuel sample. • Keep the sample container/fuse holder assembly vertical when inserting into the bomb housing. • Ensure that the sample/fuse holder assembly fully seats in the bomb housing. • Keep the bomb housing vertical while screwing the retainer ring on fully and securely.
	Charge the bomb	Compressed gas	• The bomb must be charged with high pressure oxygen. Refer to laboratory instructions and Appendix A to this document for correct charging procedures. • Always wear safety glasses when working around compressed gasses. • Ensure that there are no open flames or ignition sources whenever compressed oxygen is in use. • Always close gas cylinder valve when testing is done.
	Insert assembled bomb into bucket inside calorimeter and attach ignition cables	Spills	• Handle assembled bomb only with supplied tongs when lowering into water bucket. • Ensure that ignition cables fully seat into the female connectors on the bomb.
	Install cover and digital or analog thermometer	Injury, pinch points	• Ensure that there is adequate clearance in the bucket for the stirring rod and temperature probe. • Analog thermometers are glass and

			may break, handle with care.
	Remove bomb after test	Liquid spills	• Use caution when removing lid, ignition cables, and thermometers • Use supplied tong to remove bomb from water bucket.
	Clean-up after testing	Spills, slips, falls	• Clean up any water spills from around the work area, especially on floor. • Seal all fuel containers and store in an approved flammables cabinet.
For more information about this LSA, contact the *Department of Engineering Technology* at UNC Charlotte (704) 687-2305 Please visit our website at: http://www.et.uncc.edu\			
The development of Laboratory Safety Analyses is a very effective means of helping reduce incidents, accidents, and injuries in the workplace. It is an excellent tool to use for training purposes and can also be used to investigate "near misses" and accidents.			

Appendix A: Charging the Oxygen Bomb

Once the bomb is fused, loaded with the fuel to be tested and assembled, it must be filled with oxygen from the supply tank through the pressure regulator valve. This procedure is outlined below as taken from the Parr Operating Instruction Manual.

The pressure connection to the bomb is made with a slip connector on the oxygen hose which slides over the gas inlet fitting on the bomb head. Slide the connector onto the inlet valve body and push it down as far as it will go. If it does not slide easily, a drop of water spread around the inlet valve will lubricate the sealing rings. This is shown in Figure 1 below.

Close the outlet valve on the bomb head, then open or "crack" the oxygen tank main valve not more than one-quarter turn. (See Figure 2) Open the filling connection control valve slowly (in a counter-clockwise direction) and watch the gage as the bomb pressure rises to the desired filling pressure (usually 30 atm., but not more than 40 atm.); then close the control valve (clockwise). The bomb inlet check valve will close automatically when the oxygen supply is shut off, leaving the bomb filled to the highest level indicated on the 0-55 atm. Gage. Release the residual pressure in the filling hose by pushing downward on the lever attached to the relief valve. The gage should now return to zero. If the pressure drops slowly and a large amount of gas escapes when the pressure relief is opened, the check valve in the head is not operating properly. This must be corrected before the bomb can be used. If too much oxygen is accidentally introduced into the bomb, DO NOT proceed with the combustion. Detach the filling connection, exhaust the bomb by opening the outlet valve, remove the head and reweigh the sample before repeating the filling operation.

Figure 1

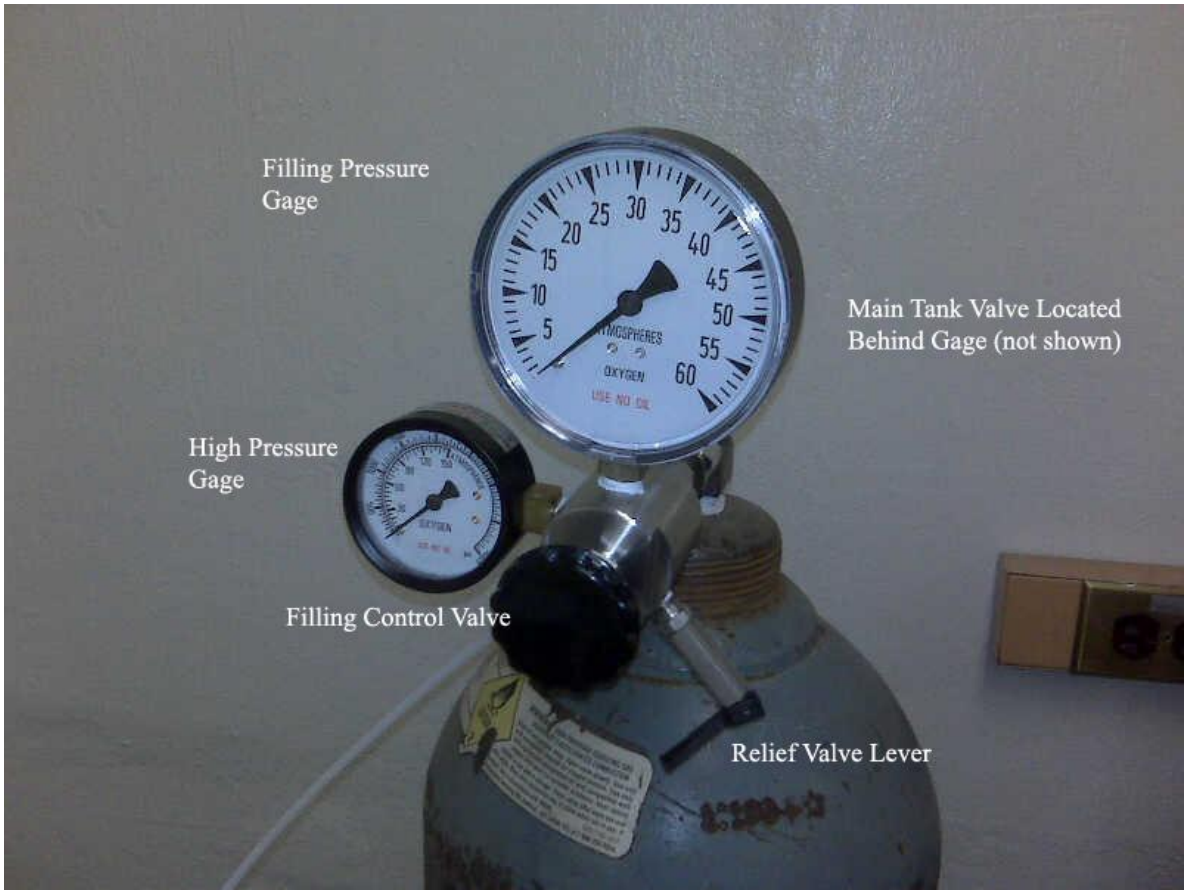
Filling Pressure Gage
Main Tank Valve Located Behind Gage (not shown)
High Pressure Gage
Filling Control Valve
Relief Valve Lever
OXYGEN

Figure 2