

# Operation Instruction

## Operating

1. Switch on balance, analyzer, printer and computer in sequence. Turn on oxygen cylinder and adjust reducing valve to (2.8~3.0) MPa, cylinder pressure  $\geq 5$ MPa. Check if each component is good;
2. Run the testing software to check if testing items and data in system setting are in compliance with testing requirements. Click Start Analysis in Testing menu;
3. Start sample weighing. If balance is connected with computer, click Print on balance, it will input sample weight automatically;
4. Load oxygen bomb head on the bomb holder and put sample on crucible holder. Connect ignition wire with sample; fill 10ml distilled water into oxygen bomb and put oxygen head loaded with sample into oxygen bomb. Fasten oxygen bomb lid;
5. Oxygen charging. Charge oxygen bomb with charger until pressure is 2.8~3.0 MPa. Keep 15 seconds after it's stable; if cylinder pressure is 5MPa, keep it longer; if cylinder pressure is less than 4MPa, replace oxygen cylinder;
6. Load oxygen bomb on triangular stand inside bucket and close lid. Input data as sample number and sample weight on testing dialog box, then click Start Analysis. It will be ok.
7. After analysis, take out oxygen bomb and exhaust with exhaust valve. Remove bomb head to check if sample is splashed out or carbon is left inside. If any, redo the analysis; clean each parts of the bomb with water that

is close to room temperature and then dry it.

8. Repeat the above process until all the sample analysis is finished. After that, stop testing software. Switch off analyzer, printer, PC, balance and power in sequence. Finally turn off cylinder valve and cover calorimeter with covering cloth.

9. Clean possible residue inside bucket and all the used crucibles. Then dry it for next analysis.

## Note

### 1. Ambient Conditions

- a. Keep separate room (15°C~30°C) for analysis, humidity  $\leq 80\%$ .
- b. No strong air flow, heat source and fan, nor strong vibration, EMI or erosive gas.
- c. Do not have other high temperature testing in the same room simultaneously.
- d. Do not turn on or turn off air conditioning or heating equipment in the lab at times. Nor is it allowed to be on for working hours, off after working time.
- e. Keep calorimeter far from heating unit and air conditioning. Avoid direct sunlight.
- f. The variation of room temperature in one analysis should be kept within 1°C.
- g. Variation between room and water temperature should be less than 1.5°C.

### 2. Water

- a. The water in bucket is required to be distilled water or deionized water.

- b. Fill up with water immediately when water reduces.
- c. The water in the reservoir should be changed every three months. If polluted, it should be changed immediately.

### 3. Oxygen

- a. Oxygen cylinder should be equipped with double-meter reducing valve.
- b. Oxygen purity should be more than 99.5%, no electrolytic oxygen is used.
- c. The pressure of cylinder is required to be more than 5MPa.
- d. The pressure of reducing valve is required to be 0.8~3.0MPa.
- e. The measuring range of the meter should be 6MPa.
- f. After pressure is stable in oxygen charging, keep for 15s.

### 4. Sample Weighing

- a. Sample size should be less than 0.2mm.
- b. Before weighing, mix coal samples. Take 1g ( $\pm 0.1$ ) samples.
- c. If the same spoon is used for different type of coal sample, it should be cleaned before next sampling.
- d. For analysis sample at high calorific value, mass should be less than 1g and gross calorific value less than 35000J.

### 5. Load Sample

- a. For coal sample with high volatile content, small space should be kept from ignition wire which is required to have no contact with crucible.
- b. For the splashing coal sample, wrap it with lens paper with known mass and calorific value, or press it.

- c. For the coal sample that is difficult to ignite, first fill crucible bottom with asbestos paper that has been burned for 30 minutes under 800°C or wrap it with lens paper with known mass and calorific value.
- d. During operation, avoid shaking oxygen bomb in case crucible and ignition wire change position by shaking and fails to ignite or even burns the crucible.

## 6. Oxygen Bomb

- a. Water for oxygen bomb cleaning and filling should be close to room temperature.
- b. Check gas leakage regularly.
- c. Perform 20.0MPa hydraulic pressure test regularly to ensure safe operation.

***Please stop using the oxygen bomb immediately and have hydraulic pressure test and screw test when any of the followings occur.***

- ① Oxygen bomb has been used in four years but more than two years since last testing.
- ② Oxygen bomb has been used over four years and it's been one year since last testing.
- ③ Oxygen bomb has been used over 5000 times since last testing.
- ④ The closure ring of oxygen bomb is severely wearing: When the closure ring is placed right above the oxygen bomb, it falls for two threads or even more without clockwise rotation.

## 7. Other

- a. Switch it off in installing, disassembling or moving instrument.
- b. Preheat half an hour or do a waste sample before analysis.
- c. Do not to use damaged CD or USB without virus detection in case it damages driver or computer is inflected with virus.
- d. Game software is not recommended to install.