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INTRODUCTION

Calorimetry is a fundamental test of great significance to anyone concerned with the production or utilization of solid or liquid fuels.

One of the most important tests in the evaluation of materials which are burned, as fuels, is the determination of the heat of combustion, or calorific value. These measurements can be made in the Bomb Calorimeter Set for Testing Calorific Value of Fuels (TBCF).

The Bomb Calorimeter is a classic device used to determine the heating or calorific value of solid and liquid fuel samples at constant volume. Basically, this device burns a fuel sample and transfers the heat into a known mass of water. From the weight of the fuel sample and temperature rise of the water, the calorific value can be calculated. The calorific value obtained in a bomb calorimeter test represents the gross heat of combustion per unit mass of fuel sample. This is the heat produced when the sample burns, plus the heat given up when the newly formed water vapor condenses and cools to the temperature of the bomb. Determining calorific values is profoundly important; fuels are one of the biggest commodities in the world, and their calorific value.

The Bomb Calorimeter study is carried out to gain a better understanding of the working principles behind the bomb calorimeter and also to find out the gross calorific values of different types of liquid fuel.



ISO 9000: Quality Management
(for Design, Manufacturing,
Commercialization and After-sales service)



European Union Certificate
(total safety)



**Certificates ISO 14000 and
ECO-Management and Audit Scheme**
(environmental management)



**Worlddidac Quality Charter
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GENERAL DESCRIPTION

The unit (TBCF) comprises the calorimeter, a calorimeter vessel, an outer double walled water jacket, control unit to switch on/off the stirrer and the ignition device, a Beckman type thermometer, a magnifying glass, and charging unit with pressure gauges to facilitate the charging of the calorimeter with oxygen.

The particular features of the calorimeter bomb are the method of sealing and the method of ensuring ignition.

The calorimeter vessel and outer jacket wall are manufactured in stainless steel.

The calorimeter bomb is a container made of stainless steel that can support high pressures. It is sealed by a screw top. The bomb is charged with gas (oxygen) through the filling valve. This bomb is introduced inside a calorimeter vessel made of stainless steel that is filled with water, and at the same time it is introduced inside a double walled water jacket.

The rod of the calorimeter supports a metallic crucible. The calorimeter bomb, which contains the fuel sample to be burned, is hermetic to the gas by closing the filling valve and its cover. Combustion is started through a thin wire that is red hot-heated up momentarily due to the passing of an electrical current that flows through an isolated terminal and the rod, which is electrically connected to the cover.

The water in the calorimeter vessel is agitated automatically with a stirrer driven by a small motor. The top of the double walled jacket is closed with a cover that has some orifices. A Beckman thermometer to measure the temperature of the calorimeter vessel passes through one of these orifices. Other orifices are used to fasten the jacket to the cover. Also, one of these holes is used to insert the wire that supplies the electric current to the rod.

The unit includes a control unit that switches on/off the stirrer and the ignition device through the heating up of the thin wire, a load unit with pressure gauges to make the filling with oxygen of the calorimeter easier and a magnifying glass to magnify the Beckman's thermometer reading accuracy.

SPECIFICATIONS

Calorimeter for testing calorific value of fuels, including:

Main metallic elements in stainless steel.

Diagram in the front panel with similar distribution to the elements in the real unit.

Calorimeter bomb in stainless steel. Working pressure: 30 atm.

Calorimeter vessel:

Made in stainless steel.

Maximum volume: 4 l.

Double walled outer jacket in stainless steel, with water inlet and outlet.

Electric stirrer with one rod and two blades. (330 rpm).

Control unit to switch on/off the stirrer and the ignition device.

Beckman thermometer, range: 6°C.

Magnifying glass.

Charging unit with pressure gauges.

One nickel crucible.

Reel of Nickel-Chrome wire.

Cables and accessories, for normal operation.

Manuals: This unit is supplied with the following manuals: Required Services, Assembly and Installation, Starting-up, Safety, Maintenance & Practices Manuals.

EXERCISES AND PRACTICAL POSSIBILITIES

- 1.- Beckman thermometer adjustment.
- 2.- Obtaining the calorific value of fuel.
- 3.- Determination of the water value of the unit.
- 4.- Performing experiments to measure heats of combustion.
- 5.- Calculating the heats of combustion from experimental results.
- 6.- Calculating internal energies of combustion from bomb calorimeter experiments.
- 7.- Calculating enthalpies of combustion from bomb calorimeter experiments.

REQUIRED SERVICES

- Electrical supply: single- phase, 220V./50Hz or 110V./60Hz.
- Water.
- Oxygen cylinder.
- Several types of fuels.

DIMENSIONS & WEIGHTS

- Dimensions : 600 x 400 x 1000 mm. approx.
(23.62 x 15.75 x 39.37 inches approx.)
- Weight : 50 kg. approx.
(110.23 pounds approx.)

OPTIONAL ACCESSORIES

- TBCF-1 . Briquetting press for use with solid fuels.
- TBCF-2. Replacement calorimeter for use as a spare.

*Specifications subject to change without previous notice, due to the convenience of improvements of the product.



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