eisco

Trust | Deliver | Learn

CHARLES LAW APPARATUS

CAT NO. PH0422

Instruction Manual

CHARLES LAW APPARATUS

INTRODUCTION:

This apparatus can be used to demonstrate (at an elementary level) the thermal expansion of gases, to verify Charles' law and to estimate a Celsius value for the absolute zero of temperature.

APPARATUS PROVIDED:

- Glass Charles' law apparatus
- Glass beaker with stirrer

ADDITIONAL REQUIREMENTS:

- Water, with means of heating (low-voltage electric immersion heater)
- Celsius thermometer (range 0 to 100°C)
- Strong sulphuric acid
- Rubber tubing to fit the small central tube, with tap or stop cock on the other end
- Small beaker for overflowing acid
- Retort stand and clamp
- Protection of hands, eyes and surroundings from splashed acid

PROCEDURE:

Fit the rubber tubing on the small central tube to provide a siphon path for acid. Holding the glass tubing vertically, carefully fill the open tube with acid to a level sufficient to create a siphon path between the central tube and the small beaker at bench level. Open the siphon and run some acid out until the levels in the two outer tubes are equal.

Place the glass tubing in the large beaker and fill the beaker with cold water. Secure the tubing in position using the retort stand and clamp.

Read the graduation on the tube with the bulb, giving the volume of the air trapped in the bulb and tube. Take the temperature using the thermometer.

Using the immersion heater, carefully raise the water temperature by (say) ten degree steps.

After each step, stir the water to ensure a uniform temperature, and run out sufficient of the acid, using the siphon, to ensure that the levels in the two outer tubes are level. Read the acid level (and hence the volume of air trapped) from the graduations.

ANALYSIS:

A table of readings relating air volumes and Celsius temperatures should confirm one aspect of Charles' law, that the volume expansivity of air at constant pressure is 1/273 K^{-1}. A graph of readings (volume vertically against Celsius temperature horizontally) should give a straight line. This line, extrapolated backwards to zero volume, should cut the temperature axis at 273^{o}C, the absolute zero of temperature.

Manufactured by :

www.eiscolabs.com

U.S. Distributor :

Eisco Scientific

850 St Paul St, Suite 15, Rochester, NY 14605

Website : www.eiscolabs.com