

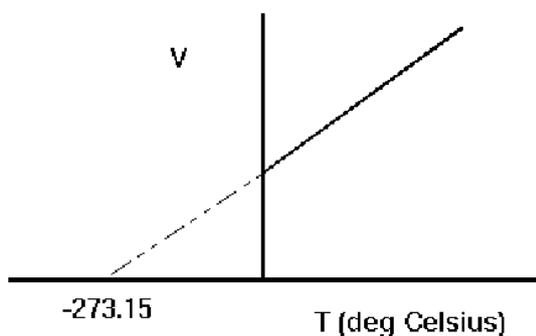
## Charles Law - Code: L1018

The Irwin Charles' Law Apparatus comprises a capillary tube, which is sealed at the bottom, showing a scale from 0 to 200mm. This is mounted onto a base plate which also has a -10 – 100°C thermometer mounted alongside the tube.

**Ensure that the open end of the capillary tube is uppermost.**

Fill a tall form beaker with water, sit it on a tripod/gauze and then immerse the Charles' Law Apparatus into the water so that the water level is about 10mm above the top of the oil bead. It is advisable to hang the apparatus from a clamp rod mounted on a retort stand. A suitable hole is provided for this.

Take a temperature reading and a scale reading from the bottom of the bead in the capillary bore. Heat the water using a Bunsen burner and take both readings every 30s. Plot a graph of length (volume) against temperature. Plot a line of best fit. You should get a straight line which intersects the volume axis. If you rescale the graph so that the temperature axis goes down to about -300°C, you should be able to extrapolate the absolute zero of temperature. The straight line supports Charles' Law demonstrating that volume of a gas is directly proportional to its temperature provided the pressure is kept constant. (In this case the pressure is atmospheric pressure). The Kelvin scale may then be introduced.



**N.B.** Before carrying out the experiment ensure that the base of the capillary tube is aligned with the zero mark on the base plate.