**The Charles' Law Apparatus comprises a capillary tube, which is sealed at the bottom. This is mounted onto a base plate showing a scale from 0 to 200mm, which also has a 300mm 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. Alternatively, lay the Charles' Law Apparatus in a water bath with the top propped up out of the water.

Heat the water using a Bunsen burner and take readings every 30s Take a temperature reading and a scale reading from the bottom of the bead in the capillary bore. Plot a graph of length (volume) against temperature, plotting 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 -300°C, you should be able to extrapolate the absolute zero of temperature. The straight line supports Charles' Law, demonstrating that the volume of a fixed mass of gas is directly proportional to its absolute temperature, provided the pressure is kept constant. (In this case the pressure is atmospheric pressure). The Kelvin scale may then be introduced.
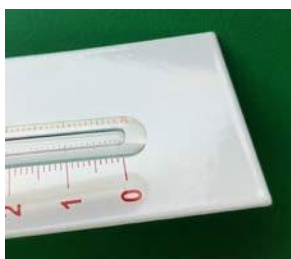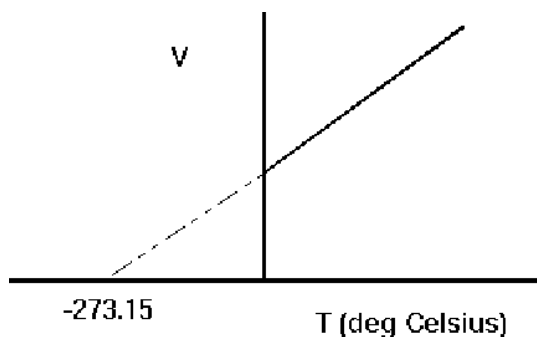
N.B. Before carrying out the experiment, ensure that the base of the air column in the capillary tube is aligned with the zero mark on the base plate. **If there is a small amount of oil at the bottom of the tube, then set the top of that oil to the zero mark. This is to ensure that you are measuring the actual length of the trapped air.**

Broken Bead
If the oil bead contains an air bubble or two this does not affect the operation or accuracy. Should you wish to remove an air bubble push a length of tinned copper wire through it and jiggle the wire up and down. Continue until the air bubble breaks and then set the apparatus upright. The bead will reform within 5 minutes.