Physics Lab
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Scaling a thermometer

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Aim:

- Making a thermometer scale by locating its fixed points.
- Investigating the properties of a thermometer

Variables:

Dependent: length of mercury liquid L/cm
Independent: Temperature T/°C
Controlled Variables: mercury glass tube, pressure

Materials Required:

A Bunsen burner
2 500ml beakers
A glass thermometer, with no scale
Ice
A permanent marker
Water

Method:

- To scale a thermometer, 2 fixed points must be determined. In this case, the fixed points will be the freezing point of ice and the boiling point of water.
- Place the glass thermometer (tube) into a beaker full of ice. The mercury line will start to decrease.
- Leave the tube in the beaker for approximately 15min.
- After 15 min, mark the mercury level in the tube using a permanent marker. Since the freezing point of ice is 0°C, then the mercury level of the tube refers to this value.
- Now, place the tube into a beaker of boiling water. Water boils at 100°C and thus, the mercury level in the tube will rise to a level representing a temperature of 100°C. Again, mark this level with a permanent marker.
- Now that we have two fixed points, we can divide the distance between these two points by 100. Thus, we have formed a thermometer scale.

Data Collection, Processing and Presentation:

The following graph is a drawing of the thermometer scale obtained. The 2 fixed points are labeled. The scale is divided into 10 sections only and not 100 as a real normal thermometer.

Conclusion and Evaluation:

A thermometer scale consists of two fixed points. For mercury, the scale usually ranges from 0°C to 100°C. This is because mercury solidifies below 0°C and stops expanding efficiently over 100°C. However, for other thermometer scales, different ranges are used. It is important to conclude that in a thermometer the expansion of the liquid is always uniform and this is the most important property. In addition, it is important that the liquid used be visible. In this case, mercury is well seen but in some cases where alcohol is used, it cannot be seen.