

Temperature measurement \Rightarrow

Temperature \Rightarrow The temperature of a substance is a measure of its hotness or coldness, of that substance.

Temperature \Rightarrow Degree of heat.
Heat is quantity of heat.

Relation between Fahrenheit and Centigrade (Celsius) Temperature Scales.

$$\frac{^{\circ}\text{C}}{100} = \frac{^{\circ}\text{F} - 32}{180}$$

Centigrade ($^{\circ}\text{C}$) and Kelvin ($^{\circ}\text{K}$)

$$^{\circ}\text{K} = ^{\circ}\text{C} + 273.15$$

Fahrenheit ($^{\circ}\text{F}$) and Rankine ($^{\circ}\text{R}$) \Rightarrow

$$^{\circ}\text{R} = ^{\circ}\text{F} + 459.69$$

Boiling point \rightarrow The temperature at which the substance changes physical state and become a gas.

Freezing point \rightarrow The temperature at which the substance changes physical state and becomes a solid.

Method of temperature measurement \rightarrow

- (i) Expansion thermometer.
- (ii) Filled system thermometer.
- (iii) Electrical temperature instruments
- (iv) Pyrometers

(i) Expansion Thermometers \rightarrow

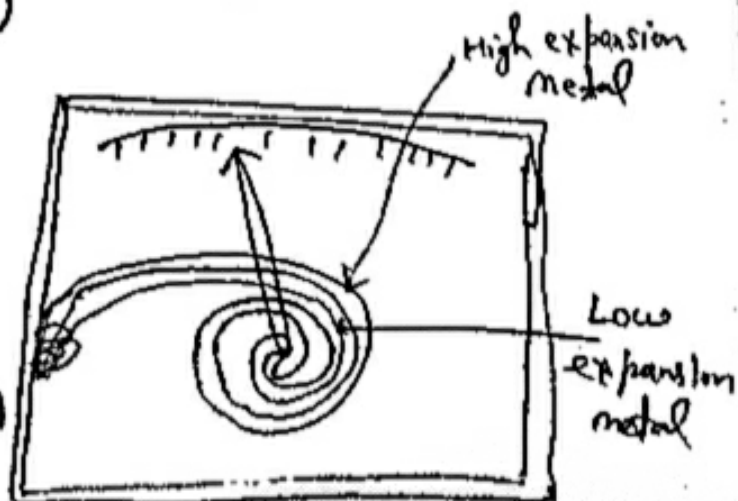
(a) Expansion of solids (Bimetallic thermometers)

(b) Expansion of liquids Liquid in glass thermometer
Liquid in metal thermometer

(c) Expansion of gases (Gas thermometers)

(a) Bimetallic thermometer \rightarrow

It consist of two strips of metal such as iron and brass welded together, each strip made from a metal having a different coefficient of thermal expansion.



If one end of the bimetallic strip is fixed so that it cannot move, the distance of the other end bends is "directly proportional to the square of the length of metal strip." The movement of the bimetallic strip is utilized to deflect a pointer over a calibrated scale. The deflection of pointer shows the temperature.

Advantages \Rightarrow

- (i) Easy to read.

- (ii) Low cost
- (iii) Good accuracy
- (iv) Wide temperature ranges
- (v) Easily maintained.

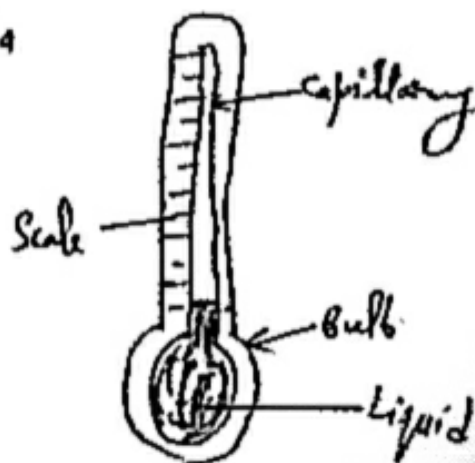
Disadvantages \Rightarrow

- (i) Only indication type is possible.
- (ii) Accuracy is not much high.

Liquid in glass thermometer \Rightarrow

It consists of a small bore glass tube with a thin wall glass bulb at its lower end.

As heat transferred through the well and metal stem and into the mercury the mercury expands in capillary tube which indicates temperature.



(-18.4 to 608°F)
range.