UNIT 2 CHAPTER 09

* Heat *

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Heat and Temperature

Temperature scale:-

1) Celsius scale:-
   Lower fixed point ⇒ 0°C
   Upper fixed point ⇒ 100°C

2) Kelvin scale:-
   Lower fixed point ⇒ 273 K
   Upper fixed point ⇒ 373 K

3) Fahrenheit Scale:-
   Lower fixed point ⇒ 32°F
   Upper fixed point ⇒ 212°F

4) Reaumer Scale:-
   Lower fixed point ⇒ 0°R
   Upper fixed point ⇒ 80°R

Temperature Conversion formula:

$$\frac{x - L.P.}{U.P - L.P.} = \frac{C-0}{100-0} = \frac{F-32}{212-32} = \frac{K-273}{373-273} = \frac{R-0}{80-0}$$

$$\Rightarrow \boxed{\frac{C}{100} = \frac{F-32}{180} = \frac{K-273}{100} = \frac{R}{80}}$$

SQ. 1[A] At what temperature does the Celsius scale coincide with ~~Fahrenheit~~ Fahrenheit Scale?

☆ Soln:-

Let, $F = C = x$ (Let);

we have, $\frac{C}{100} = \frac{F-32}{180}$

or, $\frac{x}{100} = \frac{x-32}{180}$

or, $180x = 100x - 3200$

or, $80x = -3200$

$\Rightarrow x = -40$

Thus, At $-40°C$ or $-40°F$ temperature Celsius Scale Coincide with Fahrenheit Scale.

5B.1[B] At what temperature will the Celsius Scale reading double the Fahrenheit Scale?

★ Sol^n Let, F = x, then, C = 2x

we have, $\frac{C}{100} = \frac{F-32}{180}$

or, $\frac{2x}{100} = \frac{x-32}{180}$

or, $360x = 100x - 3200$

$\Rightarrow x = 12.3°F$

Thus, At 12.3°F temperature, Celsius Scale reading double the Fahrenheit Scale.

Thermal equilibrium:-

↳ Two bodies are said to be in thermal equilibrium if they have same temperature.

When a hot body is kept in contact with cold body, the heat flows from hot body to cold body until they attains same temperature and finally their temperature becomes same. This condition is said to be thermal equilibrium.

Zeroth law of Thermodynamics:-

↳ According to this law, if two bodies are in thermal equilibrium with a third body saparately then all the bodies are in thermal equilibrium.

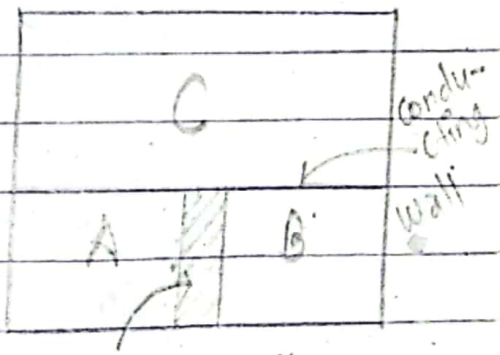

Fig: Zeroth law of thermodynamics.

Let us Considers three bodies A, B and C are join together such that A and B are separated each other by insulating wall whereas they are separated by C with conducting wall. Also let T_A, T_B & T_C are temperature of body A, B & C respectively.

Since, A and C are in thermal equilibrium, so,

$$T_A = T_C \quad \text{—(i)}$$

Also, B and C are in thermal equilibrium, so,

$$T_B = T_C \quad \text{—(ii)}$$

from eqⁿ (i) & (ii)

$$\boxed{T_A = T_B}$$

Which shows that if two bodies A & B are in thermal equilibrium with body C, then A & B are also in thermal equilibrium.

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	Heat		Temperature
1	It is form of energy	1	It is degree of hotness or coldness of body.
2	It is measured by calorimeter	2	It is measured by thermometer.
3	It's SI unit is joule.	3	It's SI unit is Kelvin.
4	It is an cause	4	It is a effect.