Chapter-11

Q.1 what is Temperature?

Q.2 what is Heat?

Q.3. Write the diffrence b/w Temperature and Heat.

Ans.2 → Sensation of Hotness and Coldness of any object or material.

Ans-3 → Tem. is the quantity measured by Thermometer.

Q.4 Write the various Scale to measure temperature.

Ans.4 → four Types :-

1) Celcius (C)
2) Kelvin (K)
3) Fehrenheit (F)
4) Reaumer (R)

Relation :-

$$\frac{C}{5} = \frac{F-32}{9} = \frac{R}{4} = \frac{K-273}{5}$$

Q. What is Molar Specific heat ?
Q. what is heat capacity or Thermal capacity ?
Q. what is calorie meter
Q. Explain the change of state of the matter.

Ans. Molar mass of a substance is the amount of heat required that raise the tem. of a 1 mol. of the substance by 1°C.

Ans- Heat capacity or thermal capacity :-

$$\Rightarrow \Delta Q = S m \Delta T$$
$$\Rightarrow S = \frac{\Delta Q}{m \Delta T} \Big\} \rightarrow \text{Specific Heat.}$$

$$\Rightarrow \boxed{Sm} = \frac{\Delta Q}{\Delta T} \Big\} \text{ Heat capacity.}$$

↳ heat capacity

Calorimetry :- The branch of Physics which deals with the measurement of Heat energy is called calorimetry.

Calorie :- The quantity of heat required to raise ~~from~~ the tem. of 1gm of pure water by 1°C that is ↑ 14.5°C to 15.5°C is called 1 calories

1 calorie = 4.2 Joule

Change of State :- The transition of a substance from 1 physical state to other physical state is called change of state.

Some terms of "change of state" :-

1) Freezing of liquid (l → s)
2) Melting of solid (s → l)
3) condensation of ~~solid~~ vapour (g → l)
4) Vaporization of liquid (l → g)
5) sublimation (s → g)

Latent Heat :- The amount of heat required to change the state of unit mass of substance at constant temperature.

$$\Rightarrow \quad \Delta Q \propto m$$
$$\Rightarrow \quad \Delta Q = L.m$$
$$\Rightarrow \quad L = \frac{\Delta Q}{m}$$

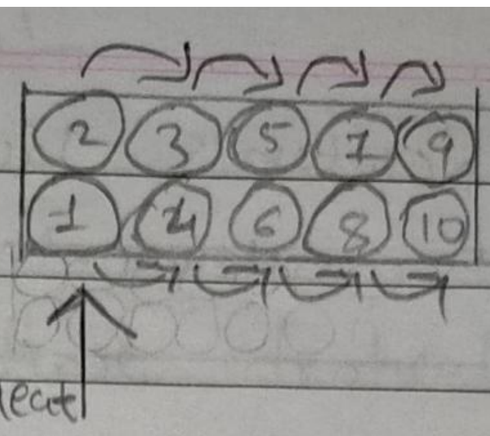
where, L = latent heat
ΔQ = Amount of heat
m = mass

S.I unit :- $\boxed{L = J/kg}$

Heat Transfer :- The transfer of heat from one Point to another Point is known as heat transfer.

3 methods of heat Transfer :-
1) conduction 2) convection 3) Radiation.

1) Conduction :-



The Process in which heat flows from objects with higher tem. to objects with lower tem.

There is no movement of particle or object, Generally it happens in solid.

2) Convection :- i) Happens in liquid
ii) ~~object~~ Particle has random or zig-zag movement.

→ The movement of fluid molecules from higher tem. regions to lower tem. regions.

3) Radiation :- i) Happens in gas.
ii) No required of any medium.
iii) move in straight line.

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Q. Wrcite the Newton's law of cooling.

Ans. According to the Newton's law of cooling, the rate of cooling or rate of loss of heat of a liquid is directly proportional to the diff. in tem. of the liquid and the surrounding, ~~of the liquid~~ provided the diff. of tem. is small

$$\Rightarrow \frac{\theta_1 - \theta_2}{t} \propto \left(\frac{\theta_1 + \theta_2}{2} - \theta\right)$$

where, θ_1 = initial temp.

θ_2 = final temp.

θ = surrounding tem.

$\left(\frac{\theta_1 - \theta_2}{t}\right)$ = Rate of heat loss

$\left(\frac{\theta_1 + \theta_2}{2}\right)$ = mean tem. of liquid

$$\Rightarrow \left(\frac{\theta_1 - \theta_2}{t}\right) = \lambda \left(\frac{\theta_1 + \theta_2}{2} - \theta\right)$$

and $\lambda = \frac{c}{ms}$

where,

m = mass

S = specific heat

c = constant

Factors affecting flow of heat in steady state in conduction process :-

$Q \propto A \rightarrow (1)$

$Q \propto (\theta_1 - \theta_2) \rightarrow (2)$

$Q \propto t \rightarrow (3)$

$Q \propto \frac{1}{d} \rightarrow (4)$

where, A → cross section Area

$(\theta_1 - \theta_2)$ → Tem. diff.

t → Tem.

d → lenghth

Q → heat.

from (1), (2), (3) & (4),

$$\Rightarrow \boxed{Q \propto \frac{A(\theta_1 - \theta_2)\, t}{d}}$$

$$\Rightarrow \boxed{Q = K \cdot \frac{A(\theta_1 - \theta_2)\, t}{d}}$$

where,

K → cofficient of thermal conductivity.

(or) Thermal conductivity.

(or) Rate of heat,

$$\Rightarrow \boxed{\frac{Q}{t} = K \cdot \frac{A(\theta_1 - \theta_2)}{d}}$$