unit - 10

PH calculation

$$pH = -\log_{10}[H^+]$$

$$pOH = -\log_{10}[OH^-]$$

$$pH + pOH = 14$$

unit - 9 Solubility

$$\text{Solubility} = \frac{\text{mass of the Solute}}{\text{mass of the Solvent}} \times 100$$

$$\text{volume percentage} = \frac{\text{Volume of solute}}{\text{volume of solution}} \times 100$$

$$\text{Mass percentage} = \frac{\text{mass of the Solute}}{\text{mass of Solution}} \times 100$$

Atoms and molecules

No of moles =>

$\Rightarrow \frac{\text{mass}}{\text{atomic mass}}$

$\Rightarrow \frac{\text{mass}}{\text{molecular mass}}$

$\Rightarrow \frac{\text{No of atom}}{6.023 \times 10^{23}}$

$\Rightarrow \frac{\text{no of molecules}}{6.023 \times 10^{23}}$

Relative atomic mass (RAM) $= \frac{\text{Average mass}}{\frac{1}{12}\text{th mass of 1 carbon atom}}$

mass % of an element $= \frac{\text{mass of element}}{\text{molar mass}} \times 100$

Atomicity $= \frac{\text{molecular mass}}{\text{Atomic mass}}$

Atomic mass = no of proton + no of neutron

Conductance

$G = \frac{1}{R}$ (Reciprocal of Its resistan

unit = ohm^{-1} or mh

Conductivity

$\sigma = \frac{1}{\rho}$ unit = $ohm^{-1} metre^{-1}$

Electrical resistivity

$R = \frac{\rho L}{A}$, $\rho = \frac{RA}{L}$

(ohm metre)

Voltage

$V = \frac{W}{Q}$

unit - 3 (thermal energy)

Linear expansion - $\frac{\Delta L}{L_0} = \alpha_L \Delta T$

Areal expansion - $\frac{\Delta A}{A_0} = \alpha_A \Delta T$

cubical expansion - $\frac{\Delta V}{V_0} = \alpha_V \Delta T$

} K^{-1}

Real expansion = $L_3 - L_2$

Apparent expansion = $L_3 - L_1$

Boyle's Law - PV = constant

charles law - $\frac{V}{T}$ = constant

Avagadro Law - $\frac{V}{n}$ = constant

Ideal gas equation (or) equation of state } $PV = RT$

celcius and kelvin $K = C + 273$

Fahrenheit and kelvin $K = (F + 460) \times \frac{5}{9}$

unit - 2 (optics)

speed of light = $3 \times 10^8 m s^{-1}$

Snell's Law = $\frac{\sin i}{\sin r} = \frac{\mu_2}{\mu_1}$

Refractive index $\mu = \frac{c}{v}$

Rayleigh Scattering Law

$$S \propto \frac{1}{\lambda^4}$$

(λ = wavelength

S :- amount of scattering

Lens formula :-

$$\frac{1}{f} = \frac{1}{V} + \frac{1}{U}$$

$$\frac{1}{f} = \frac{1}{V} - \frac{1}{U}$$

magnification

$$m = \frac{h'}{h}$$

where h' = height of the image

h = height of the object

$$m = \frac{V}{U}$$

where

V = Distance of the image

U = Distance of the object.

Magnification

~~< 1 (enlarge)~~

> 1 (enlarge)

< 1 (diminished)

Len's maker formula

$$\frac{1}{f} = (\mu - 1)\left(\frac{1}{R_1} - \frac{1}{R_2}\right)$$

Here,

μ - refractive Index of the material

R_1 and R_2 are radii of curvature of the two faces of the lens

f - focal Length of the Lens.

Power of the Lens

$$P = \frac{1}{f}$$ (SI unit is Diopter (D))

near point of the eye = 25 cm

fair point of the eye = ∞ (Infin

focal Length of myopia

$$f = \frac{xy}{x-y}$$

focal length of Hypermetropia

$$f = \frac{dD}{d-D}$$

Where, D = 0.25 cm (for normal eye)

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unit - 1 (Laws of motion)

Newton's second Law,

$$F = m \times a$$

Here,

F = Force
m = mass
a = acceleration

1 Newton (1N)

$$1N = 1 kg ms^{-2}$$

1 dyne (1d)

$$1 dyne = 1 g cm s^{-2}$$

$$1N = 10^5 dyne$$

Gravitational unit of force

$$1 kgf = 1 kg \times 9.8 ms^{-2} = 9.8 N$$

$$1 gf = 1 g \times 980 cm s^{-2} = 980 dyne$$

Impulse (J)

$$J = F \times t$$

Newton's III rd Law,

$$F_B = -F_A$$

Law of conservation of linear momentum,

$$m_1 v_1 + m_2 v_2 = m_1 u_1 + m_2 u_2$$

sum of momentum ~~before~~ after collison
= sum of momentum before collison

Universal Law of Gravitation

$$F = \frac{GM_1M_2}{R^2}$$

CSI unit $= 6.674 \times 10^{-11}\ Nm^2kg^{-2}$

Acceleration due to gravity

$$g = \frac{GM}{R^2}$$

Mass of the earth (M)

$$M = gR^2/G$$

$$M = 5.972 \times 10^{24}\ kg$$

Acceleration due to gravity on surface of the moon

$$1.625\ ms^{-2}$$

Lift moving upwards $R = m(g+a)$, $R > w$

Lift moving downwards $R = m(g-a)$, $R < w$

Lift at rest $R = mg$, $R = w$

Lift falling down freely $R = m(g-g)$ $R = 0$

Principles of moments

$$F_1 \times d_1 = F_2 \times d_2$$

moment in clockwise direction = Moment in anti clockwise direction

moment of couple

$$M = F \times S$$

SI unit = N m (In SI)

CGS SI unit = dyne cm (In CGS)

Here,

F = Force

S = Perpendicular distance between the line of actions of force

Moment of force

torque (τ) = $F \times d$

Vector quantity

SI unit = Nm

Linear momentum

$$P = mV$$

(mass × velocity)

SI system = Kg ms^{-1}

C.G.S system = g cm s^{-1}

unit -- 5 (Acoustics)

Velocity of sound in gas

$$V \propto \sqrt{\frac{1}{d}} \quad (d = \text{density})$$

$$V \propto \sqrt{T} \quad (T = \text{Temperature})$$

$$V_T = (V_0 + 0.61\,T)\ m\,s^{-1}$$

$$V = \frac{\text{Distance}}{\text{Time taken}} \quad (\text{once})$$

$$V = \frac{2d}{t} \quad (\text{reflected})$$

Minimum distance to hear an echo = 17.2 m

Minimum Time = 0.1 s

Frequency

$$T = \frac{1}{n} \quad (\text{compression}$$

$V = n\lambda$

$\lambda = \frac{V}{n}$

$n = \frac{V}{\lambda}$

$V = \frac{2d}{t}$

Both source and observer move towards

$n' = \left(\frac{V+V_L}{V-V_S}\right)$

away from

$n' = \frac{V-V_L}{V+V_S}$

unit - 6

(nuclear physics)

$E = mc^2$

1 alpha $|\alpha = {}_2He^4$

1 beta $|\beta = {}_{-1}e^0$ (electron)

$= {}_1H^1$ (proton)

$= {}_0n^1$ (neutron)