* calculation of no. of moles :-

(i) no. of moles = $\frac{\text{given mass (gm)}}{\text{molar mass (gm)}}$ → For any state.

(ii) no. of moles = $\frac{\text{no. of particles (atom)}}{N_A}$

(iii) no. of moles (exclusively gases) = $\frac{\text{vol. occupied at STP}}{22.4\ \text{Lt.}}$ (only for gases)

STP = std. temperature pressure
↓ T = 0°C or 273.15 K
↓ P = 1 ~~atm~~ bar = 0.987 atm

vol. occupied by 1 mole of gas at STP = 22.4 lt.

$n = \frac{\text{given mass}}{\text{molar mass}} = \frac{\text{no. of particle}}{N_A} = \frac{\text{vol. at STP}}{22.4\ \text{lt.}}$

no. of moles = no. of gm atoms

Q. calc. no. of moles for :-
a) 2204g of Fe → $n = 224/56 =$ 4 moles
b) 12.044×10^{24} O-atoms → $\frac{12.022 \times 10^{23}}{6.022 \times 10^{23}} =$ 20 moles
c) 45.4 lt. of Ne at STP → $\frac{45.4}{22.4} \Rightarrow$ 2 moles

Q. calc. mass of 3.011×10^{22} atoms of S?
→ no. of moles $= \frac{\text{mass}}{\text{molar mass}} = \frac{\text{no. of particles}}{N_A}$
no we of this
$\frac{\text{mass of S}}{32} = \frac{3.011 \times 10^{22}}{6.022 \times 10^{23}}$ → mass of S = 1.6gm

Q. A piece of Cu = 0.635gm then how many atoms of Cu?
→ For-1 = For-2
$\frac{\text{mass of Cu}}{\text{molar mass of Cu}} = \frac{\text{no. of particles}}{N_A}$
$\frac{0.635}{63.5} = \frac{x}{6.022 \times 10^{23}}$ ∴ $x = 6.022 \times 10^{21}$

Q. How many gm of Si atoms are ent in 20 gm-at of Si?
→ gm-atoms = moles
gm-molecule = n
$20 = \frac{x}{28}$ ∴ x = 56gm

Q. calc. vol. occupied by 12.044×10^{24} atoms of He at STP?
→ $\frac{\text{no. of atoms}}{N_A} = \frac{\text{vol.}}{22.4} \Rightarrow \frac{12.044 \times 10^{24}}{6.022 \times 10^{23}} = \frac{V}{22.4}$
∴ $20 = \frac{V}{22.4}$ ∴ V = 454 l

Q. How many gm are there in 2 gm-atom of Na?
a) 1.39 b) 23g ~~c) 46gm~~ d) 1/23 gm
→ gm-atom = moles ∴ $2 = \frac{x}{23}$ ∴ x Na = 46gm

Q. calc. vol. occupied by 60gm of Ne at STP?
→ $n = \frac{60}{20} = 3$ ∴ $3 = \frac{\text{vol.}}{22.4}$ vol. = 67.2 lt.