Daily Tutorial Sheet-1	JEE Main (Archive)

1.(A) Fe (no. of moles) $= \frac{558.5}{55.85} = 10$ moles

C (no. of moles) = 60/12 = 5 moles.

(atomic weight of carbon = 12)

2.(A) 1 atomic mass unit on the scale of 1/6 of C – 12 = 2 amu on the scale of 1/12 of C–12.

Now, atomic mass of an element $= \frac{\text{Mass of one atom of the element}}{1\,\text{amu (Here on the scale of } \frac{1}{6}\text{ of C} - 12)}$

$= \frac{\text{Mass of one atom of the element}}{2\,\text{amu (Here on the scale of } \frac{1}{12}\text{ of C} - 12)}$

$\therefore$ Numerically the mass of a substance will become half of the normal scale.

3.(B) 1 mole of $Mg_3(PO_4)_2$

$\Rightarrow$ 3 moles of Mg atom + 2 moles of P atom + moles of O atom

8 moles of oxygen atoms are present in = 1 mole of $Mg_3(PO_4)_2$

0.25 mole of oxygen atoms are present in $= \frac{1 \times 0.25}{8} = 3.125 \times 10^{-2}$ moles of $Mg_3(PO_4)_2$

4.(A) $2Al_{(s)} + 6HCl_{(aq)} \longrightarrow 2Al^{3+}_{(aq)} + 6Cl^{-}_{(aq)} + 3H_{2(g)}$

6 moles of HCl produced H_2 at STP $= 3 \times 22.4$ L

$\therefore$ 1 mole of HCl will produce H_2 at STP $= \frac{3 \times 22.4}{6} = 11.2$L

5.(A) The data illustrates the law of conservation of mass.

6.(A) Since total moles of HCl is conserved

$$M_1V_1 + M_2V_2 = M_fV_f$$

$$0.5 \times 750 + 2 \times 250 = M_f(750 + 250)$$

$\therefore$ $M_f = \frac{875}{1000} = 0.875$ M

7.(C) Mass ratio of $O_2 : N_2$ is 1 : 4

Mole ratio of $O_2 : N_2$ is $\frac{1}{32} : \frac{4}{28}$

Ratio of molecules of $O_2 : N_2$ is same as molar ratio i.e. 7 : 32.

8.(B) 52 gm $BaCl_2$ with 9 gm H_2O.

$\left(\frac{52}{208}\right)$ mole of $BaCl_2$ with $\left(\frac{9}{18}\right)$ moles of H_2O

$\therefore$ 1 mole of $BaCl_2$ with 2 moles of H_2O

9.(C)

$$\underset{t=0}{\underset{0.1}{A} + \underset{1}{2B} + \underset{0.036}{3C}} \longrightarrow \underset{0}{AB_2C_3}$$

C is limiting regent therefore moles of AB_2C_3 will be 0.012.

Mass of 0.012 mol AB_2C_3 is 4.8 gm

Mass of 1 mol AB_2C_3 is $\frac{4.8}{0.012} = 400$

Molar mass of AB_2C_3 is 400 gm

$A + 2B + 3C = 400\,gm$

$60 + 2B + 240 = 400 \quad \Rightarrow \quad B = 50$

Atomic mass of B is 50u

10.(C) Moles of arsenic acid in 35.5 gm $= 0.25$ according to given reaction 2 moles of arsenic acid give 1 mole As_2S_5 therefore 0.25 moles of arsenic acid will give 0.125 mole.

11.(B) For minimum molecular weight compound has just one sulphur atom.

Mass of sulphur atom is 8% of mass of 8% = mass of one sulphur atom

$8\% = 32$

$100\% = \frac{32}{8} \times 100 = 400$

Mass of molecule = 400 gm / mole

12.(B) For neutralization

gm equivalent of acid = gm equivalent of base

$0.1V = 0.04$

v = 0.4 litre = 400 ml

13.(C) Mass of acid in $x\,mL$ of 45% acid solution is $\frac{45x}{100}$

Mass of acids in $(800 - x)$ of 20% acid solution is $\frac{20(800-x)}{100}$

And mass of acid in 800 mL of 29.875% acid

$\Rightarrow \quad 29.875 \times 8 = 239\,gm$

So, $\frac{45x}{100} + \frac{20(800-x)}{100} = 239 \quad \Rightarrow \quad x = 316\,mL$

14.(C)

$$M_2CO_3 + 2HCl \rightarrow 2MCl + H_2O + CO_2$$

Molar ratio $1 : 1$

$\frac{1g}{2M+60}$ moles yield $\frac{1}{2M+60}$ moles $CO_2 = 0.01186$ (given)

$\Rightarrow \quad M = 84.3$

15.(D) O – 61.4%

C – 22.9%

H – 10.0%

N – 2.6%

Hence, gain in wt. is 7.5 kg

75 kg healthy human adult has 7.5 kg H atom(10%) which would be replaced by 15 kg ^2H-atoms.