DPP # 10

M.M. : 38 **MAX. TIME : 20 Min.**

ONLY ONE OPTION CORRECT TYPE

1. A mixture of gas "X" (mol. wt. 16) and gas Y (mol. wt. 28) in the mole ratio a : b has a mean molecular weight 20. What would be mean molecular weight if the gases are mixed in the ratio b : a under identical conditions (gases are non reacting). **[3]**

(A) 24 (B) 20 (C) 26 (D) 40

2. How many moles of P_4O_6 and P_4O_{10} will be produced by the combustion of 12.4 gm of phosphorus in 12.8 gm of O_2, leaving no P_4 or O_2 ? [Atomic wt. P = 31] **[3]**

(A) 0.11 mol and 0.3 mol (B) 0.15 mol and 0.25 mol
(C) 0.05 mol each (D) 0.1 mol each

3. The density of a liquid is 1.2 g/mL. There are 35 drops in 2 mL. The number of molecules in 1 drop is (molecular weight of liquid = 70) : **[3]**

(A) $\frac{1.2}{35}N_0$ (B) $\left(\frac{1}{35}\right)^2 N_0$ (C) $\frac{1.2}{(35)^2}N_0$ (D) $1.2\ N_0$

4. An oxide of iron contains 30% of oxygen by mass simplest formula of oxide is - **[3]**

(A) Fe_2O_3 (B) FeO (C) Fe_2O (D) Fe_3O_4

ONE OR MORE THAN ONE OPTION CORRECT TYPE

5. Hexamethylenediamine $[H_2N\text{-}(CH_2)_6\text{-}NH_2]$ reacts with adipic acid $[HO\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH]$ to form dimer as : **[3]**

$$NH_2\text{-}(CH_2)_6\text{-}NH_2 + HO\text{-}\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH \xrightarrow{50\%\text{ yield}} \underset{\text{Dimer}}{H_2N(CH_2)_6\ NH\text{-}\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH} + H_2O$$

The dimer polymerises to form Nylon 6,6 as per the reaction -

$$nH_2N\text{-}(CH_2)_6\text{-}NH\text{-}\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\text{-}OH \xrightarrow{70\%\text{ yield}} \left(N\underset{H}{|}\text{-}(CH_2)_6\text{-}NH\text{-}\overset{O}{\overset{\|}{C}}\text{-}(CH_2)_4\text{-}\overset{O}{\overset{\|}{C}}\right)_n + nH_2O$$

Select the correct statement -

(A) 290 gm of Hexamethylenediamine is required to make 610 gm of dimer.
(B) 730 gm of adipic acid is required to make 610 gm of dimer.
(C) In order to obtain 1.13 kg of Nylon-6,6 at least 1220 gm of dimer is required.
(D) In order to obtain 1.13 kg of Nylon-6,6 at least 1742.9 gm of dimer is required.

6. When $N_2(g)$ and $H_2(g)$ are mixed N_2H_4 (g) , $NH_3(g)$ or both may form , depending upon the relative amount of N_2 and H_2 taken. If initial moles of N_2, H_2 are x, y and final moles of N_2H_4, NH_3 are z, v, then the correct options from the following in order of (x, y , z, v) is/are- **[3]**

(A) (2, 2, 1, 0) (B) (3, 8, 1, 4) (C) (4, 9, 4, 1) (D) (0.5, 3, 0, 1)

Comprehension :

7. $FeSO_4$ undergoes decomposition as **[6]**

$$2FeSO_4\,(s) \longrightarrow Fe_2O_3(s) + SO_2(g) + SO_3(g)$$

At 1 atm 273K, if (7.6 gm) $FeSO_4$ is taken then

(i) The volume occupied by the gases at 1 atm & 273 K.

(A) 22.4 lit (B) 11.2 lit (C) 1.12 lit (D) 2.24 lit

(ii) The average molar mass of the gaseous mixture.

(A) 72 (B) 36 (C) 48 (D) 60

MATCH THE COLUMN

8. Match the column. **[8]**

Column-I **Atomic masses**				**Column-II** **% composition of heavier isotope**	
	Isotope-I	Isotope-II	Avg		
(A)	(z – 1)	(z + 2)	z	(P)	33.33% by moles
(B)	(z + 1)	(z + 3)	(z + 2)	(Q)	50% by moles
(C)	z	3z	2z	(R)	% by mass dependent on z
(D)	(z – 1)	(z + 1)	z	(S)	75% by mass

INTEGER/SUBJECTIVE TYPE

9. The abundance of three isotopes of oxygen are as follows **[3]**

% of O^{16} = 90%

% of O^{17} + % of O^{18} = 10%

Assume at. mass same as mass no. Find out % of O^{17} and O^{18}, if the avg. atomic mass is 16.12.

10. Assume isotope of chlorine present on the unknown planet are ^{34}Cl and ^{38}Cl. If average atomic weight of Cl is found to be 35. What is the sum of moles of proton and neutron in 7 gm of sample of chlorine **[3]**