

Topic :- SOME BASIC CONCEPTS OF CHEMISTRY

1 (d)

Silica	Water	Clay	Mineral
45	12	43	Initial %
a	8	$(92 - a)$	% after heating

The % ratio of silica and clay remains constant on heating

$$\text{i.e., } \frac{45}{43} = \frac{a}{92 - a}$$
$$\therefore a = 47\%$$

2 (b)

N atom = 1 g atom

3 (a)

Meq. of conc. HCl = Meq. of dil. HCl

$$10 \times V_1 = 100 \times 1$$

$$\therefore V_1 = 10\text{mL}$$

Thus, 10 mL of conc. HCl should be added 90 mL to make at 100 mL of desired normality.

4 (a)

$\text{CaF}_2 = 146.4 \text{ g}$

Molecular weight of $\text{CaF}_2 = 78.08\text{g/mol}$

$$\text{Moles of } \text{CaF}_2 = \frac{\text{weight}}{\text{molecular weight}}$$

$$= \frac{146.4}{78.08} = 1.875 \text{ mol}$$

Number of formula units of

CaF_2 in 146.4 g of CaF_2

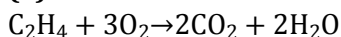
$$= \text{No. of moles} \times 6.022 \times 10^{23}$$

$$= 1.875 \times 6.022 \times 10^{23}$$

$$= 11.29 \times 10^{23}$$

$$= 1.129 \times 10^{24} \text{ CaF}_2$$

5

(a)

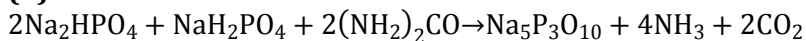
$$28 \text{ g} \quad 96 \text{ g}$$

∴ The weight of oxygen required for complete combustion of 28 g ethylene = 96 g.

∴ Weight of oxygen required for combustion of 2.8 kg ethylene

$$= \frac{96 \times 2.8 \times 1000}{28 \times 1000} \text{ kg} = 9.6 \text{ kg}$$

7

(b)

Hence, the stoichiometric ratio of sodium dihydrogen orthophosphate and sodium hydrogen orthophosphate is 2 : 1 or 3 : 1.5

8

(b)

$$44 \text{ g CO}_2 = N \text{ molecules,}$$

$$\therefore 4.4 \text{ g CO}_2 = N/10 \text{ molecules,}$$

$$22.4 \text{ litre H}_2 \text{ at STP} = N \text{ molecules,}$$

$$\therefore 2.24 \text{ litre H}_2 \text{ at STP} = N/10 \text{ molecules,}$$

$$\text{Thus, total molecules} = \frac{N}{10} + \frac{N}{10} = \frac{N}{5}.$$

9

(c)

$$\text{Molecular mass of CO}_2 = 12 + 32 = 44$$

$$44 \text{ g of CO}_2 \text{ has} = 6.023 \times 10^{23} \text{ molecule}$$

$$0.2 \text{ g of CO}_2 \text{ has} = \frac{6.023 \times 10^{23}}{44} \times 0.2$$

$$= 0.0273 \times 10^{23}$$

If 10^{21} molecules are removed then number of molecules

$$= 1.73 \times 10^{21}$$

$$\therefore 6.023 \times 10^{23} \text{ molecules} = 1 \text{ mol}$$

$$\therefore 1.73 \times 10^{21} \text{ molecules} = \frac{1}{6.023 \times 10^{23}} \times 1.73 \times 10^{21}$$

$$= 0.0028 \text{ mol}$$

10

(a)

24 g carbon has $2N$ atoms. Rest all have 1 mole atoms.

11

(b)

$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$ has 1 mole of copper and 9 moles of oxygen atoms,

$$63.5 \text{ g Cu} = 9 \times 16 \text{ g of oxygen}$$

$$8.64 \text{ g of oxygen} = \frac{63.5 \times 8.64}{9 \times 16}$$

$$= 3.81 \text{ g}$$

12

(c)

Meq. of H_3PO_3 = Meq. of KOH

$$20 \times 0.1 \times 2 = 0.1 \times 1 \times V$$

(H_3PO_3 is dibasic, KOH is monobasic)

$$\therefore V = 40 \text{ mL}$$

13

(a)

Given mass of $O_2 = 2 \text{ g}$ at 0°C and 760 mm Hg

32 g of $O_2 = 22.4 \text{ L}$ at STP

$$\therefore 2 \text{ g of } O_2 = \frac{22.4}{32} \times 2 = 1.4 \text{ L}$$

14

(a)

Ratio of atoms

$$C:H:N:O:: \frac{20.0}{12} : \frac{6.66}{1} : \frac{47.33}{14} : \frac{26.01}{16}$$

$$= 1.67:6.66:3.38:1.63$$

$$= 1:4:2:1$$

Empirical formula = CH_4N_2O

Molar empirical formula mass = 60 g

Molecular formula = CH_4N_2O

15

(b)

Molarity = $\frac{\text{moles of solute}}{\text{volume of solution}}$; $V_{\text{solution}} > 1 \text{ litre water}$.

17

(d)

Number of atoms = moles $\times N_A \times$ atomicity

Here, N_A = Avogadro's number

(a) Number of oxygen atoms in 1 g of O

$$= \frac{1}{16} \times N_A \times 1$$

$$= \frac{N_A}{16}$$

(b) Number of oxygen atoms in 1 g of O_2

$$= \frac{1}{32} \times N_A \times 2$$

$$= \frac{N_A}{16}$$

(c) Number of oxygen atoms in 1 g of O_3

$$= \frac{1}{48} N_A \times 3 = \frac{N_A}{16}$$

Hence, all have the same number of oxygen atoms.

18

(b)

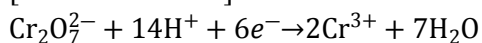
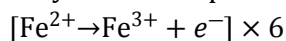
$$N = \frac{4 \times 1000}{40 \times 100} = 1.0$$

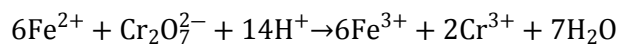
19

(c)

Mohr's salt is $FeSO_4 \cdot (NH_4)_2SO_4 \cdot 6H_2O$

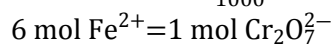
Only oxidizable part is Fe^{2+} .





$$\text{Millimoles of Fe}^{2+} = 750 \times 0.6 = 450$$

$$\text{Moles of Fe}^{2+} = \frac{450}{1000} = 0.450 \text{ mol}$$



$$\therefore 0.450 \text{ mol Fe}^{2+} = \frac{0.450}{6}$$

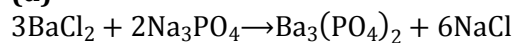
$$= 0.075 \text{ mol Cr}_2\text{O}_7^{2-}$$

$$= 0.075 \times 294 \text{ g}$$

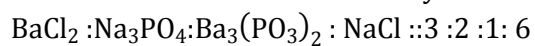
$$= 22.05 \text{ g}$$

20

(d)



See mole ratio from stoichiometry.



PE

ANSWER-KEY										
Q.	1	2	3	4	5	6	7	8	9	10
A.	D	B	A	A	A	D	B	C	A	A
Q.	11	12	13	14	15	16	17	18	19	20
A.	B	C	A	A	B	C	D	B	C	D

PE