

## Class – 11

### CHEMISTRY

Q. Calculate the molecular mass of H<sub>2</sub>O and CO<sub>2</sub>?

Ans:- The molecular mass of H<sub>2</sub>O is

$$\begin{aligned} &= (2 \times \text{atomic mass of hydrogen}) + (1 \times \text{atomic mass of oxygen}) \\ &= (2 \times 1.0084) + (1 \times 16.00) \text{ u} \\ &= 2.016 \text{ u} + 16.00 \text{ u} \\ &= 18.016 \text{ u} \end{aligned}$$

Now, the molecular mass of CO<sub>2</sub> is

$$\begin{aligned} &= (1 \times \text{atomic mass of carbon}) + (2 \times \text{atomic mass of oxygen}) \\ &= (1 \times 12.011) + (2 \times 16.00) \text{ u} \\ &= (12.011 + 32.00) \text{ u} \\ &= 44.01 \text{ u} \end{aligned}$$

Q. Determine the empirical formula of an oxide of iron which has 69.9% iron and 30.1% dioxygen by mass.

Ans:- % of iron by mass = 69.9%

% of dioxygen by mass = 30.1%

$$\begin{aligned} \text{Relative moles of iron in iron oxide} &= \frac{\% \text{ of iron by mass}}{\text{atomic mass of iron}} \\ &= \frac{69.9}{55.85} \\ &= 1.25 \end{aligned}$$

$$\begin{aligned} \text{Relative moles of oxygen in iron oxide} &= \frac{\% \text{ of oxygen by mass}}{\text{atomic mass of oxygen}} \\ &= \frac{30.1}{16.00} \\ &= 1.88 \end{aligned}$$

Simplest molar ratio of iron to oxygen = 1.25 : 1.88

$$= 1 : 1.5$$

$$\cong 2 : 3$$

∴ The empirical formula of the iron oxide is Fe<sub>2</sub>O<sub>3</sub>

Q. Calculate the mass of sodium acetate required to make 500 ml of 0.375 molar aqueous solution. Molar mass of sodium acetate is 82.0205g/mol.

Ans:- 0.375M aqueous solution of sodium acetate means 1000 ml of solution containing 0.375 moles of sodium acetate.

$$\begin{aligned}\therefore \text{Number of moles of CH}_3\text{COONa in 500ml} &= \frac{0.375}{1000} \times 500 \\ &= 0.1875 \text{ mole}\end{aligned}$$

Molar mass of  $\text{CH}_3\text{COONa} = 82.0245 \text{ g/mol}$

$$\begin{aligned}\therefore \text{Required mass of CH}_3\text{COONa} &= (82.0245 \times 0.1875) \text{ g/mol.mol} \\ &= 15.38 \text{ g (Ans)}\end{aligned}$$

Q. What is the concentration of sugar in mol/L if its 20g are dissolved in enough water to make a final volume up to 2L?

$$\begin{aligned}\text{Ans:- Molarity} &= \frac{\text{number of moles of solute}}{\text{volume of solution in litres}} \\ &= \frac{\text{mass of sugar / molar mass of sugar}}{2\text{L}} \\ &= \frac{20\text{g} / [(12 \times 12) + (1 \times 22) + (11 \times 16)]\text{g}}{2\text{L}} \\ &= \frac{20\text{g} / [(144 + 22 + 176)]\text{g}}{2\text{L}} \\ &= \frac{20\text{g} / 342\text{g}}{2\text{L}} \\ &= \frac{0.0585\text{mol}}{2\text{L}} \\ &= 0.0292\text{mol/L}\end{aligned}$$

$\therefore$  Molar concentration of sugar is 0.02925 mol/L

Q. Express the following in the scientific notation:-

i) 0.0048

ii) 234000

iii) 8008

iv) 500.0

v) 6.0012

Ans:- i)  $0.0048 = 4.8 \times 10^{-3}$

ii)  $234,000 = 2.34 \times 10^5$

iii)  $8008 = 8.008 \times 10^3$

iv)  $500.0 = 5.000 \times 10^2$

v)  $6.0012 = 6.0012$

Q. How many significant figures are present in the following:-

i) 0.0025

ii) 208

iii) 5005

iv) 126,000

v) 500.0

vi) 2.0034

Ans:- i) There are 2 significant figures.

ii) There are 3 significant figures.

iii) There are 4 significant figures.

iv) There are 3 significant figures.

v) There are 4 significant figures.

vi) There are 5 significant figures.

Q. Calculate the number of atoms present in 52 moles of Ar.

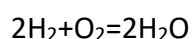
Ans:- 1 mole of Ar =  $6.022 \times 10^{23}$  atoms of Ar

$\therefore$  52 moles of Ar =  $52 \times 6.022 \times 10^{23}$  atoms of Ar

$$= 3.131 \times 10^{23} \text{ atoms of Ar}$$

Q. If 10 volumes of dihydrogen gas reacts with 5 volume of dioxygen gas how many volumes of water vapour would be produced?

Ans:- Reaction of dihydrogen with dioxygen can be written as:



Now, 2 volume of dihydrogen react with 1 volume of dioxygen to produce 2 volume of water vapour.

Hence, 10 volume of dihydrogen will react with 5 volume of dioxygen to produce 10 volume of water vapour.

Q. What will be the mass of 1  $^{12}\text{C}$  atom in g?

Ans:- 1 mole of C atoms =  $6.022 \times 10^{23}$  atoms of C = 12g of C

$$\begin{aligned}\therefore \text{Mass of one } \text{C}^{12} \text{ atom} &= \frac{12}{6.022 \times 10^{23}} \\ &= 1.993 \times 10^{-23} \text{ g (ans)}\end{aligned}$$