Class – 11

CHEMISTRY

Q. Calculate the molecular mass of H_2O and CO_2?

Ans:- The molecular mass of H_2O is

= (2× atomic mass of hydrogen) + (1× atomic mass of oxygen)

=(2× 1.0084) + (1× 16.00) u

= 2.016 u + 16.00 u

= 18.016 u

Now, the molecular mass of CO_2 is

= (1x atomic mass of carbon) + (2 x atomic mass of oxygen)

= (1 x 12.011) + (2 x 16.00) u

= (12.011 + 32.00) u

= 44.01 u

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%

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

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

Simplest molar ratio of iron to oxygen = 1.25 : 1.88

= 1 : 1.5

≅ 2: 3

∴ The empirical formula of the iron oxide is Fe_2O_3

Q. Calculate the mas 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.

∴ Number of moles of CH_3COONa in 500ml $= \frac{0.375}{1000} \times 500$

$= 0.1875$ mole

Molar mass of CH_3COONa = 82.0245 g/mol

∴Required mass of CH_3COONa = (82.0245×0.1875) g/mol.mol

= 15.38 g (Ans)

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?

Ans:- Molarity = $\frac{\text{number of moles of solute}}{\text{volume of solution in litres}}$

$= \frac{\text{mass of sugar/ molar mass of sugar}}{2L}$

$= \frac{20g / [(12\times12)+(1\times22)+(11\times16)]g}{2L}$

$= \frac{20g/[(144+22+176)]g}{2L}$

$= \frac{20g/342g}{20L}$

$= \frac{0.0585mol}{2L}$

$= 0.0292mol/L$

∴ 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= 8.008×10^{3}

iv) 500.0= 5.000×10^{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= 6.022×10^{23} atoms of Ar

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

= 3.131×10^{23} 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:

$2H_2+O_2=2H_2O$

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}C atom in g?

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

$\therefore$ Mass of one C^{12} atom= $\frac{12}{6.022\times 10^{23}}$

= 1.993×10^{-23}g (ans)