Chapter 7 summary notes

Tuesday, 26 March 2024 6:56 PM

7.1

Definitions to remember:

↳Relative atomic mass ⇒For elements

↳Relative molecular mass ⇒For covalent compounds

↳Relative formula mass ⇒For ionic compounds

7.2 ⇒Calculating percentage mass

7.3 ⇒What is mole?

A mole represents 6.02×10^{23} particles

↳Avogadro constant

Amount of substance: mole (mol) ⇒SI unit

Formulas to memorise

① Number of moles = Number of particles ÷ (6.02×10^{23})

② Number of moles = Mass in g ÷ molar mass in g/mol

↳affected by relative atomic mass of constituent elements

③ Number of moles of gas = volume of the gas in dm^3 ÷ $24 dm^3$

1 mole of any gas at r.t.p is always $24 dm^3$ in volume

④ Concentration in mol/dm^3 = number of moles ÷ volume in dm^3

⑤ Concentration in g/dm^3 = Mass of solute in g ÷ volume of solvent in dm^3

(two different substances)

⑥ Concentration in g/dm^3 = concentration in mol/dm^3 × molar mass (g/mol)

↳Refer to formula 2

7.4: Empirical and molecular formulae

Definitions

Empirical formula ⇒simplest ratio of elements in a compound

Molecular formula ⇒only for covalent compounds, multiple of empirical formula

↳Exact number of atoms of each element found in one molecule of a compound

Calculating empirical formula from percentage mass data:

Table

Element			
Mass/g			
Atomic mass			
No. of moles			
mole ratio			

Finding molecular formula from empirical formula

⑦ Multiple, n = $\frac{\text{Relative molecular mass of compound}}{M_r \text{ of empirical formula}}$

7.4 exercise

(1)

no. of moles of carbon = 54.9 ÷ 12 = 4.9917

no. of moles of hydrogen = 8.1 ÷ 1 = 8.1

no. of moles of oxygen = 32.0 ÷ 16 = 2.0

C : H : O

4.9917 : 8.1 : 2.0

5 : 8 : 2

∴ Empirical formula of plexiglass is $C_5H_8O_2$.

(2)

Multiple, n = 194 ÷ (4×12+5+14×2+16) = 2

∴ Molecular formula of caffeine = $C_8H_{10}N_4O_2$

7.5

What is stoichiometry? (mole ratio)

Stoichiometry is the ratio between the quantities of substances (measured in moles) involved in a chemical reaction