Topic 16 – Simple Stoichiometry

Subject content:

(a) calculate stoichiometric reacting masses and volumes of gases (one mole of gas occupies 24dm^3 at room temperature and pressure); calculations involving the idea of limiting reactants may be set (Knowledge of the gas laws and the calculations of gaseous volumes at different temperatures and pressures are not required.)
(b) apply the concept of solution concentration (in mol/dm^3 or g/dm^3) to process the results of volumetric experiments and to solve simple problems (Appropriate guidance will be provided where unfamiliar reactions are involved.)
(c) calculate % yield and % purity.

Formulae:

1. No. of moles (mol) = $\frac{mass\ (g)}{molar\ mass\ (g/mol)}$

2. No. of moles (mol) = $\frac{volume\ (dm^3)}{molar\ mass\ (24\ dm^3/mol)}$

3. Concentration (mol/dm^3) = $\frac{no.\ of\ moles\ (mol)}{volume\ (dm^3)}$

4. Concentration (g/dm^3) = $\frac{mass\ (g)}{volume\ (dm^3)}$

5. Concentration (mol/dm^3) = $\frac{concentration\ (g/dm^3)}{molar\ mass\ (g/mol)}$

6. Volume ratio of gases = mole ratio of gases

7. Percentage purity = $\frac{mass\ of\ pure\ substance}{mass\ of\ impure\ sample} \times 100\%$

8. Percentage yield = $\frac{experimental\ mass}{theoretical\ mass} \times 100\%$

9. Avogadro's constant:

   No. of moles of particles (atoms, molecules, ions) = $\frac{no.\ of\ particles}{6 \times 10^{23}}$