SC14-16 Quantitative Chemistry, Equilibrium and Fuel Cells

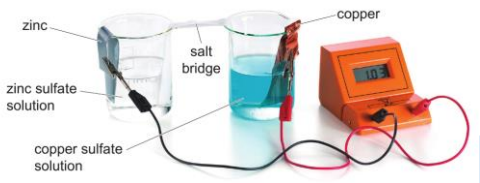
CHURCH STRETTON SCHOOL

Assessment = ★ Self-assessment = ★

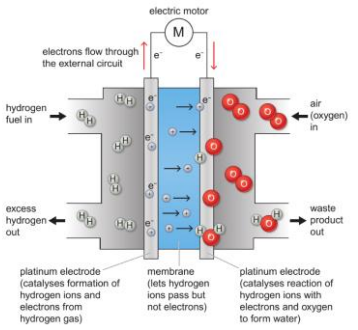
Assessment & Review

Revision lesson

Focus on retrieval, key word definitions and equations.



B This Daniell cell is connected to a voltmeter, which measures its voltage.



Chemical & Fuel cells

Comparison of a battery and a fuel cell

Factors affecting equilibrium

HIGHER TIER ONLY

Manipulation of industrial reversible reactions

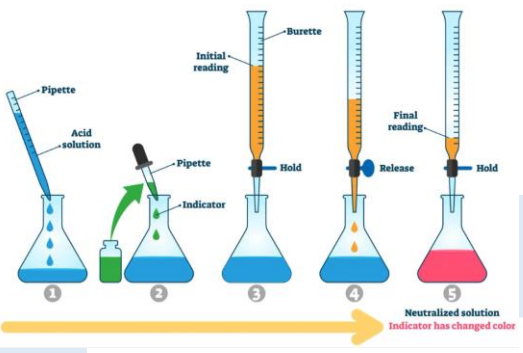
Change in conditions	Position of equilibrium	Time taken to reach equilibrium
temperature increased	moves in the direction of the endothermic reaction	decreases
pressure increased in a reaction involving gases	moves towards the side of the balanced equation with the fewer molecules of reacting gas	decreases
concentration of a reacting substance increased	moves away from the reacting substance in the balanced equation	decreases
catalyst added	no change	decreases

Fertilisers and the Haber process

Comparison of laboratory and batch processing

	Laboratory preparation	Industrial production
scale of production	small scale	large scale
starting materials	ammonia solution and dilute sulfuric acid	raw materials for making ammonia and sulfuric acid
stages	titration (see *SC8 Acids and Alkalis*), then crystallisation	several stages
type of process	batch	continuous

B some features of making ammonium sulfate in the laboratory or industrially

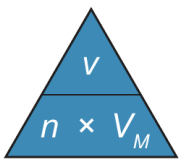


Molar volumes of gases

HIGHER TIER ONLY

Avogadro's law

1 mole of any gas occupies 24dm³ at room temp and pressure (= V_m)



B n = amount in mol, v = volume of gas, V_m = molar volume


B The initial volume of solution in the burette is 0.20 cm³ and the final burette reading is 22.20 cm³.

Titration

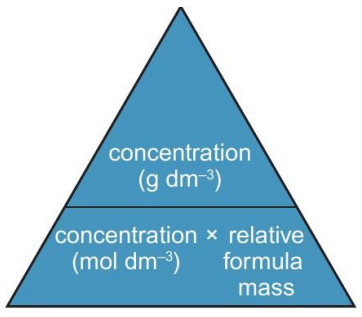
CORE PRACTICAL

Acid base titration

Titration calculations

HIGHER TIER ONLY

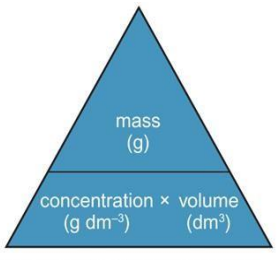
Using experimental data to calculate concentrations



E equation triangle for converting concentrations

Concentration

Metal oxides are insoluble bases



C equation triangle for working out concentration

$$\text{atom economy} = \frac{\text{relative formula mass } (M_r) \text{ of the useful product}}{\text{sum of relative formula masses of all the reactants}} \times 100\%$$

Atom economy

The proportion of reactants converted into useful products

The **percentage yield** compares the actual yield and the theoretical yield:

$$\text{percentage yield} = \frac{\text{actual yield}}{\text{theoretical yield}} \times 100$$

Yield

Acids release hydrogen ions, alkalis release hydroxide ions.

Retrieve:
Year 7 particles
Year 8 reactions
SC8 Acids and alkalis
SC9 Calculations, moles
SC12 Equilibrium

Keywords

Yield, theoretical yield, actual new, percentage yield, at an economy, by-product, volumetric flask, pipette, burette, mole ratio, Avogadro's law, molar gas volume, reversible reaction, closed system, dynamic equilibrium, reaction pathway.

Check the word sheet for more key words and definitions.