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Stoichiometry and Mole Concept

- Chemical equations, molar ratio
- Concentration, molar mass, Avogadro's constant
- Excess and limiting reactants
- Percentage purity, yield and mass

Redox

- Definitions: electron transfer, change in oxidation state (Transfer of Hydrogen and Oxygen)
- Half-equations
- Oxidising and reducing agents
- Test using Potassium Iodide, Acidified Potassium Manganate(VII), Potassium Dichromate(VI)

Chemical Energetics

- Enthalpy change, activation energy, bond breaking, bond forming, exothermic, endothermic
- Energy profile diagram
- Bond energy
- Examples of exothermic and endothermic reactions

Qualitative Analysis

- Identification of 8 cations, 5 anions, 6 gases
- Solubility table

Metals – Reactivity, Extraction and Corrosion

- Reactivity Series, reaction with cold water, steam, dilute hydrochloric acid
- Thermal stability of metal carbonates
- Displacement reaction
- Extraction method and explanation
- Blast furnace
- Chemical reduction
- Rusting, factors that speed up rusting, rust prevention
- Alloys, mild steel, stainless steel

Electrolysis and Simple Electric Cell

- Electrolytic cell vs simple electric cell
- RED CAT AN OX OIL RIG
- Electrochemical series, concentration effect, nature of electrodes
- Purification, electroplating, manufacturing of metals

Acids and Bases

- Acidic and alkaline definition, physical properties, litmus, indicators
- Chemistry of acids and bases
- Strength, concentration, basicity, pH, $\text{pH} = -\log[\text{H}^+]$, titration curves
- Acid rain, methods to control pH (eg. Using calcium hydroxide or calcium carbonate)
- Nature of oxides (BAM NAN ZAP)
- Solubility table, Precipitation reactions
- Ionic equations

Reaction Kinetics (Rate of Reaction)

- Effect of concentration, pressure, surface area to volume ratio (ie. particle size), temperature, catalyst on rate of reaction using key concepts of activation energy, as well as energy and frequency of collisions and effective collisions
- Graphs on rate of reaction (eg. volume of reactant produced against time, etc.)
- Experimental procedures for rate of reaction (eg. measuring temperature against time, etc.)

Periodic Table

- Position of element relates to proton number, electronic structure
- Group number - ionic charge, metallic character, Period number - number of electron shells
- Proton number/Atomic number, Shielding electrons - Atomic radius, Ionic radius
- Trends and properties of groups in table (Metals, Non-metals, Alkali metals, Halogens, Noble gases, Transition metals)

Equilibria

- Reversible reactions, Dynamic equilibrium (relating to rates of forward and backward reactions, and concentrations of reactants and products)
- Le Chatelier's Principle, effect of temperature, concentration and pressure (gaseous substances)
- Haber process, equations and conditions

Fuels

- Petroleum fractions and uses (PGPNKDLB)
- Fossil fuels as energy sources, and subsequent issues (limited supply, pollution)
- Hydrogen fuel cell

Organic Chemistry

- Homologous series, General formula, Functional group
- Nomenclature, Structural formula, Condensed structural formula
- Physical and chemical properties of alkanes, alkenes, alcohols, carboxylic acids, esters (Complete combustion, Incomplete Combustion, Substitution, Cracking, Hydrogenation, Bromination, Hydration, Addition Polymerization, Oxidation, Dehydration, Esterification)
- Uses of esters (solvents and flavouring)
- Issues with use of organic molecules, pollutants
- Isomerism