

UNIT 2 CHEMISTRY

INDEX

What Makes Water Such a Unique Chemical?

AOS 1: How Do Substances Interact With Water?

AOS 2: How Are Substances in Water Measured and Analysed?

AOS 3: Practical Investigation

The Importance of Water

Structure of Water

Intermolecular Bonding

The Unique Properties of Water

High Melting and Boiling Point

High Latent Heat Values of Water

Specific Heat Capacity

The Significance of Water's Properties

Water as a Solvent

Solubility of Ionic Compounds

Solubility of Molecular Substances in Water

Solubility of Gases in Water

The Importance of the Solvent Properties of Water

Solution Concentration

Molarity

Other Calculations Using Molarity

Calculating the Number of Particles in Solution

Other Concentration Units

Percentage by Mass (% w/w)

Percentage by Volume (% v/v)

Percentage by Mass/Volume (% w/v)

Parts Per Million (ppm) and Parts Per Billion (ppb)

Other Means of Expressing Concentration

Mass of Solute Per Litre of Solution

Mass of Solute Per Gram of Solution

Density

Converting Concentration Units

Converting Between Concentration Units

Dilutions

Dilution Using Molarity

Chemical Reactions in Water

Precipitation Reactions

Net Ionic Equations

Writing Ionic Equations

Acids and Bases

Common Acids and Bases
Properties of Acids and Bases

Acids and Bases in Water

Ionisation of Acids
Dissociation of Bases

Acid-Base Reactions

Conjugate Pairs

Reactions Involving Acids

Amphoteric Substances

The Self-Ionisation of Water

Polyprotic Acids

Acid and Base Strength

The Difference Between Acid Strength and Concentration

Acidic, Basic and Neutral Solutions

Self-Ionisation of Water
Neutral Solutions
Acidic Solutions
Basic Solutions

The pH Scale

pH Calculations at 25°C

Calculating the pH of an Acidic Solution
Calculating the pH of an Alkaline Solution

Understanding the pH Scale

Acid Deposition

Redox Chemistry

Redox Reactions

Oxidants

Reductants

Oxidation Numbers

Finding the Oxidation Number of an Element in a Compound

Identifying Redox Reactions

Other Ways of Recognising Redox Reactions

Writing Redox Equations

Balancing Redox Half Equations

Combining Half Equations

The Electrochemical Series

Uses of the Electrochemical Series

Predicting Reaction Spontaneity

Writing Redox Reactions

Corrosion

Corrosion Protection

Surface Protection

Alloying

Electroplating

Electrochemical Protection

Impressed Current

Sacrificial Anode

Electrochemical Cells

Example of a Galvanic Cell: The Daniell Cell

Half Cells

The External Circuit

Internal Circuit

The Physical States of Water

Drinking Water

Water Sample Analysis

Water Contamination

Definition

Types of Water Contaminants

Types of Water Testing

Collection of Water Samples

Avoiding Contamination of Water Samples

Matching Sampling Type to Water Source

Water Collection Methods

Measuring the Solubility of Solids

Solubility Curves
Crystallisation

Case Study: Dissolved Oxygen

Salinity of Water
Sources of Salinity
Measuring Salinity

Calculations Involving Chemical Equations (Stoichiometry)
Finding Mole Fractions
Calculations Based on One Known Reactant or Product
Calculations Based on Two Known Quantities
Identifying the Limiting Reagent
Percentage Yield

Analytical Tool – Gravimetric Analysis
Determination of Water Content in a Sample

Analysing the Salt Content of Water Via Gravimetric Analysis
Steps Involved in Gravimetric Analysis
Properties of the Precipitate
Solubility Rules
Errors in Gravimetric Analysis
Summary of Gravimetric Analysis Errors

Spectroscopy
The Electromagnetic Spectrum
Using Radiation in Spectroscopy
The Effects of Radiation on Atoms
Quantitative Analysis
Steps Involved in Quantitative Analysis via Spectroscopy
Calibration Curves
Calibrating the Spectrometer

Colorimetry (Visible Spectroscopy)
Complimentary Colours
The Components of a Colorimeter
Advantages of Colorimetry
Disadvantages of Colorimetry

UV-Visible Spectroscopy
The Components of a Simple UV-Visible Spectrometer
Qualitative Analysis
Quantitative Analysis

Atomic Absorption Spectroscopy
The Components of an Atomic Absorption Spectrometer
Use of AAS
Advantages of AAS

Analysis of Organic Compounds in Water

Column Chromatography
Why do Components Separate?

High Performance Liquid Chromatography
Interpreting Chromatograms
Predicting Elution Order
Normal Phase Chromatography
Reverse Phase Chromatography
Summary
Advantages of HPLC
Analysis for Acids and Bases in Water

Standard Solutions
Primary Standards
Correct Rinsing of Titration Glassware
Choosing an Indicator for a Titration