

KARACHI EDU COACHING CENTER • CLASS X CHEMISTRY

Chapter 7: Analytical Chemistry

Comprehensive study notes, qualitative and quantitative analysis, and analytical techniques



What is Analytical Chemistry?

The branch of chemistry dealing with separation, identification, and composition quantification.

Qualitative

Identifies the presence of elements or functional groups in a given substance.

Quantitative

Determines the exact numerical amount or percentage of each component present.

Importance of Analytical Chemistry

Essential applications across medicine, industry, environmental monitoring, and research.

Medicine & Health

Blood testing, drug purity analysis, and disease diagnosis.

Food Quality Control

Detecting contaminants, adulterants, and nutritional value.

Environmental Monitoring

Measuring pollutant levels in air, water, and soil samples.

Classical Analytical Techniques

Traditional chemical methods for separation and measurement.

Gravimetric Analysis

- ✓ **Precipitation:** Isolate analyte as insoluble solid.
- ✓ **Filtration & Washing:** Separate solid product.
- ✓ **Drying & Weighing:** Calculate exact mass percentage.

Volumetric (Titrimetric) Analysis

- ✓ **Titrant:** Solution of known concentration in burette.
- ✓ **Analyte:** Solution of unknown concentration in flask.
- ✓ **Endpoint:** Detected using specific chemical indicators.

Modern Instrumental Methods

Advanced technology utilized for precise and rapid chemical analysis.

Spectroscopy

Interaction of electromagnetic radiation with matter to identify structure.

Chromatography

Separation of complex mixtures using stationary and mobile phases.

Electrochemistry

Measuring electrical properties like potential or current for concentration.

Principles of Chromatography

How mixtures are separated based on differential partitioning between two phases.

PHASE01

Stationary Phase

Solid or liquid fixed on a support.

PHASE02

Mobile Phase

Liquid or gas flowing through.

PHASE03

Partitioning

Differential affinity causes separation.

PHASE04

Detection

Identification of separated bands.

Titration Calculations Formula

Determining unknown concentration using stoichiometry and molarity relations.

Standard Formula

$$M_1V_1 / n_1 = M_2V_2 / n_2$$

Where M = Molarity, V = Volume, and n = moles from balanced equation.

Key Steps

- Write balanced neutralization equation.
- Identify knowns and unknowns.
- Substitute values to calculate concentration.

Chapter Summary: Key Takeaways

Review of core concepts covered in Analytical Chemistry.

- ✓ **Dual focus:** Qualitative identification and quantitative measurement.
- ✓ **Classical methods:** Gravimetric and volumetric analysis techniques.
- ✓ **Modern tools:** Spectroscopy and chromatography for precise analysis.

KARACHI EDU COACHING CENTER

Questions & Discussion

Review your textbook exercises and prepare for upcoming assessments.

