

BIOCHEMICAL TECHNIQUES

Unit 1

Laws of thermodynamics- First, second, third and zero law. Law of mass action. Oxidation reduction reactions. Potentiometric titration of oxidation- reduction reactions. Principle and applications of oxygen electrode Electrochemical techniques- Measurement of pH, Standard hydrogen electrode-, Henderson- Hessel balch equation. Types of buffer, role of Buffers in biological system. Colloids- types and membrane phenomena - Electrical charge of colloidal particles. Surface tension, adsorption, viscosity and osmotic pressure. Donnan membrane equilibrium. Determination of molecular weight by osmotic pressure and viscosity.

Unit 2

Chromatography: adsorption, partition chromatography- Principle, methods and applications of paper chromatography, Thin layer chromatography, column chromatography, Gas-liquid chromatography, and Ion exchange chromatography. High performance liquid chromatography, molecular sieve chromatography and affinity chromatography.

Unit 3

Electrophoresis: Principle, instrumentation and applications of paper electrophoresis, Agarose gel electrophoresis, PAGE, cellulose acetate electrophoresis, Immunoelectrophoresis, Isoelectric focussing and molecular weight determination. Principle and applications of southern and western blotting. Principles of centrifugation. Low speed and high speed centrifugation. Preparative, Analytical ultra centrifuge- Instrumentation and applications. Basic principle and technique of subcellular fractionation by differential centrifugation.

Unit 4

Spectroscopy: Colorimetry, Beer-Lambert's law, measurement of extinction, calibration curve. Spectrophotometer, absorption spectra, components of instrument principle and applications of spectrofluorimetry and MALDI-TOF. Principle, instrumentation and applications of flame photometer, atomic absorption, NMR, ESR and mass spectroscopy.

Unit 5

Radioisotopes: Radioactive decay, units of radioactivity. Measurement of radioactivity- Geiger muller counter. Scintillation counter, and Autoradiography. Applications of radioisotopes in Biology. Manometry: The Warberg constant volume- Gilson differential respirometer- Uses of Warberg and Gilson manometry.

References

1. Principles and techniques of practical Biochemistry – Wilson and Walker.
2. Biophysical chemistry – principles and techniques – Upadhyay, Upadhyay and Nath.
3. Practical Biochemistry – Williams and Wilson.
4. Laboratory manual in Biochemistry – J. Jayaraman.