

ELECTROPHORESIS

- The term electrophoresis describes the migration of a charged particle under the influence of electric field (electro-charged particle and phoresis -movement).
- Many important biological molecules such as amino acids, peptides, proteins, nucleotides, nucleic acids possess ionisable groups and, therefore, at any given pH, exists in solution as electrically charged species either as cations or anions.
- Under the charge of an electric field these charged particles will migrate either to cathode or to anode, depending on the nature of their net charge.
- This is one of the most fundamental processes used in all types of molecular biology and RDT experiments.

DEFINITION

- Electrophoresis is migration of charged particles or molecules in a medium under the influence of an applied electric field.
- **The Rate of migration of charged molecules depends upon following factors:**
 - (a) The strength of electric field, size and shape.
 - (b) Relative hydrophobicity of the sample.
 - (c) Ionic strength and temperature of the buffer.
 - (d) Molecular size of the taken bio molecule.
 - (e) Net charge density of the taken bio molecule.
 - (f) Shape of the taken bio molecule.
- In the process of electrophoresis large molecules have more difficulty in moving through the supporting medium (i.e., gel) whereas the smaller medium has more mobility through it.

Electrophoretic Mobility

- Electrophoretic mobility is defined as the rate of migration (cm/sec) per unit field strength (Volts/cm)
- $\mu = Q/6\pi r\eta$
- Where μ - Electrophoretic mobility
Q-Net charge on the ion
r- Ionic radius of the solute
 η - Viscosity of the medium

- The different components in a mixture will have different electrophoretic mobilities and hence they can be separated.
- Mixtures of amino acids, proteins and nucleotides can be separated by their migration in an electric field.

Electrophoresis Apparatus

Electrophoresis apparatus consists of-

- 1) Buffer tank -to hold the buffer
- 2) Buffer
- 3) Electrodes- made of platinum or carbon
- 4) Power supply
- 5) Support media

Note-*Choice of buffer depends on the nature of substance to be separated and the electricity is supplied at a constant current and voltage.*