**Factors affecting electrophoretic mobility & Techniques of paper Electrophoresis**

Factors Affecting Electrophoretic Mobility:

1. Charge of the Molecule:
   * The net charge on a molecule determines its electrophoretic mobility. Positively charged molecules move towards the cathode (negative electrode), while negatively charged molecules move towards the anode (positive electrode).
2. Size and Shape of the Molecule:
   * Larger molecules experience more resistance and migrate more slowly compared to smaller molecules of the same charge.
   * The shape of the molecule also affects its mobility. Compact and spherical molecules typically migrate faster than elongated or irregularly shaped molecules.
3. Ionic Strength and pH of the Buffer:
   * The ionic strength of the buffer affects the electrophoretic mobility by influencing the screening effect of ions in the buffer solution.
   * pH can alter the charge of the molecule, impacting its migration. Changes in pH can affect the ionization state of charged functional groups, thereby altering the net charge on the molecule.
4. Gel Concentration and Pore Size:
   * In gel electrophoresis, the concentration of the gel matrix and its pore size influence the electrophoretic mobility.
   * Higher gel concentrations and smaller pore sizes result in greater resistance, slowing down the migration of molecules.
5. Applied Electric Field:
   * The strength of the electric field determines the force applied to the molecules and affects their migration speed.
   * Higher electric field strengths can result in faster migration but can also lead to increased heat generation and potential damage to the molecules or gel.

Techniques of Paper Electrophoresis:

1. Horizontal Paper Electrophoresis:
   * In horizontal paper electrophoresis, a rectangular or square paper strip is soaked in an appropriate buffer solution and placed horizontally on a flat surface.
   * The sample is applied as a spot or line near one end of the paper, and an electric field is applied across the paper.
   * As the buffer migrates through the paper, the charged components of the sample separate and migrate with the solvent front.
   * This technique is commonly used for qualitative analysis, such as separation and identification of amino acids, sugars, dyes, and small organic compounds.
2. Ascending Paper Electrophoresis:
   * Ascending paper electrophoresis involves suspending the paper strip vertically in a container filled with the buffer solution.
   * The sample is applied to the bottom of the paper strip, and the electric field is applied from the bottom to the top.
   * As the buffer migrates upwards through the paper, the charged components of the sample separate and migrate in the opposite direction, towards the anode.
   * This technique is suitable for separating charged molecules, such as proteins, peptides, and nucleic acids.
3. Descending Paper Electrophoresis:
   * Descending paper electrophoresis is similar to ascending paper electrophoresis but with the polarity reversed.
   * The sample is applied to the top of the paper strip, and the electric field is applied from the top to the bottom.
   * As the buffer migrates downwards through the paper, the charged components of the sample separate and migrate towards the cathode.
   * This technique is commonly used for separating volatile compounds or when analyzing mixtures with high conductivity.

Paper electrophoresis is a versatile and relatively simple technique that allows for the separation and analysis of charged molecules. It finds applications in various fields, including biochemistry, clinical diagnostics, environmental analysis, and food science. The choice of paper electrophoresis technique depends on the specific requirements of the analysis, the properties of the sample, and the desired separation conditions.

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