Advanced laboratory technique
Lab/8
Protein and Amino acid Separation Techniques

MSc.Yasmeen Kateb

INTRODUCTION

Separation techniques : are the processes used to separate components of a mixture based on their physical or chemical properties. These techniques can include methods such as filtration, distillation, chromatography, centrifugation, electrolysis, ultrafiltration, sedimentation, and solvent extraction.

SEPARATION OF PROTEINS

- There are several techniques used to separate proteins based on their unique properties.
- The most common methods for protein separation :

1-Chromatography:

-Ion-Exchange Chromatography: Separates proteins based on their charge

-Size-Exclusion Chromatography: Separates proteins based on their size

SEPARATION OF PROTEINS

2-Electrophoresis:

-SDS-PAGE (Sodium Dodecyl Sulfate-Polyacrylamide Gel Electrophoresis): Separates proteins based on their molecular weight

- Capillary Electrophoresis: Separates proteins based on their charge-to-mass ratio

3-Ultrafiltration:

-Dialysis: Separates proteins based on their size using a semi-permeable membrane

-Ultrafiltration: Uses pressure to force proteins through a membrane, separating them based on size.

SEPARATION OF PROTEINS

4-Centrifugation :

-Differential Centrifugation: Separates proteins based on their size and density by spinning at different speeds

-Density Gradient Centrifugation: Uses a gradient of a dense substance to separate proteins based on their buoyant density.

5- Precipitation

-Ammonium Sulfate Precipitation: Separates proteins by adding ammonium sulfate to precipitate specific proteins out of solution.

-Cold Precipitation: Uses cold temperatures to precipitate proteins .

SEPARATION OF AMINO ACIDS

- Separating amino acids is a crucial step in many biochemical and analytical processes.
- The most common methods for amino acids separation :

1. Chromatography:

-Ion-Exchange Chromatography: Separates amino acids based on their charge. It uses resins that bind amino acids differently depending on their ionic properties.

-High-Performance Liquid Chromatography (HPLC): A high-resolution method that separates amino acids based on their size, polarity, and interaction with the stationary phase.

2-Electrophoresis:

-Paper Electrophoresis: Separates amino acids based on their movement in an electric field through a medium like paper or gel.

-Capillary Electrophoresis: Uses a capillary tube filled with a buffer solution. Amino acids are separated based on their size and charge as they move through the capillary under an electric field.

SEPARATION OF AMINO ACIDS

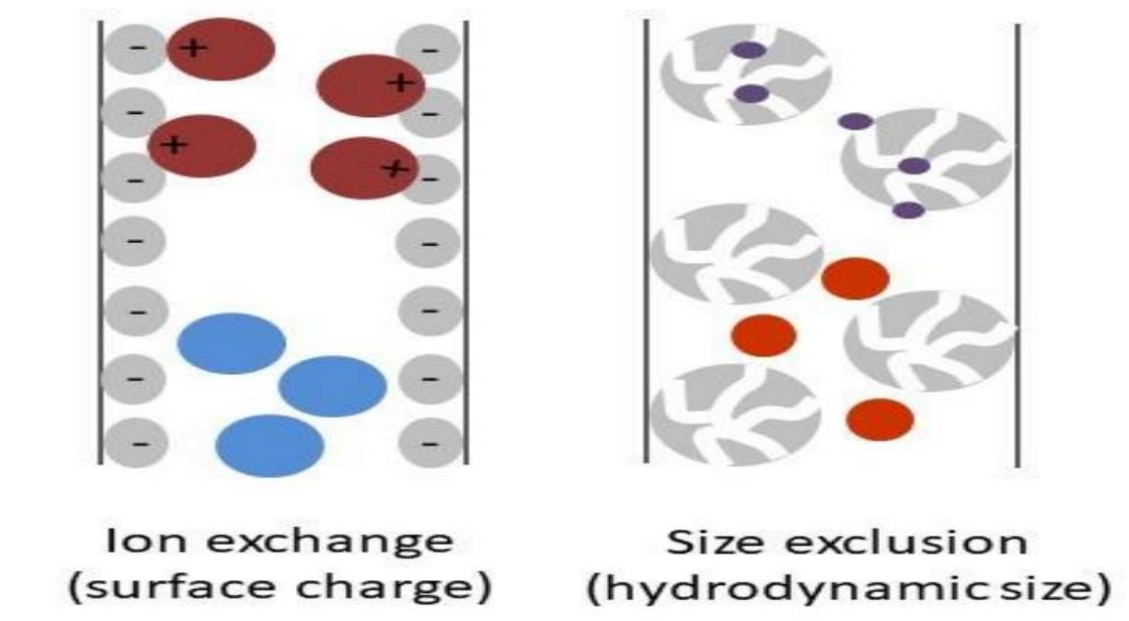
3. Ultrafiltration

-Dialysis: Separates amino acids based on their size by using a semi-permeable membrane.

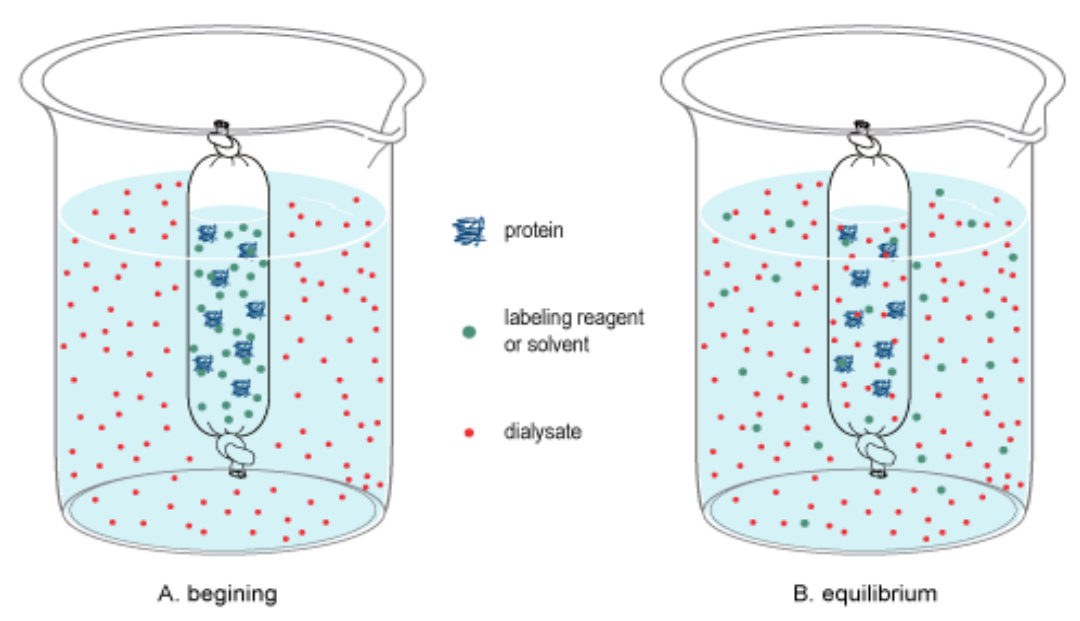
-Ultrafiltration: Uses pressure to force amino acids through a membrane, separating them based on size and molecular weight.

4. Precipitation:

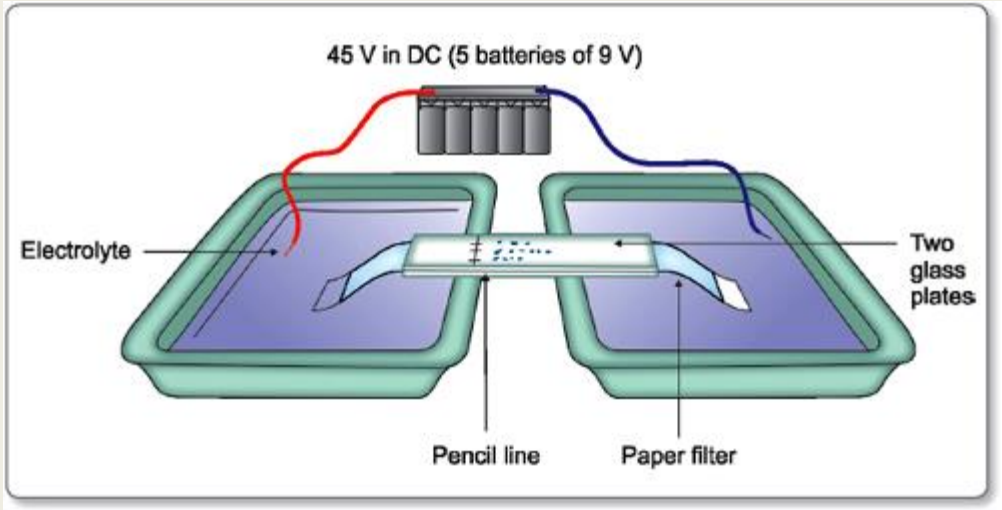
- Chemical Precipitation: Certain reagents can selectively precipitate specific amino acids out of a solution.



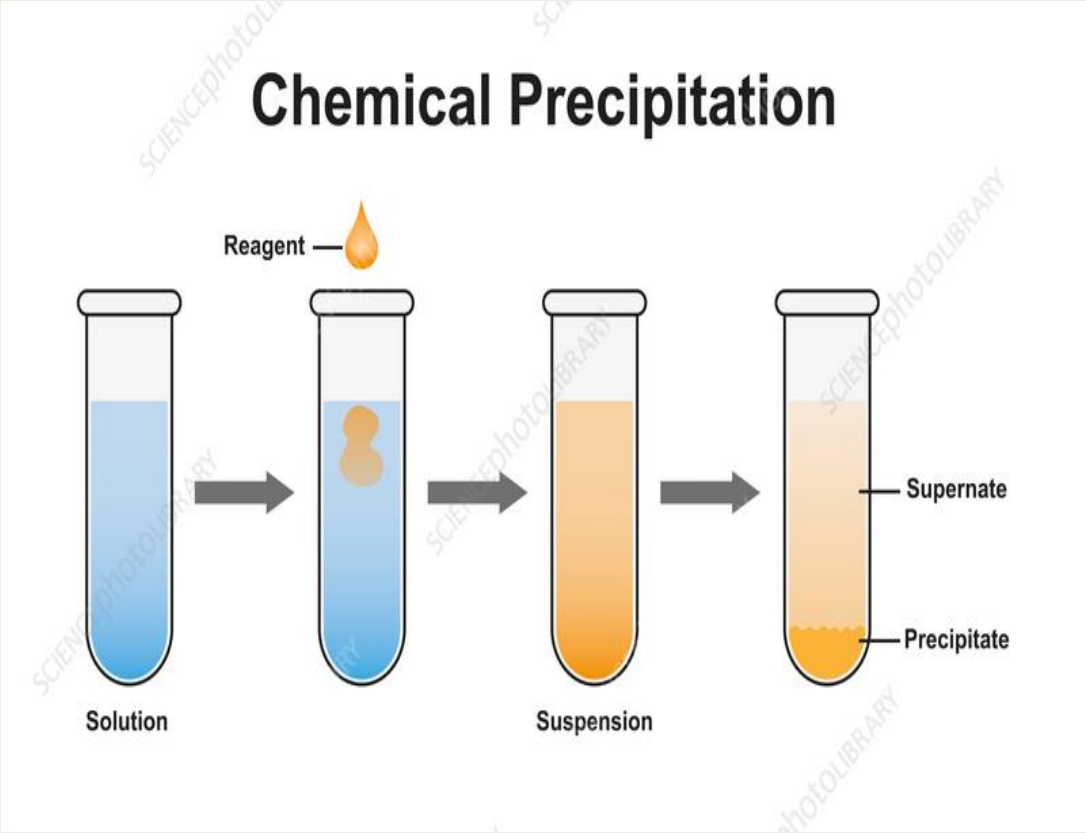
Chromatography



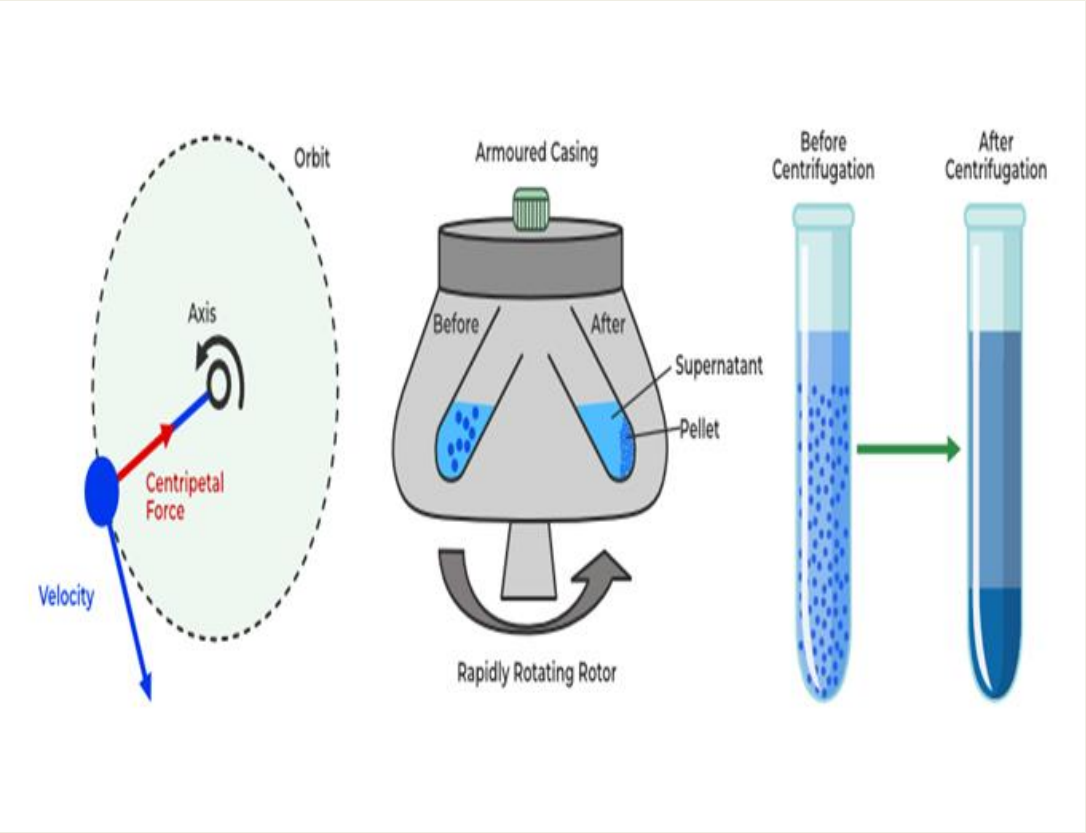
Dialysis



Paper Electrophoresis



Precipitation



Centrifugation

Thank you