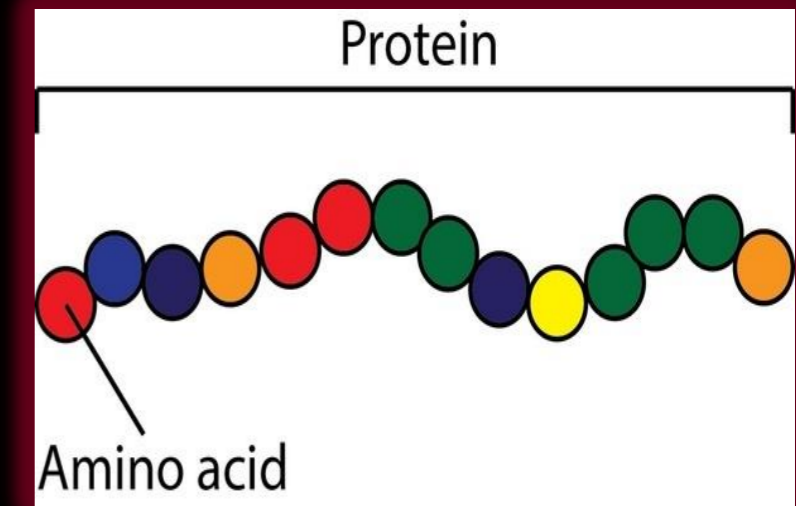


Protein

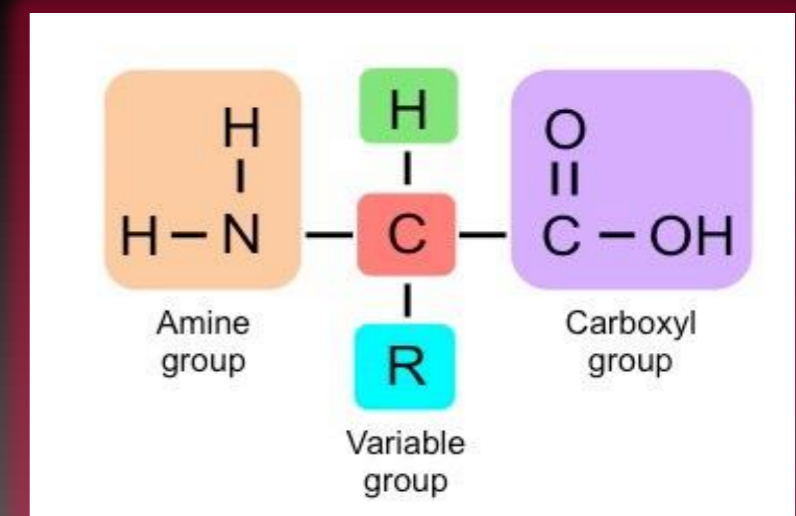


Proteins

➤ Proteins are polymers made up of amino acid units.



➤ Amino acid consist of an **amino group**, **carboxyl group**, **H atom** and **R group**.

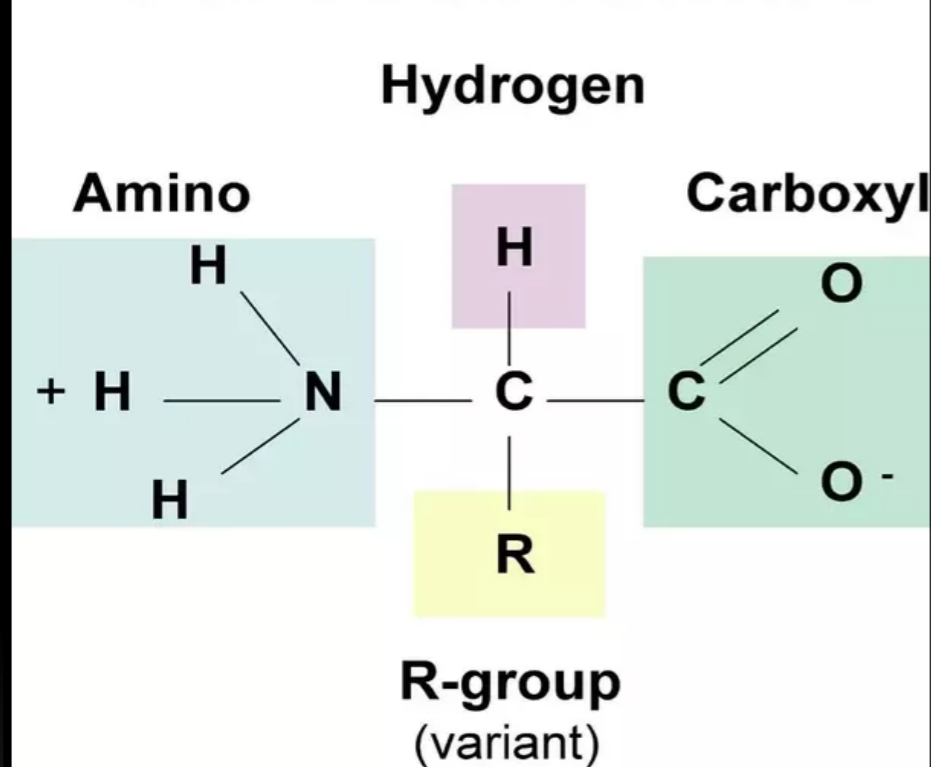


Function of proteins

- Act as structural units such as : Skin , hair , nails , muscle and connective tissue
- Act as catalysts such as enzyme
- Act as hormones such as insulin
- Act as transport such as hemoglobin

Properties of Proteins

Amino Acid Structure



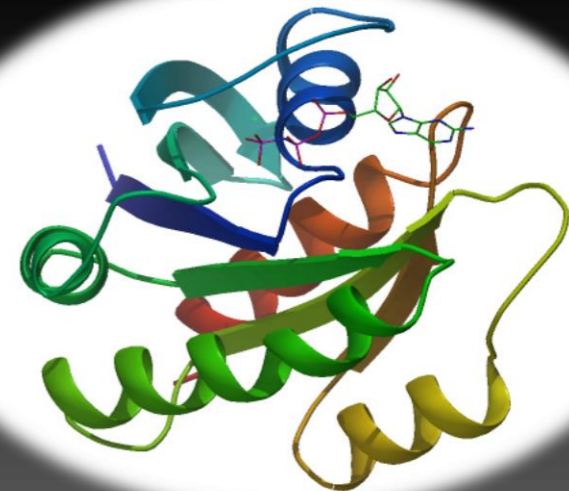
Amphoteric

Isoelectric point (p_i)

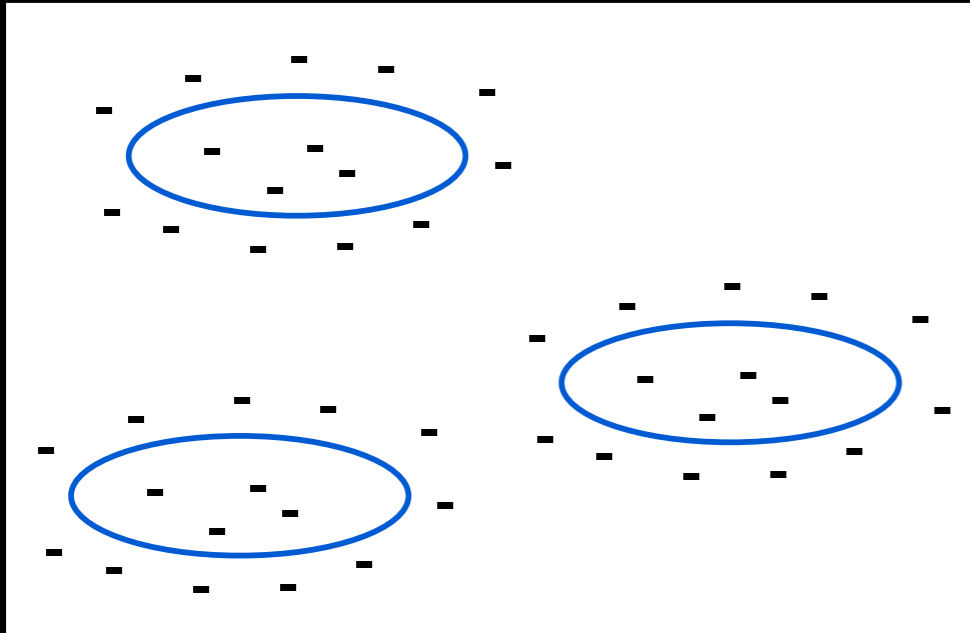
Positive and negative charges are equal at specific pH (no net electric charge)

Precipitation of proteins

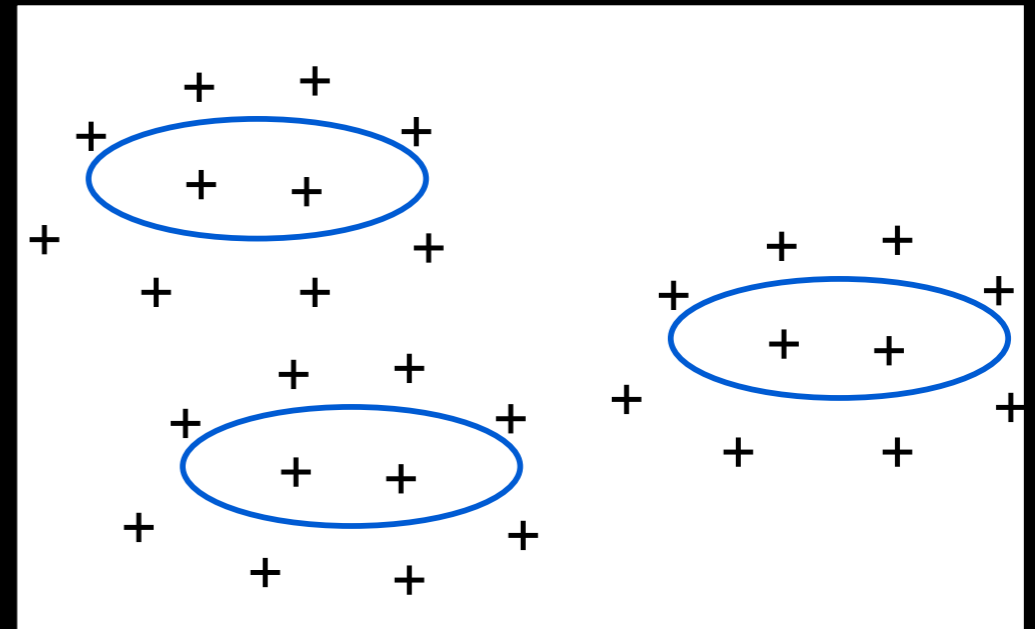
- ❖ Effect of strong acid and strong base
- ❖ Effect of neutral salts
- ❖ Effect of alkaloid reagents
- ❖ Effect of polar solvent
- ❖ Effect of heat



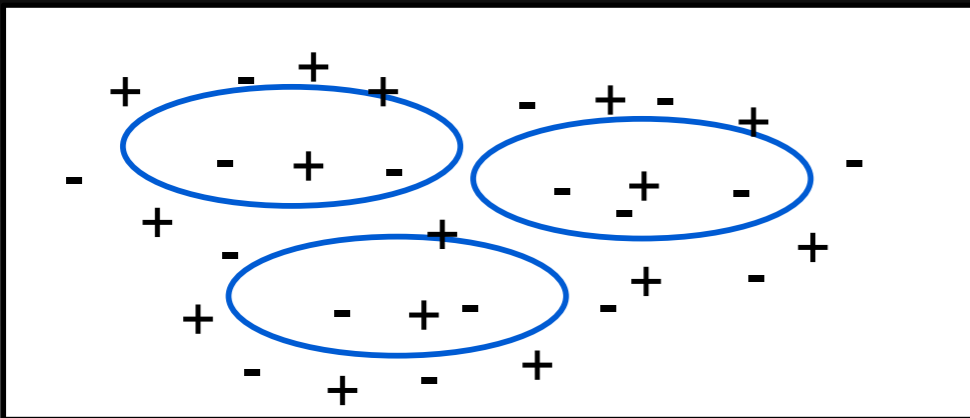
Effect of acid and base on proteins



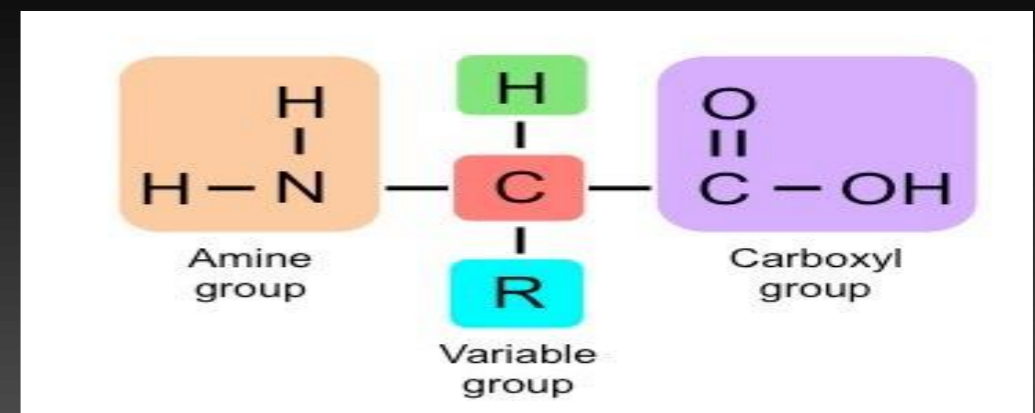
$\text{pH} > \text{pI}$ Basic solution



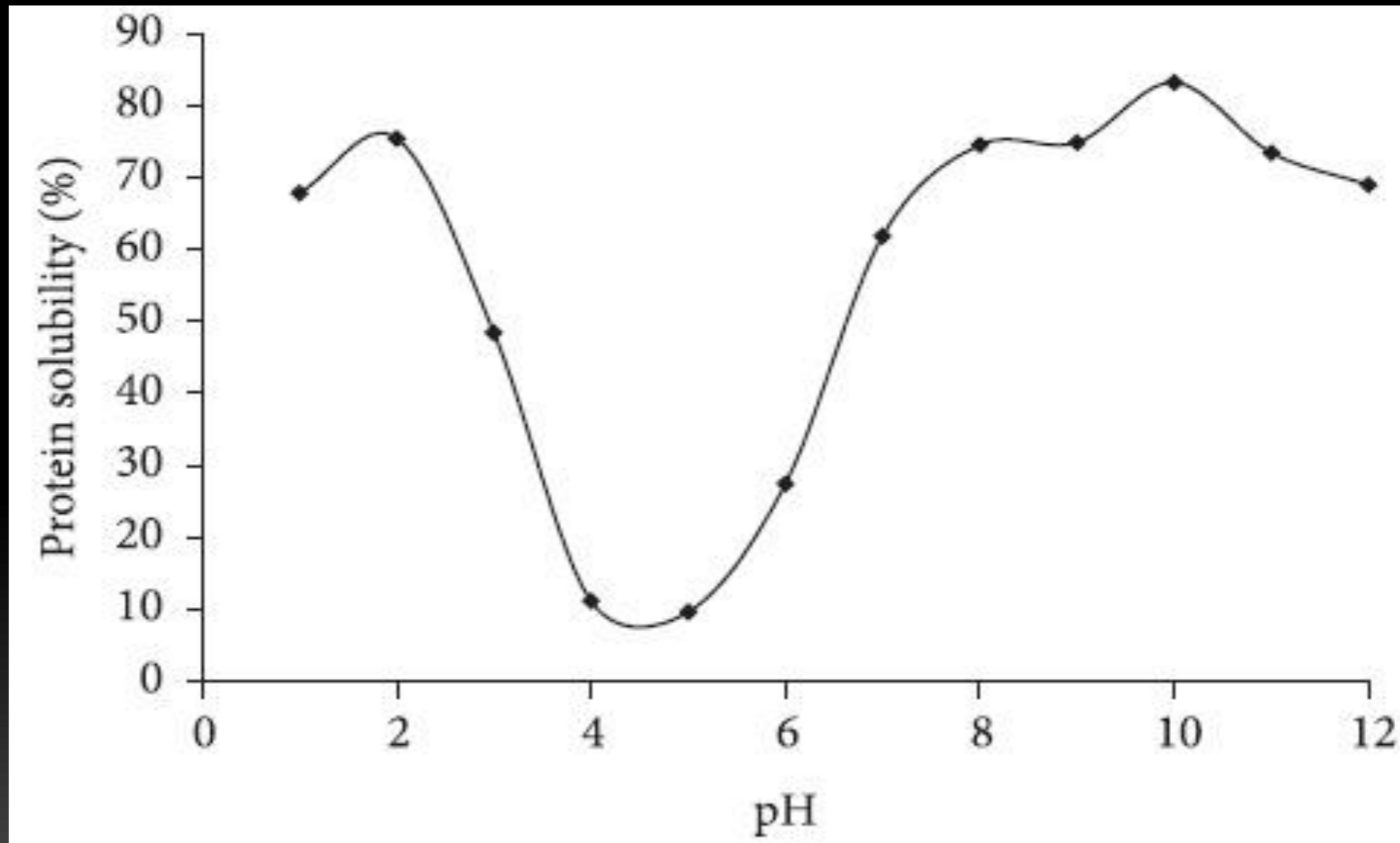
$\text{pH} < \text{pI}$ acidic solution



$\text{pH} = \text{pI}$ Neutral solution

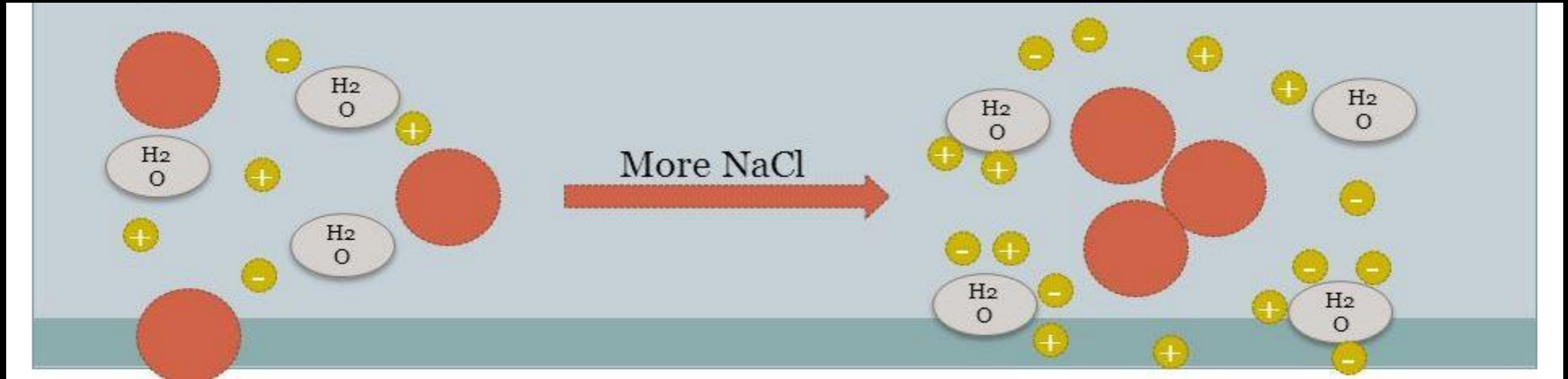


Solubility of β -lactoglobulin



pH= 5.3 minimum solubility

Effect of neutral salts



Salting in

Salting out

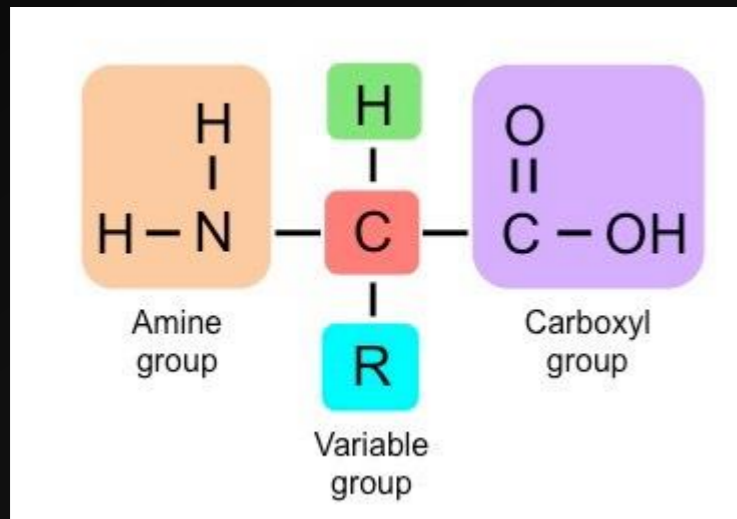
Low con. Of salt

High con. Of salt

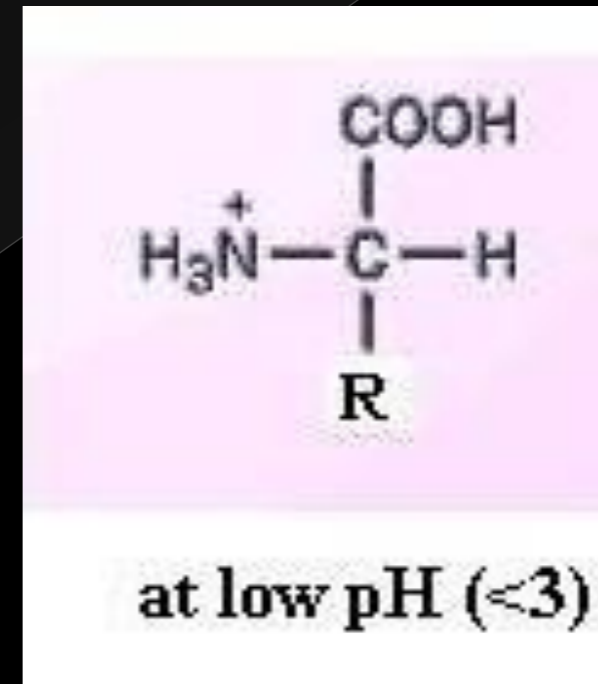
Soluble

ppt

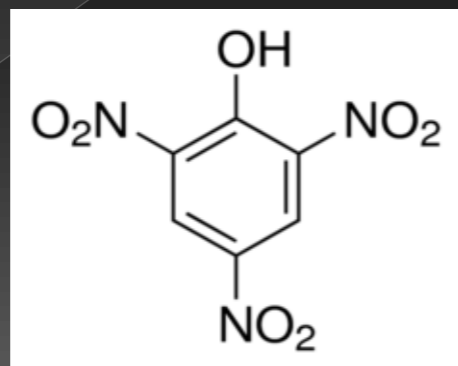
Effect of alkaloid reagent



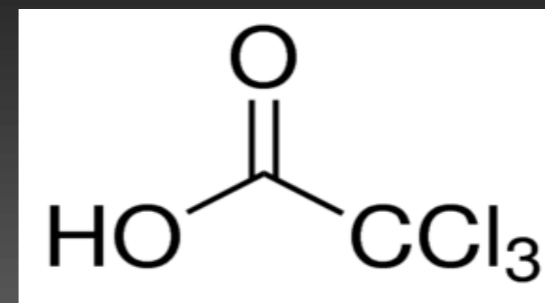
acid



Insoluble salt



Picric acid



trichloroacetic acid

Effect of polar solvent

- Polar solvent such as ethanol, methanol and acetone
- Organic solvent with water made miscible solution.
- Miscible solution decrease the solubility of protein.

Effect of heat

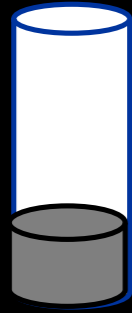
Protein types are :

- Fibrous protein (insoluble in water)
- Globular protein (soluble in water)

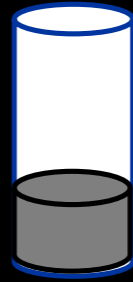
Protein coagulation results in the disorganization of a protein's structures without the hydrolysis of peptide bonds lead to precipitation of protein.

Precipitation effects

1- acid and base effect :



1ml HNO₃ (con.)
1ml albumin



2ml NaOH
(saturated)
1ml albumin

2- neutral salt effect :



10 drop
cupric sulphate
3ml albumin



3 drop
lead acetate
3ml albumin

3- alkaloid reagent effect :



10 drop tannic acid
1ml albumin

4- polar solvent effect:



2ml ethanol
1ml albumin

5ml water

