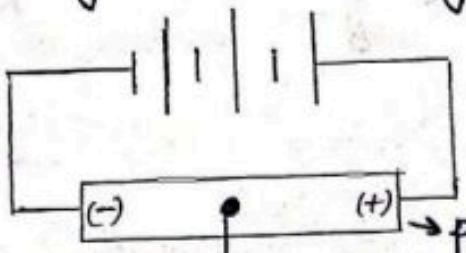
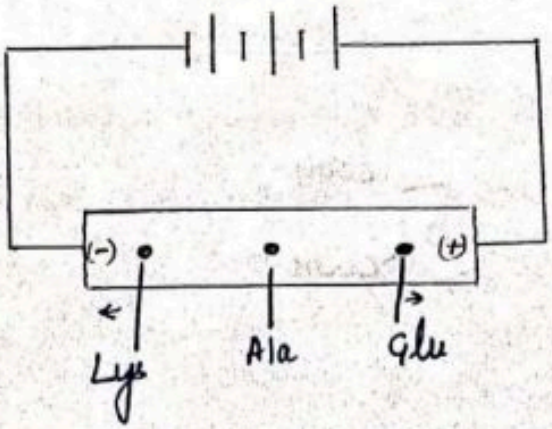
Ex- A mixture of lysine, alanine, glutamic acid at pH=6 when subjected to above conditions results in movement of glutamic acid towards anode and lysine towards cathode. Alanine has no net charge and therefor dosnot move. Ameno acid with isoelectric poent greater than buffer pH gains a proton becomes positively charged (move towards cathode). On the other hand ameno acids with isoelectric poent less than buffer pH loses a proton becomes negatively charged (move towards anode) The ameno acid with buffer and isoelectric poent comparable dosnot migrate towards any electrode.

Glu PI = 3.2
Lys PI = 9.7
Ala PI = 6



paper strip at pH=6

Mixture of Lysine + glutamic acid + alanine



an applied electric field called isoelectric point. Each amino acid has a characteristic isoelectric point. For a neutral amino acid isoelectric point is slightly less than 7 (glycine = 6·1), for acidic amino acid isoelectric point lies between: 3·2 - 3·5 (Aspartic acid 3) and for basic amino acid it lies between pH 7·6 to 10·8

At isoelectric point, an amino acid has the property has been used in Separation of different amino acid obtained from hydrolysis of proteins

* Amino acids exist as cations (I) in acidic medium and migrate towards Cathode under the influence of electric field.
* Amino acids exist as anions (III) in basic medium and migrate towards anode under the influence of electric field.

Electrophoresis:-

It is a method used for separation an analysis of amino acids. This method is based upon pH control and electric charge. The amino acid differ in their isoelectric point. A mixture of amino acid is placed on the centre of a paper strip at a certain pH. The pH is maintained by saturating the paper strip with the buffer solution. Paper strip is attached to electrodes. On passing electric current through the strip amino acid migrate towards electrodes depending upon the net charge present on them.

All these properties show that amino acids exist as dipolar ions.

As evident from their general formula amino acids contain both an acidic carboxyl group and a basic amino group. These two groups interact and thus affect the properties of each other. Acutally they neutralize each other involving transfer of a proton from carboxyl group to the amino group with in the molecule.

As a result, amino acids largely exist as dipolar ions.

$$R-\underset{NH_2}{\underset{|}{CH}}-COOH \rightleftharpoons R-\underset{{}^{+}NH_3}{\underset{|}{CH}}-COO^{-}$$

Zwitter ion

The dipolar structure is commonly known as Internal salt or Zwitter ion.

In aqueous solution an equilibrium exist between the dipolar ion, anionic form and cationic form of amino acid.

$$H_3\overset{+}{N}-\underset{R}{\underset{|}{CH}}-COOH \underset{H_3O^{+}}{\overset{OH^{-}}{\rightleftharpoons}} H_3\overset{+}{N}-\underset{R}{\underset{|}{CH}}-COO^{-} \underset{H_3O^{+}}{\overset{OH^{-}}{\rightleftharpoons}} H_2N-\underset{R}{\underset{|}{CH}}-COO^{-}$$

(I) (II) (III)

The predominant form of the amino acid in the solution depends on the pH of the solution and on the nature of amino acid. For each amino acid there is a particular pH value at which conc. of dipolar ion is maximum.

At some intermediate pH the conc. of cationic form (I) & anionic form (III) will become equal and consequently amino acids exist as neutral dipolar ion. At this pH there will be no net migration of amino acid in an electric field. This pH at which there is no net migration of amino acid under the influence of