VIVEKANANDA COLLEGE

THAKURPUKUR

KOLKATA-700063

NAAC ACCREDITED 'A' GRADE

Topic: Amino acids-Synthsis & properties

Course Title: Chemistry (Gen)

Paper: CC-4/GE-4

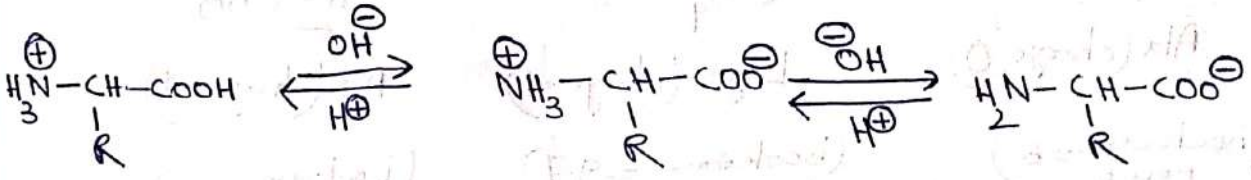
Semester: 4(Gen)

Name of the Teacher: Prabal Giri

Name of the Department: Chemistry

Isoelectric Point

An amino acid bears a positive charge in acidic solution (low pH) and a negative charge in basic solution (high pH).



Low pH (cationic in acid) | Isoelectric pH (neutral) | High pH (anionic in base)

There must be an intermediate pH where the amino acid is evenly balanced between two forms as the dipolar zwitterion with a net charge of zero. This pH is called the isoelectric point.

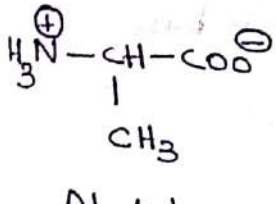
Electrophoresis

Electrophoresis uses differences in isoelectric points to seperate a mixture of amino acids.

A streak of the amino acid mixture is placed in the center of a layer of acrylamide gel. Two electrodes are placed in contact with the edge of gel and a potentia of several thousand volt is applied across the electrode. Cationic amino acids are attracted to the negative electrode (Cathode) and anionic amino acids are attracted to the positive electrode (Anode). An amin acid at its isoelectric point has no net charge, so does not move.

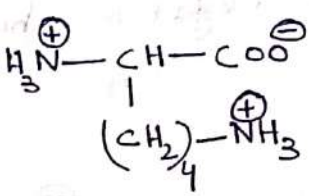
Example

Mixture of alanine, lysine and aspartic acid



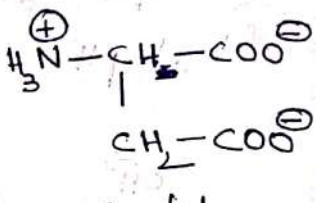
Ala (charge 0)

(isoelectric point = 6)



Lys (charge +1)

(isoelectric point = 9.7)



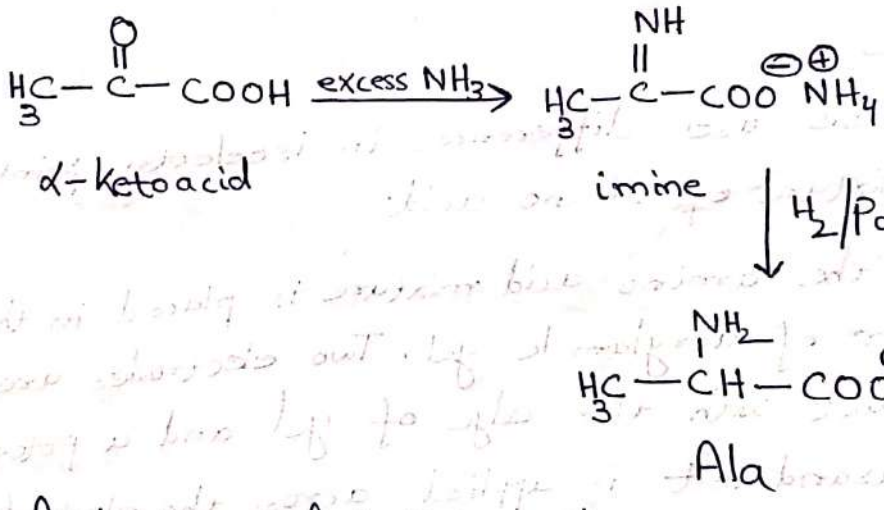
Asp (charge -1)

(isoelectric point = 2.8)

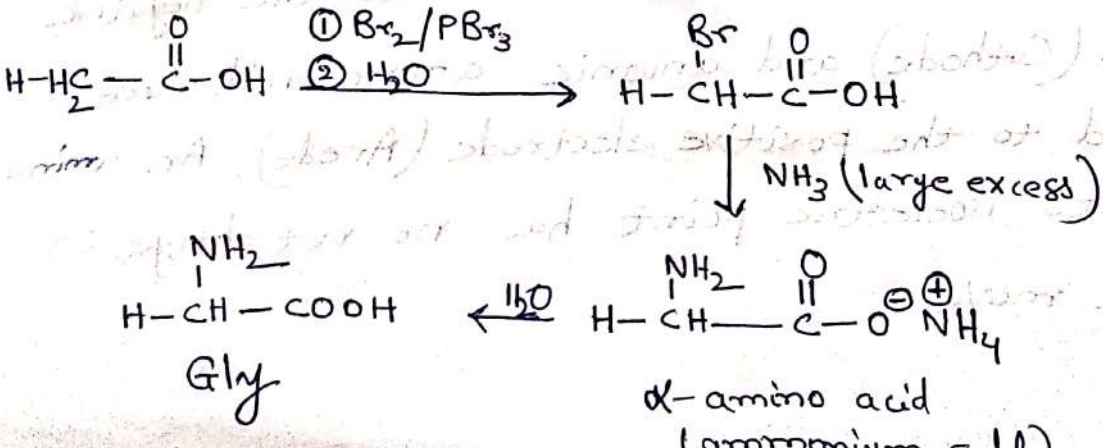
when a voltage is applied to mixture at pH=6, Ala does not move. Lys moves toward cathode and Asp moves toward anode.

Synthesis of amino acids

① Reductive amination

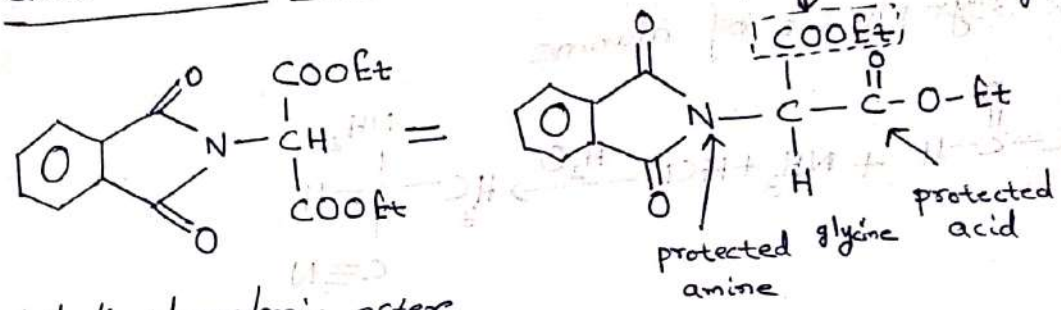


② Amination of α-Halo acid



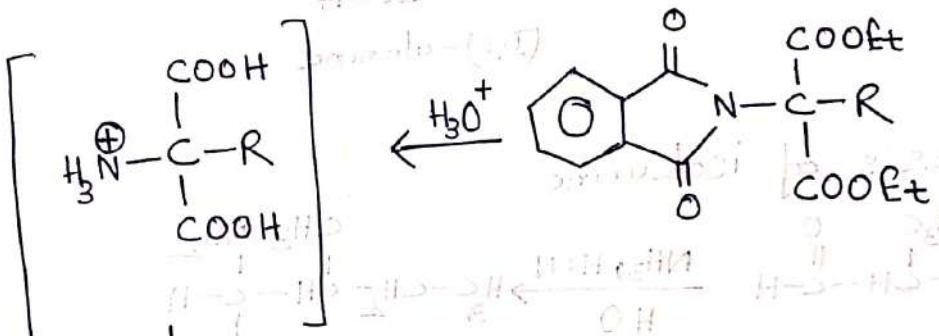
③ Gabriel–Malonic Ester Synthesis

temporary ester. Et ⇒ ethyl gr.

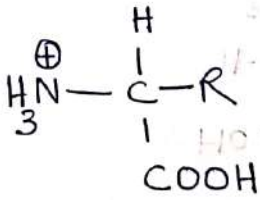


N-phthalimidomalonic ester

① Base
② R–X



(Δ)
$-CO_2$

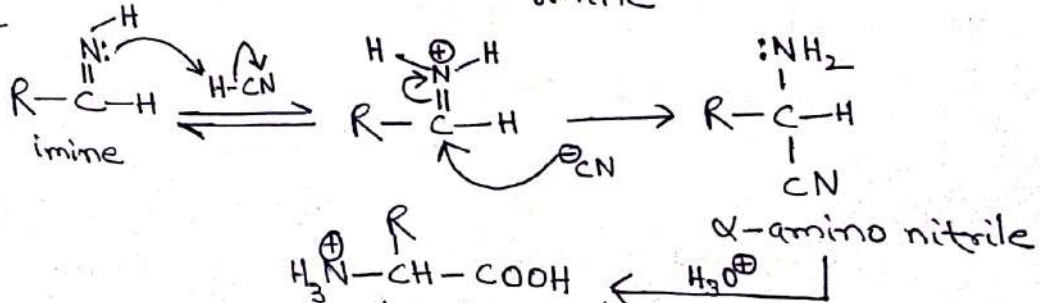


α-amino acid

④ Strecker Synthesis

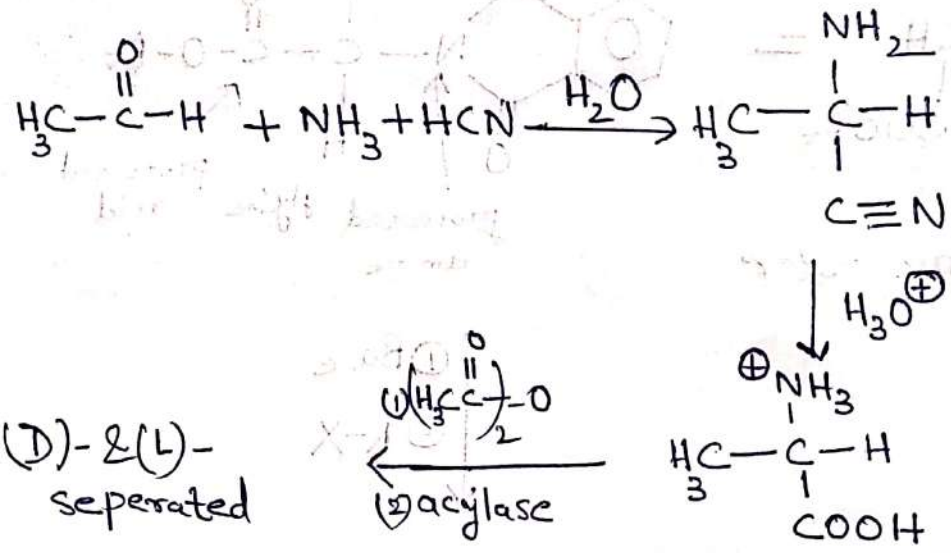
Step1

Step2

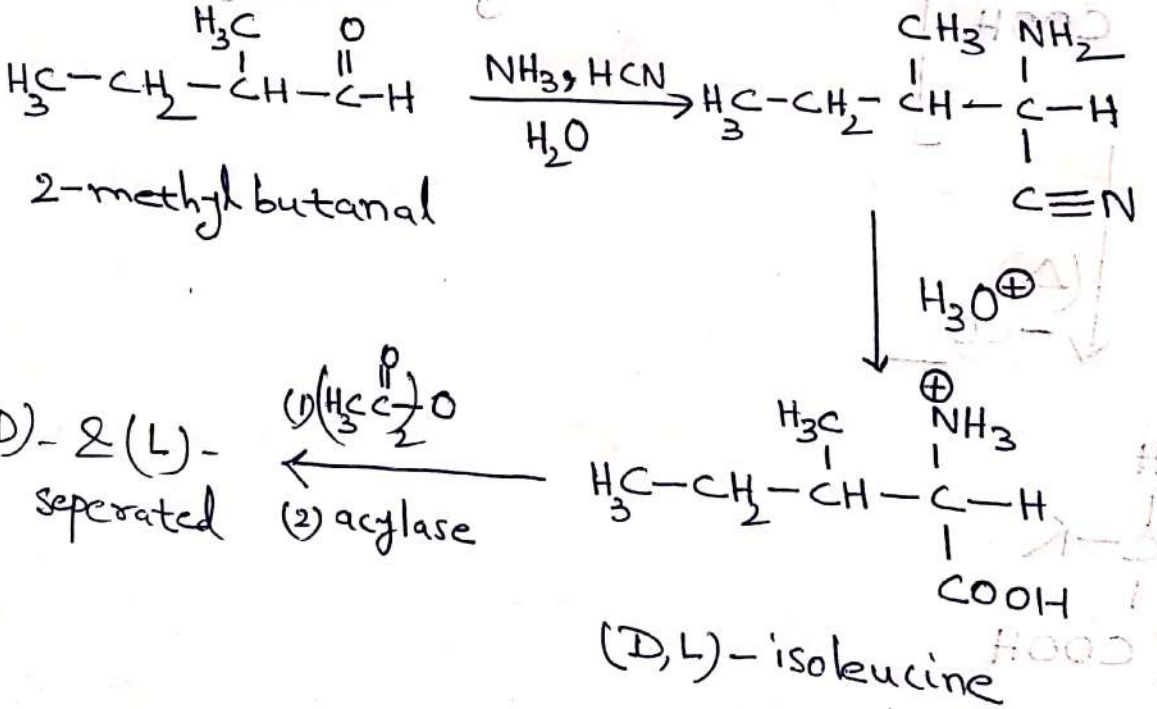


Example

a) Synthesis of alanine



b) Synthesis of isoleucine



Ref.

Organic Chemistry, Wade.