VIVEKANANDA COLLEGE

THAKURPUKUR

KOLKATA-700063

NAAC ACCREDITED 'A' GRADE

Topic: Amino acids-Introduction

Course Title: Chemistry (Gen)

Paper: CC-4/GE-4

Semester: 4(Gen)

Name of the Teacher: Prabal Giri

Name of the Department: Chemistry

AMINO ACIDS for SEM-4

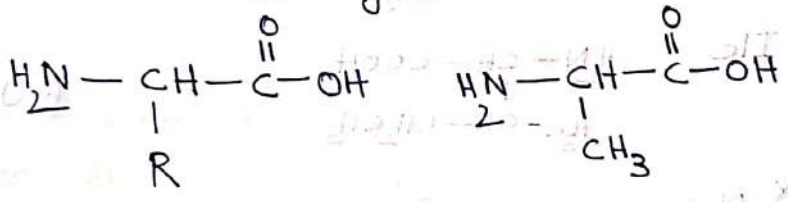
(prepared by Dr. P. Giri, Dept. of Chemistry, Vivekananda College Thakurpukur)

Amino acid ⇒ any molecule containing both an amino group and acid group

Simplest amino acid : Glycine (Abbr: Gly)

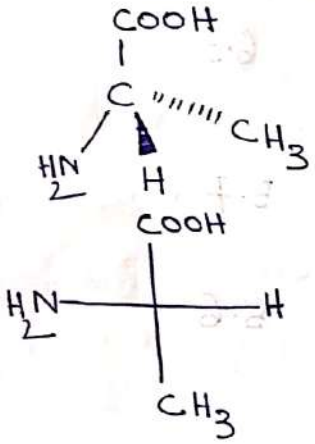
H_2N-CH_2-COOH

The term "amino acid" is always used to refer to an α-amino carboxylic acid.

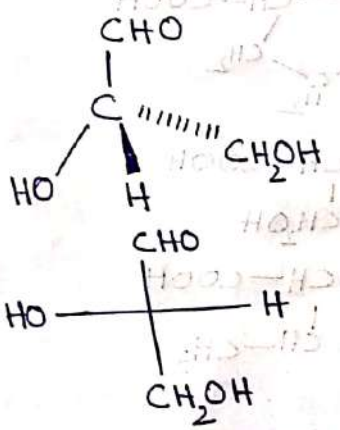


Alanine ($R=CH_3$) / Ala

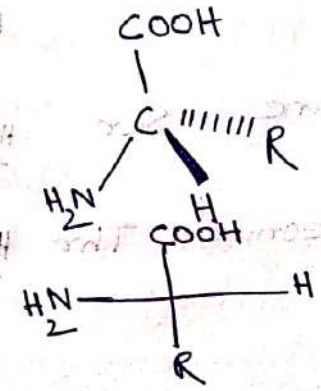
Except Gly, the α-amino acids are chiral.



L-alanine
(S)-alanine



L-(+)-glyceraldehyde
(S)-glyceraldehyde



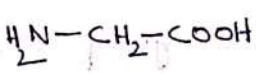
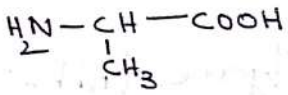
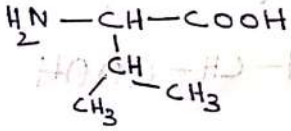
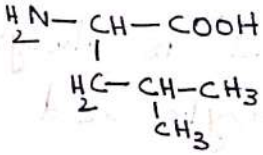
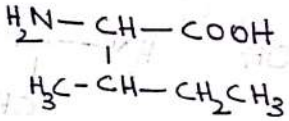
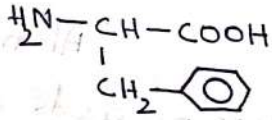
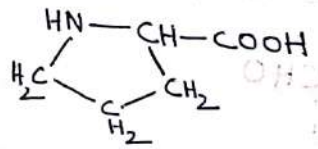
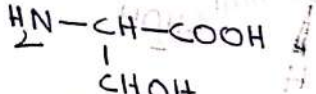
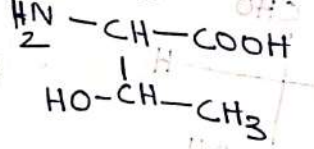
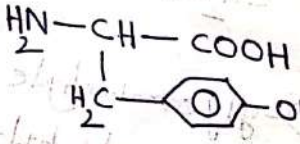
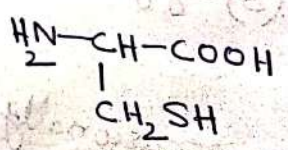
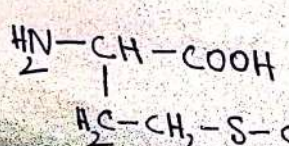
An L-amino acid
(S) configuration

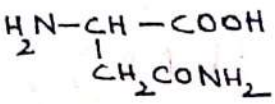
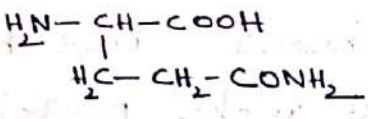
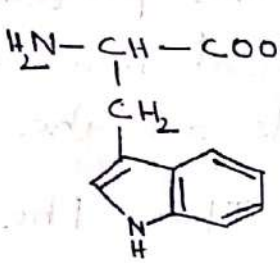
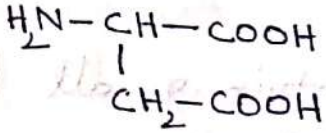
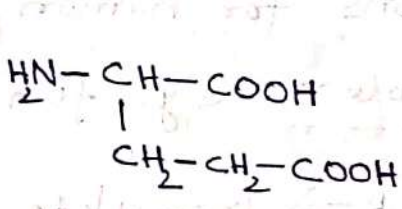
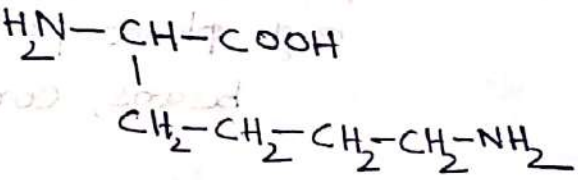
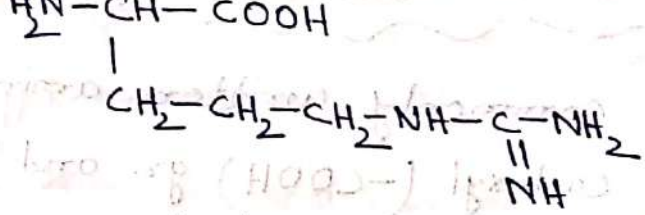
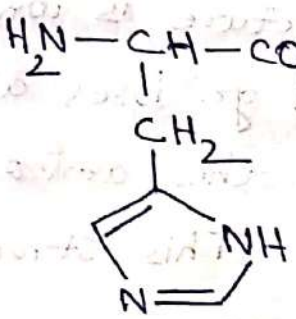
Observation

D-amino acids are occasionally found in nature.

Standard amino acids

20 common α-amino acids that are found in nearly all proteins.

Name	Abbr.	Str.	Isoelectric pt.
Glycine	Gly		6.0
Alanine	Ala		6.0
Valine*	Val		6.0
Leucine*	Leu		6.0
Isoleucine*	Ile		6.0
Phenylalanine*	Phe		5.5
Proline	Pro		6.3
Serine	Ser		5.7
Threonine*	Thr		5.6
Tyrosine	Tyr		5.7
Cysteine	Cys		5.0
Methionine*	Met		5.7

Name	Abbr.	Str.	Isoelectric pt.	
Asparagine	Asn		5.4	
Glutamine	Glu		5.7	
Tryptophan*	Trp		5.9	
Aspartic acid	Asp		2.8	Acidic amino acid
Glutamic acid	Glu		3.2	
Lysine*	Lys		9.7	Basic amino acid
Arginine*	Arg		10.8	
Histidine*	His		7.6	

(*) ⇒ Essential Amino Acid

Essential Amino acids (E.A.A.)

Humans can synthesize about half of the amino acids needed to make proteins. Othe amino acids called essential amino acids. Ten essential amino acids are the following:

Arg Val Met Leu Thr Phe His

Ile Lys Trp

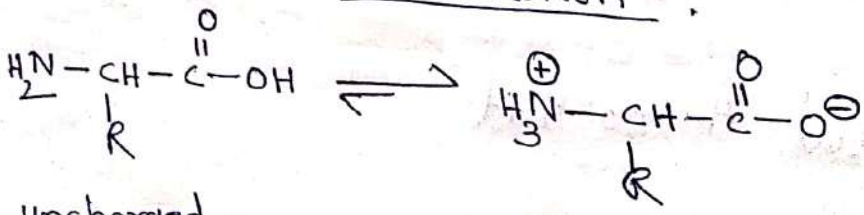
Proteins that are containing all E.A.A. in about the right proportions for human nutrition are called complete protein, e.g. fish, milk, egg.

If deficient of E.A.A ⇒ Incomplete protein

e.g. plant proteins, rice, beans, corn, wheat

Dipolar ion or Zwitterion

Although commonly written amino acids with an intact carboxyl (-COOH) gr. and amino ($-NH_2$) gr., their actual structure is ionic and depends on pH. The carboxyl gr. loses a proton, giving a carboxglate ion and the amino gr. is protonated to an ammonium ion. This structure is called a dipolar ion or a zwitterion.



uncharged (minor component) ⇌ Zwitterion (major component)