Frequently Asked Questions(FAQs)

Q.1 What are proteins? Explain the meaning of the word "proteins".

Ans.Proteins are the most abundant macromolecules in living cells. Proteins also occur in great variety; thousands of different kinds may be found in a single cell. Moreover, proteins exhibit great diversity in their biological function. The name "protein" comes from the Greek word "protos" which means first or foremost.

Q.2.What is the source of body proteins for living organisms?

Ans. Plants are able to utilize inorganic sources of nitrogen such as ammonia, nitrates and nitrites, man and other animals are for the most part dependent on a source of amino acids to build their body proteins.

Q.3.What is the composition of proteins?

Ans: All proteins, whether from the most ancient line of bacteria or from the most complex forms of life, are polymers of amino acids, with each amino acid residue joined to its neighbor by a specific type of covalent bond.(the term residue reflects the loss of the elements of water when one amino acid is joined to another).

Q.4.How many amino acids are commonly found in proteins? Write a short note on their trivial names.

Ans: Twenty different amino acids are commonly found in proteins. The first amino acid to be discovered in protein was asparagine, in 1806. The last of the 20 to be found, threonine, was not identified until 1938. All the amino acids have trivial or common names, in some cases derived from the source from which they were first isolated. Asparagine was first found in asparagus, glutamate from wheat gluten tyrosine from cheese (Greek tyros "cheese" and glycine (Greek *glycos* "sweet") was so named because of its sweet taste.

Q.5. What is the common structural feature of amino acids?

Ans: The naturally occurring amino acids have a common structure. Amino acids, as the name implies, have two functional groups, an amino group ($-NH_2$) and a carboxyl group (–COOH). These groups are joined to a single (aliphatic) carbon.

Q.6. What is an α-amino acids?

Ans: In organic chemistry, the carbon directly attached to a carboxyl group is the alpha (α) position, so the amino acids in proteins are all **alpha-amino acids.**

Q.7.In the general formula of amino acids H2NCHRCOOH, what does R stand for?

Ans: R is the functional group of the amino acids. In the simplest case, R=H (amino acetic acid or glycine). In other amino acids, R is an aliphatic, aromatic or heterocyclic residue and may incorporate other functional groups which vary in structure, size, and electric charge, and which influence the solubility of the amino acids in water.

Q.8.What do you mean by a chiral centre?

Ans: Amino acids (except for glycine have a chiral carbon atom i.e α- carbon is bounded to four different groups; a carboxyl group, an amino group; an R group, and a hydrogen atom, in glycine, the R group is another hydrogen atom. The α- carbon is thus a chiral center.

Q.9. What are optically active molecules?

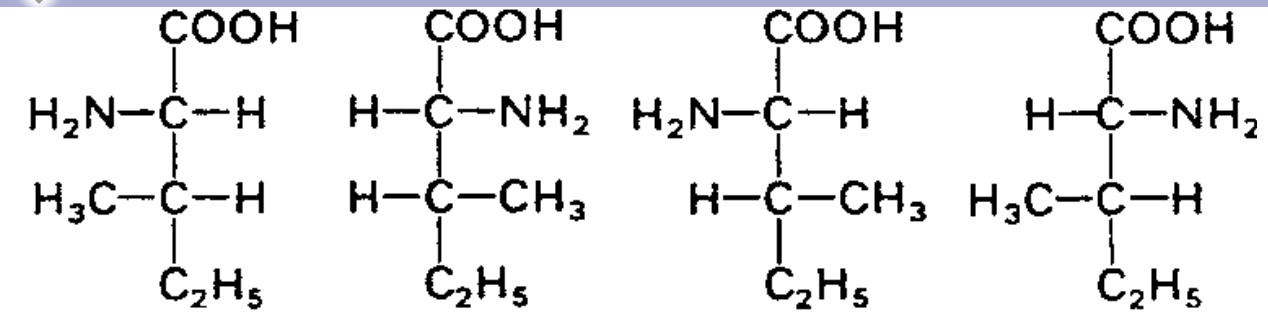
Ans. All molecules with a chiral centre are also optically active- that is, they rotate plane polarized light, with the direction of the rotation differing for different stereoisomers.

Q.10. What are D-amino acids. How are they important in organic world?

Ans. The stereoisomers of amino acids related to D-glyceraldehyde are designated D –amino acidsThe D comes from **dextrorotatory,** meaning right.) D-amino acids are not naturally found in proteins and are not involved in the metabolic pathways of eukaryotic organisms, although they are important in the structure and metabolism of bacteria. For example, D-glutamic acid and D-alanine are structural components of certain bacterial cell walls. Similarly some peptide antibiotics, such as bacitracin, also contain D-amino acids.

Q.11. Name the amino acids with two chiral carbon atoms. Write the structural isomers for isoleucine.

Ans. Isoleucine, threonine and 4-hydroxyproline have two asymmetric C-atoms, thus each has four isomers:



L-Isoleucine (2S:3S)-Isoleucine (Common in proteins)

D-Isoleucine (2R:3R)-Isoleucine

L-allo-Isoleucine (2S:3R)-Isoleucine

D-allo-Isoleucine (2R:3S)-Isoleucine

Q.12. Name the amino acids with aliphatic R groups.

Ans. Glycine, alanine,valine, leucine, isoleucine and proline have aliphatic R groups

Q.13. How is proline unique among amino acids with non-polar side chains?

Ans.Proline is unique (the cyclic amino acid) among these amino acids. It has four carbons, with the alpha amino group bonded not only to the alpha carbon but also to the last side chain carbon. The cyclic side chain means that proline is conformationally rigid. That is, the carbon-carbon bonds of proline do not rotate in solution.

Q.14.Name one toxic volatile compound formed during the heating of food

Ans The toxic compound acrylamide is one of the volatile compounds formed during the heating of food.

Q.15.Why is need for improving biological value of food

seriously felt nowadays?

Ans. Since food is not available in sufficient quantity or quality in many parts of the world, the chemical industry has up to know been highly successful in raising the quantity as well as quality of proteins for increasing its biological value by supplementation with essential amino acids. Illuminating examples are rice fortification with L-lysine and L-threonine, supplementation of bread with L-lysine and fortification of soya and peanut protein with methionine.