



8. Can you describe what happens when milk is converted into curd or yoghurt, from your understanding of proteins.

Solution: Milk is converted into curd or yoghurt due to denaturation of proteins. In denaturation, disruption of bonds that maintains secondary and tertiary structure leads to the conversion of globular proteins into fibrous proteins. This involves a change in physical, chemical and biological properties of protein molecules.

9. Can you attempt building models of biomolecules using commercially available atomic models (Ball and stick models).

Solution: Yes, models of biomolecules can be prepared using commercially available atomic models.

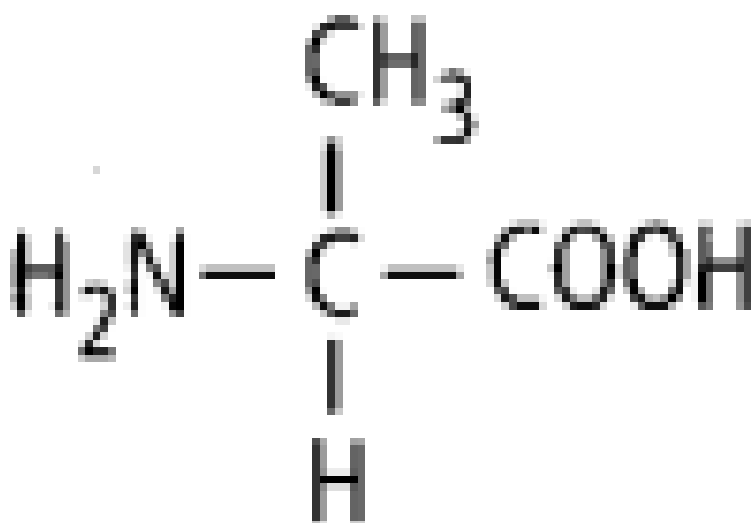
Ball and stick models and space filling models are 3D or spatial molecular models which serve to display the structure of chemical products and substances or biomolecules. With ball and stick models, the centers of the atoms are connected by straight lines which represent the covalent bonds. Double and triple bonds are often represented by springs which form curved connections between the balls. The bond angles and bond lengths reflect the actual relationships, while the space occupied by the atoms is either not represented at all or only denoted essentially by the relative sizes of the spheres.

10. Attempt titrating an amino acid against a weak base and discover the number of dissociating (ionizable) functional groups in the amino acid.

Solution: The existence of different ionic forms of amino acids can be easily understood by the titration curves. The number of dissociating functional group is one in case of neutral and basic amino acids and two in case of acidic amino acids.

11. Draw the structure of the amino acid, alanine.

Solution:



Alanine

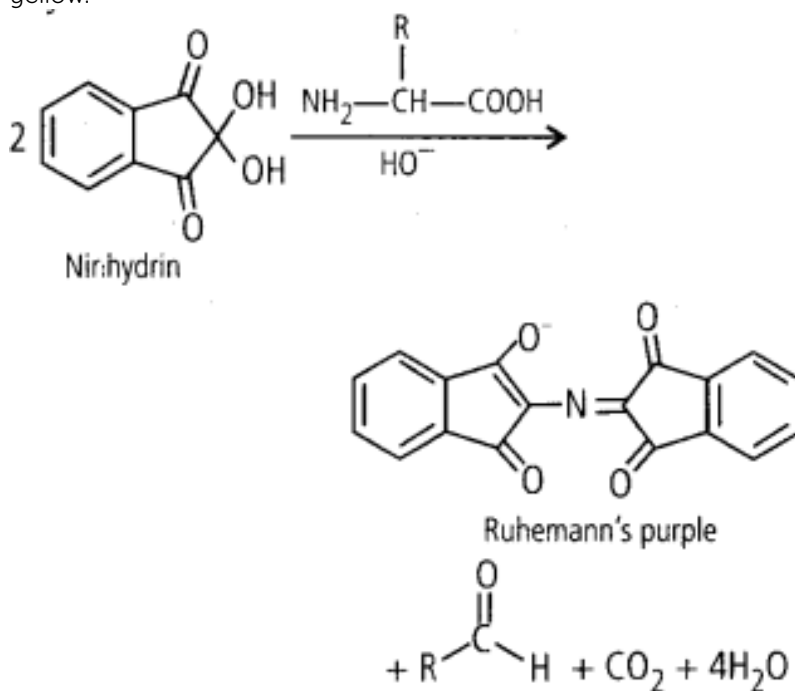
12. What are gums made of ? Is fevicol different ?

Solution: Gums are hetero-polysaccharides (poly-mers) of large number of different monosaccharide units. Yes, fevicol is a different kind of polymer. It is a synthetic sticky substance called resin which is manufactured by esterification of organic compounds.

13. Find out a qualitative test for proteins, fats and oils, amino acids and test, any fruit juice, saliva, and urine for them.

Solution: Biuret test for protein : The biuret test is a chemical test used for determining the presence of peptide bonds. In a positive test, a copper II ion (Cu^{2+} ion) is reduced to copper I (Cu^+) which forms a complex with the nitrogen and carbon of peptide bonds in an alkaline solution. A violet colour indicates the presence of proteins.

Ninhydrin test for amino acid: Ninhydrin (2,2 Dihydroxy indane-1,3-dione) is a chemical used to detect ammonia or primary and secondary amines. When reacting with these free amines, a deep blue or purple colour known as Ruhemann's purple is evolved. Amino acid analysis of proteins is also done by ninhydrine. Most of the amino acids (including α -amino acids) are hydrolysed and reacted with ninhydrin except proline (a secondary amine). Amino acid containing a free amino group and a free carboxylic acid group reacts together with ninhydrin to produce coloured product. When the amino group is secondary, the condensation product is yellow.



Solubility test for fats and oils : A positive solubility test for fats is that the fat dissolves in lighter fluid and not in water. In this test, 5 drops of fat or oil are added in two test tubes containing 10 drops of lighter fluid and 10 drops cold water respectively.

Fruit juice contains sugar so it cannot be tested by the above mentioned tests. Saliva contains proteins, mineral salts, amylase etc., so it can be tested for protein and amino acids. Urine contains proteins, so it can be tested for it.

14. Find out how much cellulose is made by all the plants in the biosphere.

Solution: About 100 billion tonnes of cellulose is prepared per year by the plants of the world.

15. Describe the important properties of enzymes.

Solution: The important properties of enzymes are as follows:

(i) The enzymes are generally proteins which are high molecular weight complex globular proteins. They can associate with non-

protein substance for their activity.

(ii) The enzymes do not start a chemical reaction but only accelerate it. They combine temporarily with the substrate molecules and are not consumed or changed permanently in the reaction which they catalyse.

(iii) The enzyme controlled reactions are reversible.

(iv) The enzymes are specific in action. An enzyme catalyses only a particular kind of reaction or acts on a particular substrate only.

(v) The enzymes are thermolabile i.e., heat sensitive and can function best at an optimum temperature. Similarly, enzymes show maximum activity at optimum pH.

(vi) The enzymes are inactivated by poisons and radiation

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