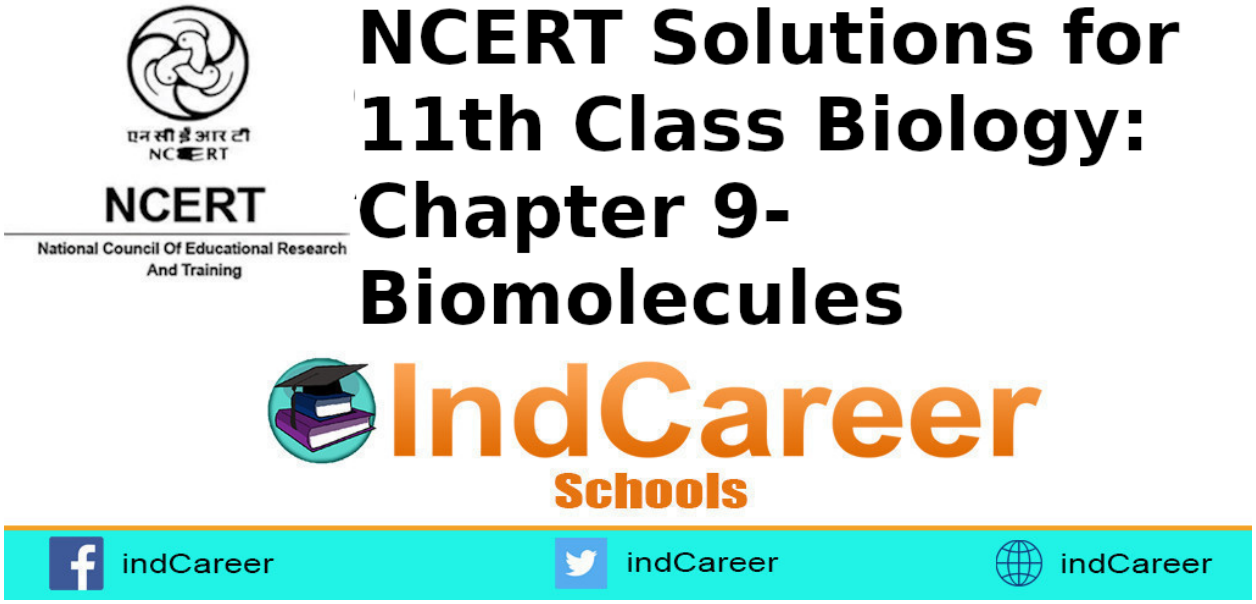

NCERT Solutions for 11th Class Biology: Chapter 9-Biomolecules

Class 11: Biology Chapter 9 solutions. Complete Class 11 Biology Chapter 9 Notes.

NCERT Solutions for 11th Class Biology: Chapter 9-Biomolecules

NCERT 11th Biology Chapter 9, class 11 Biology chapter 9 solutions

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Exercises

1. What are macromolecules? Give examples.

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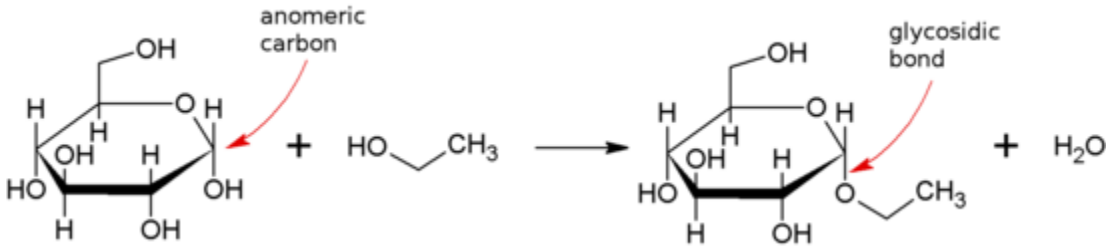
Answer

Biomolecules with molecular weights more than one thousand Dalton are called macromolecules. These are found in the acid-insoluble fraction. Examples: Protein, polysaccharides, lipids, etc.

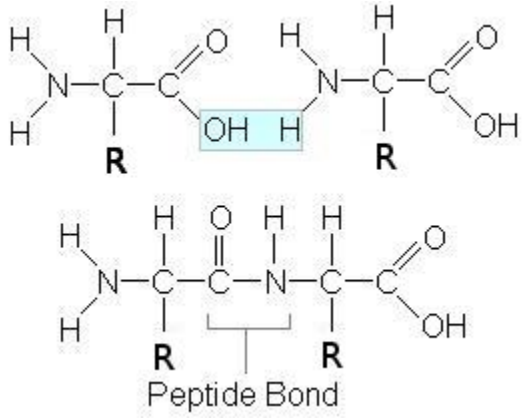
2. Illustrate a glycosidic, peptide and a phospho-diester bond.

Answer

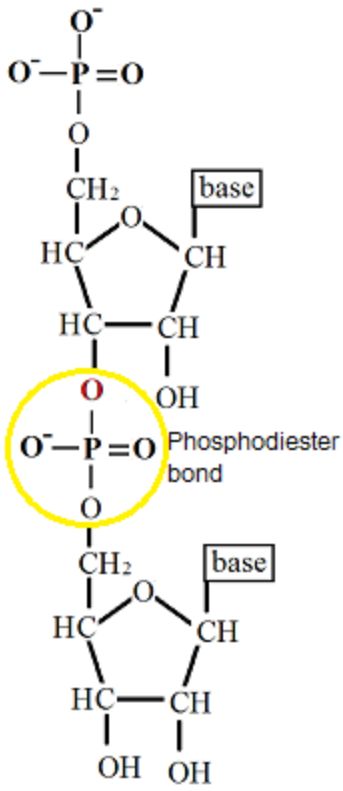
(a) Glycosidic bond is formed normally between carbon atoms, 1 and 4, of neighbouring monosaccharide units.



(b) Peptide bond is a covalent bond that joins the two amino acids by - NH - CO linkage.



(c) Phosphodiester bond is a strong covalent bond between phosphate and two sugar groups. Such bonds form the sugar phosphate backbone of nucleic acids.



3. What is meant by tertiary structure of proteins?

Answer

The helical polypeptide chain undergoes coiling and folding to form a complex three-dimensional shape is called tertiary structure of proteins. These coils and folds are arranged to hide the non-polar amino acid chains and to expose the polar side chains. The tertiary structure is held together by the weak bonds formed between various parts of the polypeptide chain.

Tertiary structure of protien

4. Find and write down structures of 10 interesting small molecular weight biomolecules. Find if there is any industry which manufactures the compounds by isolation. Find out who are the buyers.

Answer

Yes, we can connect the given information to purity or homogeneity of a protein. It is known that an accurate sequence of a certain amino acid is very important for the functioning of a protein. If there is any change in the sequence, it would alter its structure, thereby altering the function. If we are provided with a method to know the sequence of an unknown protein, then using this information, we can determine its structure and compare it with any of the known correct protein sequence. Any change in the sequence can be linked to the purity or homogeneity of a protein.

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5. Proteins have primary structure. If you are given a method to know which amino acid is at either of two termini (ends) of a protein, can you connect this information to purity or homogeneity of a protein?

Answer

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There are several methods provided by several scientists to find out the sequence of amino acids. Frederick Sanger proposed Sanger's reagent to know the amino acid sequence in a polypeptide chain.

Sanger used 1-fluoro 2, 4 dinitrobenzene (FD NB) to determine insulin structure. FDNB specifically binds with N-terminal amino acid to form a dinitrophenyl (DNP) derivative of peptide. This DNP- derivative peptide can be identified by chromatography. The identified sequence of amino acids shows the homogeneity of a protein molecule

6. Find out and make a list of proteins used as therapeutic agents. Find other applications of proteins (e.g., cosmetics, etc.)

Answer

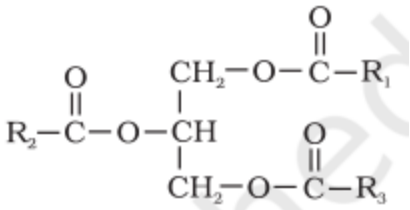
List of proteins used as therapeutic agents are Insulin, Oxytocin, Antidiuretic Hormone (ADH), Thrombin, Fibrinogen, Renin, Immunoglobulin, Diastase and Streptokinase.

Proteins are also commonly used in the manufacture of cosmetics, toxins, and as biological buffers.

7. Explain the composition of triglyceride.

Answer

Triglycerides are composed of two types of molecules, i.e., glycerol (3 carbon molecules) and fatty acids which attach to the glycerol at the alcohol unit. It is mainly present in vegetable oils and animal fat. The structure is given:



Triglyceride (R_1, R_2 and R_3 are fatty acids)

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

Answer

Milk is converted into curd or yogurt by the process of fermentation. Milk consists of globular proteins. During fermentation, the milk sugar (lactose) produces lactic acid. Lactic acid acts on the globular proteins present in the milk and denatures them. This denaturation destroys the tertiary and quaternary structures of proteins and the globular proteins are converted into fibrous proteins thus giving a thick texture to the milk due to coagulation of the proteins.

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

Answer

Yes. The biomolecules can be represented by the ball and stick model. The bonds which hold the atoms are represented by sticks, whereas the atoms are represented by balls.

Example: In the model of D-glucose, the oxygen atoms are represented by red balls, the hydrogen atoms by blue balls, while the carbon atoms are represented by grey balls.

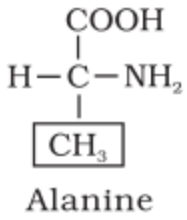
10. Attempt titrating an amino acid against a weak base and discover the number of dissociating (ionizable) functional groups in the amino acid.

Answer

Titratinga neutral or basic amino acid against a weak base will dissociate only one functional group, whereas titration between acidic amino acid and a weak acid will dissociate two or more functional groups.

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

Answer



Alanine

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

Answer

Gums are natural heteropolysaccharides which are formed of a large number of different monosaccharide units linked together by glycosidic bonds.

Yes, Fevicol is different from gums as it comprises synthetic polymers.

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

Answer

Qualitative tests for proteins, amino acids and fats:

• Biuret test: The Biuret test for protein identifies the presence of protein by producing light blue to purple colour of the solution.

• Grease test for oil: Certain oils give a translucent stain on brown paper. This test can be used to show the presence of fat in vegetable oils.

• Ninhydrin test: If Ninhydrin reagent is added to the solution, then the colourless solution changes to pink, blue or purple colour depending on the type of amino acid.

Item	Name of the test	Procedure	Result	Inference	
1.	Fruit juice	Biuret's test	Fruit juice + Biuret's reagent	Colour changes from light blue to purple	Protein is present.
		Grease test	To a brown paper, add a few drops of fruit juice.	No translucent spot	Fats and oils are absent or are in negligible amounts.
		Ninhydrin test	Fruit juice + Ninhydrin reagent + boil for 5 minutes	Colourless solution changes to pink, blue, or purple colour	Amino acids are present.
2.	Saliva	Biuret's test	Saliva + Biuret's reagent	Colour changes from light blue to purple	Proteins are present.
		Grease test	On a brown paper, add a drop of saliva.	No translucent spot	Fats/oils are absent.

		Ninhydrin test	Saliva + Ninhydrin reagent + boil for 5 minutes	Colourless solution changes to pink, blue, or purple colour	Amino acids are present.
3.	Sweat	Biuret's test	Sweat + Biuret's reagent	No colour change	Proteins are absent.
		Solubility test	Sweat + Water	Oily appearance	Fats/oil may be present.
		Ninhydrin test	Sweat + Ninhydrin reagent + boil for 5 minutes	No colour change, solution remains colourless	Amino acids are absent.
4.	Urine	Biuret's test	Few drops of urine + Biuret's reagent	Colour changes from light blue to purple	Proteins are present.
		Solubility test	Few drops of urine + Water	Little bit of oily appearance	Fats may or may not be present.
		Ninhydrin test	Few drops of urine + Ninhydrin reagent +	Colourless solution changes to pink, blue, or purple colour depending	Amino acids are present.

boil for 5 minutes	on the type of amino acid

14. Find out how much cellulose is made by all the plants in the biosphere and compare it with how much of paper is manufactured by man and hence what is the consumption of plant material by man annually. What a loss of vegetation!

Answer

Approximately, 100 billion tonnes of cellulose are made per year by all the plants in the biosphere and it takes 17 full grown trees to make one ton of paper. Trees are also used to fulfil the other requirements of man such as for timber, food, medicines, etc. Hence, it is difficult to calculate the annual consumption of plant material by man.

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15. Describe the important properties of enzymes.

Answer

Important properties of enzymes are:

→ Enzymes are generally complex macromolecules of globular proteins with high molecular weight.

→ Enzymes do not start a reaction but increase the rate of chemical reaction.

→ Enzyme itself is not used up in the reaction it catalyzes so it can be used over again and again.

→ Enzymes have a high turn over number. It means the number of reactions that an enzyme molecule can catalyze per second.

→ Enzymes are specific in action.

→ The action of enzyme is greatly affected by temperatures. Their activity decreases with increase in temperature.

→ They show maximum activity at an optimum pH of 6 - 8.

→ The velocity of enzyme increases with increase in substrate concentration and then, ultimately reaches maximum velocity.

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Chapterwise NCERT Solutions for Class 11 Biology:

- Chapter 1: The Living World
- Chapter 2: Biological Classification
- Chapter 3: Plant Kingdom
- Chapter 4: Animal Kingdom
- Chapter 5: Morphology of Flowering Plants
- Chapter 6: Anatomy of Flowering Plants
- Chapter 7: Structural Organisation in Animals
- Chapter 8: Cell-The Unit of Life
- Chapter 9: Biomolecules
- Chapter 10: Cell Cycle and Cell Division
- Chapter 11: Transport in Plants
- Chapter 12: Mineral Nutrition
- Chapter 13: Photosynthesis in Higher Plants
- Chapter 14: Respiration in Plants
- Chapter 15: Plant - Growth and Development
- Chapter 16: Digestion and Absorption
- Chapter 17: Breathing and Exchange of Gases
- Chapter 18: Body Fluids and Circulation
- Chapter 19: Excretory Products and Their Elimination
- Chapter 20: Locomotion and Movement
- Chapter 21: Neural Control and Coordination
- Chapter 22: Chemical Coordination and Integration

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