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## Chapter 1 : CBSE Class 12th Chemistry | Biomolecules

*Chemistry Notes for class 12 Chapter 14 Biomolecules Biomolecules are the organic compounds which form the basis of life, i.e., they build up the 12 H 22 O 11 is.*

Pentaacetyl glucose does not react with hydroxyl amine. This shows the absence of â€”CHO group and hence the presence of ring structure. Cyclic structure of glucose: Cyclic structure of fructose: Haworth representation of fructose Glycosidic linkage: The oxide linkage formed by the loss of a water molecule when two monosaccharides are joined together through oxygen atom is called glycosidic linkage. Since the reducing groups of glucose and fructose are involved in glycosidic bond formation, sucrose is a non-reducing sugar. Haworth Projection of Sucrose: The free aldehyde group can be produced at C1 of second glucose in solution and it shows reducing properties so it is a reducing sugar. Haworth projection of maltose: The linkage is between C1 of galactose and C4 of glucose. Hence it is also a reducing sugar. Haworth projection of lactose: It is a polymer of -glucose and consists of two components â€” Amylose and Amylopectin. It occurs exclusively in plants. It is a straight chain polysaccharide composed only of -D-glucose units which are joined by glycosidic linkage between C1 of one glucose unit and C4 of the next glucose unit. The carbohydrates are stored in animal body as glycogen. It is also known as animal starch because its structure is similar to Amylopectin. It is present in liver, muscles and brain. When the body needs glucose, enzymes break the glycogen down to glucose. Types of amino acids: The amino acids which cannot be synthesised in the body and must be obtained through diet, are known as essential amino acids. The amino acids, which can be synthesised in the body, are known as non-essential amino acids. Amino acids behave like salts rather than simple amines or carboxylic acids. This behaviour is due to the presence of both acidic carboxyl group and basic amino group groups in the same molecule. In aqueous solution, the carboxyl group can lose a proton and amino group can accept a proton, giving rise to a dipolar ion known as zwitter ion. This is neutral but contains both positive and negative charges. In zwitterionic form, amino acids show amphoteric behaviour as they react both with acids and bases. The pH at which the dipolar ion exists as neutral ion and does not migrate to either electrode cathode or anode is called isoelectronic point. Proteins are the polymers of -amino acids and they are connected to each other by peptide bond or peptide linkage. A polypeptide with more than hundred amino acid residues, having molecular mass higher than 10,u is called a protein. Peptide linkage is an amide linkage formed by condensation reaction between â€”COOH group of one amino acid and â€”NH2 group of another amino acid. Peptide link age Primary structure of proteins: The sequence of amino acids is said to be the primary structure of a protein. Secondary structure of proteins: It refers to the shape in which long polypeptide chain can exist. Two different types of structures: It was given by Linus Pauling in It exists when R- group is large. Also known as 3.

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## Chapter 2 : CBSE Class 12 Chemistry Notes: Unit 14 â€“ Biomolecules | AglaSem Schools

*Biomolecules notes for class 12 chemistry chapter BIOMOLECULES. The study of chemical make-up and structure of living matter and of the chemical changes that take place within them is called biochemistry.*

The natural polysacchardies generally contain about monosacchardie units. The three most abundant natural polysaccharides-cellulose, starch and glycogen are derived from the same monomer, i. It is a polymer of glucose. Its molecular formular is C6H10O5 n where the value of n - varies from source to source. It is the chief food reserve material or storage polysacchardie of plants and is found mainly in seeds, roots, tubers, etc. Wheat, rice, potatoes, corn, bannans etc. Both amylose and amylopectin are polymers of a-D glucose. Amylose is a linear polymer of a-D glucose. It contains about glucose units which are linked to one another through a-linkage involving C1 of one gluose unit with C4 of the other. Amlopectin, on the other hand, is a highly branched polymer. It consists of a large number several branches of short chains each containnig glucose units which are joined together through a-linkages involving C1 of one glucose unit with C4 of the other. The C1 of terminal glucose unit in each chain is further linked to C6 of the other glucose. This gives amylopectine a highly branched structure as shown below: Hydrolysis of starch with hot dilute acids or by enzmyes give dextrins of varying complexity, maltose and finally D-glucose. It is used as a food. It is encountered daily in the form of potatoes, bread, cakes, rice etc. It is used in coating and sizing paper to improve the writing qualities. Strch is used to treat textile fibres before they are woven into cloth so that they can be woven without breaking. It is used in manufacture of dextrins, glucose and ethyl alcohol. Starch is also used in manufacture of starch nitrate, which is used as an explosive. Cellulose is the chief component of wood and plane fibres; cotton, for instance, is nearly pure cellulose. It is insoluble in watre and tasteless; it is a non-reducing carbohdrate. These properties, in part at least, are due to extremely high molecular weight. Cellulose Cellulose has the formula C6H10O5 n. Complete hydrolysis by acid yields D -glucose as the monosaccharide. Hydrolysis of completely methylated cellulose gives a high yield of 2, 3, 6-tri-O-methyl-D-glucose. Like starch, therefore, cellulose is made up of chains of D-glucose units, each unit joined by a glycoside linkage of C-4 of the next. Cellulose differs from starch, however, in the configuration of the glycoside linkage. Physical methods give molecular weights for cellulose ranging from to or more; it seems likely that there are at least glucose units per molecule. End group analysis by both methylation and periodic acid oxidation gives a chain legnth of glucose units or more. These bundles are twisted togethr to form. Rope like structure which themselvs are grouped to from the fibers we can see. In wood these cellulose "ropes" are embedded in lignin to give a structure that has been likened to reinforced concrete. Now let us look briefly at reactions of cellulose in which the chain remains essentially intact. EAch glucose unit in cellulose contains three free -OH groups; these are the positions at which reactions occurs. These reactions of cellulose, carried out to odify the properties of a cheap, available ready-made polymer, are of tremendous industrial importance. The properties and uses of the product depend upon the extent of nitration. Guncotton, which is used in making smokeless powder, is very nearly completely nitrated cellulose, and is often called cellulose trinitrate three nitrate groups per glucose unit. Pyroxylin is less highly nitrated material containing between two and three nitrate groups per glucose unit. It is used in the manufacture of plastics like celluloid and collodion, in photographic film, and in lacquers. It has the disadvantage of being flammable, and forms hihgly toxic nitrogen oxides upon burning. Considerable degradation of the long chain is unavoidable in these reactions. Methyl, ethyl, and benzyl others of cellulose are important in the production of textiles, films, and various plastic objects.

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The monosaccharides are polyhydroxy aldehydes or polyhydroxy ketones. There are, therefore, two main classes of monosaccharides. The Aldoses, which contain an aldehyde group 2. The Ketoses, which contain a ketone group â€" â€" The aldoses and ketoses are further divided into sub-groups on the basis of the number of carbon atoms in their molecules, as trioses, tetroses, pentoses, hexoses, etc. To classify a monosaccharide completely, it is necessary to specify both, the type of the carbonyl group and the number of carbon atoms present in the molecule. Thus monosaccharides are generally referred to as aldotrioses, aldotetroses, aldopentoses, aldohexoses, ketohexoses, etc. The aldoses and ketoses may be represented by the following general formulas Glucose and fructose are specific examples of an aldose and a ketose Trioses D and L Terminology: The simplest of all carbohydrates that fit the definition we have given for carbohydrates are the trioses, glyceraldehyde and dihydroxyacetone. Glyceraldehyde is aldotriose, and dihydroxyacetone is a ketotriose. Clearly, the two forms are mirror images that cannot be superimposed, that is they are enantiomers. The two forms of glyceraldehyde are especially important because the more complex monosaccharides may be considered to be derived from them. They serve as a reference point for designating and drawing all other monosaccharides. In carbohydrate chemistry, the Fischer projection formulas are always written with the aldehyde or ketone groups at the top of the structure. By definition, if the hydroxyl group on the asymmetric carbon atom farthest from aldehyde or ketone group projects to the right, the compound is a member of the D-family. If the hydroxyl group on the farthest asymmetric carbon projects to the left, the compound is a member of the L-family. The maximum number of optical isomers of a sugar is related to the number of asymmetric carbon atoms in the molecule and may be calculated by the following simple equation. Since glyceraldehyde contains only one asymmetric carbon atom, the number of optical isomer is  Aldotetroses If we examine the general formula of an aldotetrose, we see that they contain two asymmetric carbon atoms marked by asterisks. This means that 22 or 4 optical isomers are possible. They may be represented as the following two pairs: All four isomers have been prepared synthetically. The D- and L-erythrose are mirror images, that is, they are enantiomers. Equal amounts of the two would constitute a racemic mixture, that is, a mixture that would allow a plane-polarised light to pass through the solution unchanged but could be separated into detrorotatory and laevorotatory isomers. However, D-erythrose and L-threose are not images, that is, they are diastereomers optical isomers that are not mirror images are called diastereomers , and the degree of rotation of each would probably differ. Aldopentoses If we examine the general formula of an aldopentose, we see that they contain three asymmetric carbon atoms. This means that 23 or 8 optical isomers are possible. This means that 24 or 16 optical isomers are possible. They are D-glucose, D- mannose, and D-galactose. No one of these three optical iosmers is a mirror image of any of the others, so all three are diastereomers of each other. Epimers A pair of diastereomers that differ only in the configuration about of a single carbon atom are said to be epimers.

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*Biomolecules - CBSE Notes for Class 12 Chemistry NCERT Solutions Maths Physics Chemistry Biology Science 1. Carbohydrates is a class of compounds that include polyhydric aldehydes and ketones and large number of other polymeric molecules that yield these on hydrolysis, e.g., sugars, glycogen, cellulose, starch, etc.*

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*In carbohydrate chemistry, the Fischer projection formulas are always written with the aldehyde or ketone groups at the top of the structure. By definition, if the hydroxyl group on the asymmetric carbon atom farthest from aldehyde or ketone group projects to the right, the compound is a member of the D-family.*