

**COVENANT UNIVERSITY
NIGERIA**

*TUTORIAL KIT
OMEGA SEMESTER*

PROGRAMME: BIOCHEMISTRY

COURSE: BCH 221

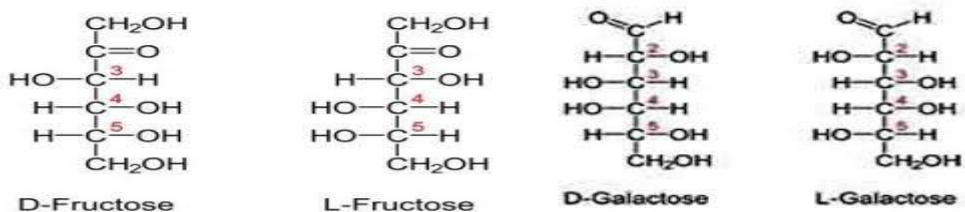
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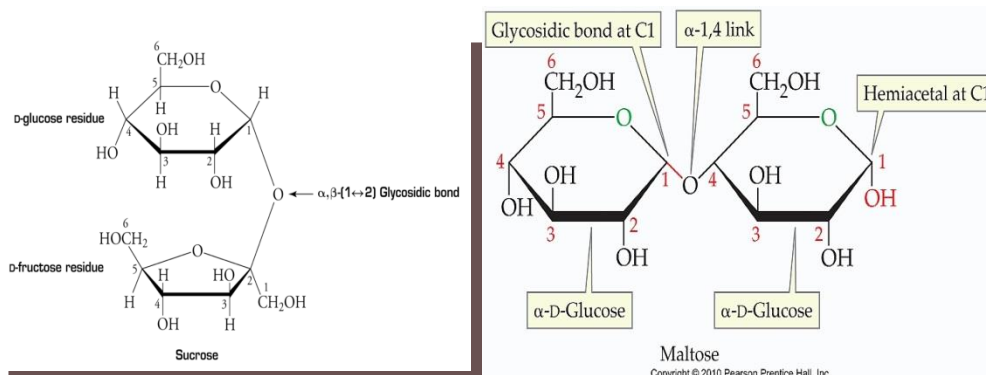
BCH 221: Biomolecules II

CONTRIBUTORS: Dr. Iweala E.E.J., Dr. Omotosho* O. E. and Miss T. Bisi-Adeniyi

1. Draw the Fischer projection of D- fructose, L-fructose, L-galactose and D-fructose.



2. Draw Haworth projection for α -D –glucose and β -D–galactose
3. Draw the structures of α -D-glucopyranosyl-(1 \rightarrow 2)- β -D-fructofuranose and α -D-glucopyranosyl-(1 \rightarrow 4)- α -D-glucopyranose.



4. What is the systematic name of lactose and raffinose.
5. Mention one example each of a disaccharide, trisaccharide, tetrasaccharide and pentasaccharide
 - Dissaccharide = maltose, lactose, sucrose
 - Trisaccharide = raffinose, maltotriose and melezitose, GOS
 - Tetrasaccharide = Stachyose
 - Pentasaccharide = Verbascose, FOS (inulin),
6. Distinguish between constitutional isomers, enantiomers, epimers and anomers of monosaccharides with specific examples.
7. Discuss the important types of derived (modified) sugars found in living organisms
Derived or modified sugars are sugars derived by reactions and modifications of their parent monosaccharides. They include the following;

Deoxy sugars - Deoxy sugars arise from the removal of oxygen atoms from one of the hydroxyl groups found in monosaccharides ie contain one oxygen less than the parent sugar. E.g 2-deoxy-β-D-ribose sugar, a building block for DNA.

Amino sugars - derived by substituting one of the hydroxyl groups in the parent monosaccharides with an amino group (NH₂). E.g Glucosamine

Sugar alcohol - obtained by reduction (hydrogenation) of the carbonyl oxygen of the parent monosaccharide. The result is the formation of additional hydroxyl group in place of the carbonyl group, thus making the whole molecule a polyhydroxy alcohol. E.g glycerol, an important component of lipid, is formed from dihydroxyacetone.

Sugar acids - carboxylic acids derive from aldoses by the oxidation of the aldehydic carbon (C-1) to yield an aldonic acid or by oxidation of the highest numbered carbon to give an alduronic acid. E.g D-gluconate

Sugar Phosphates - monosaccharides found in several metabolic pathways that are often phosphorylated (i.e. converted to phosphate esters. E.g triose phosphate, dihydroxyacetone-phosphate and D-glyceraldehyde-phosphate, found in the Calvin cycle and glycolytic pathway.

8. Discuss the following:

- a. Miscelles
- b. Mono-layers
- c. Bi-layers
- d. Liposomes

9. Write extensively on biological membranes.

- The cell membrane is a biological membrane that separates the interior of all cells from the outside environment. It is selectively-permeable to ions and organic molecules and controls the movement of substances in and out of cells.
- Cell membranes are involved in a variety of cellular processes such as cell adhesion, ion conductivity and cell signaling and serve as the attachment surface for the extracellular glycocalyx and cell wall and intracellular cytoskeleton.
- The cell membrane has 2 primary building blocks:
 - Protein (integral proteins, peripheral proteins, glycoproteins): They form about 60% of the membrane.
 - Lipid: They form about 40% of the membrane.
- The primary lipid is called phospholipid (in some cases cholesterol, lipoproteins). The molecules of phospholipid form a 'phospholipid bilayer' (two layers of phospholipid molecules).

10. Differentiate between homoglycans and heteroglycans.

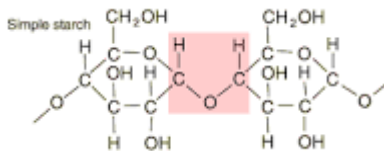
11. Discuss the structure and function of biological membranes.

- The cell membrane surrounds the protoplasm of a cell and, in animal cells, physically separates the intracellular components from the extracellular environment. Fungi, bacteria and plants also have the cell wall which provides a mechanical support for the cell and precludes passage of the larger molecules.

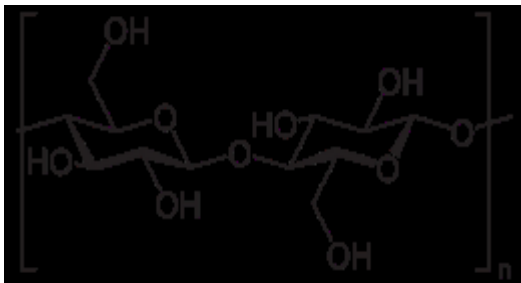
- The cell membrane also plays a role in anchoring the cytoskeleton to provide shape to the cell, and in attaching to the extracellular matrix and other cells to help group cells together to form tissues.
- The barrier is differentially permeable and able to regulate what enters and exits the cell, thus facilitating the transport of materials needed for survival. The movement of substances across the membrane can be either passive (occurring without the input of cellular energy), or active (requiring the cell to expend energy in moving it).

12. ----- is an example of bacterial and yeast polysaccharides.

13. Draw the structure of starch.



14. Draw and label the structures of two storage polysaccharides.



15. Draw the structure of cellulose.