Pakistan School
Kingdom of Bahrain

PAKISTAN SCHOOL, KINGDOM OF BAHRAIN.

Welcome to

Grade 11

Rules of the class

1) Be on time for all your classes.
2) Respect all the participants of the class.
3) Do not create any disturbance.
4) Pay attention to your teacher.
5) Raise hand if you have a question.
6) Enter into the class with your actual name and CPR number.

Chapter 2

Biological molecules

OBJECTIVES:

At the end of this lesson students will be able to:

- Distinguish between α and β molecules in carbohydrates
- Define stereoisomerism.
- Compare isomers and stereoisomers.
- Distinguish the properties of Oligosaccharides.
- Explain the formation of glycosidic bond /linkage

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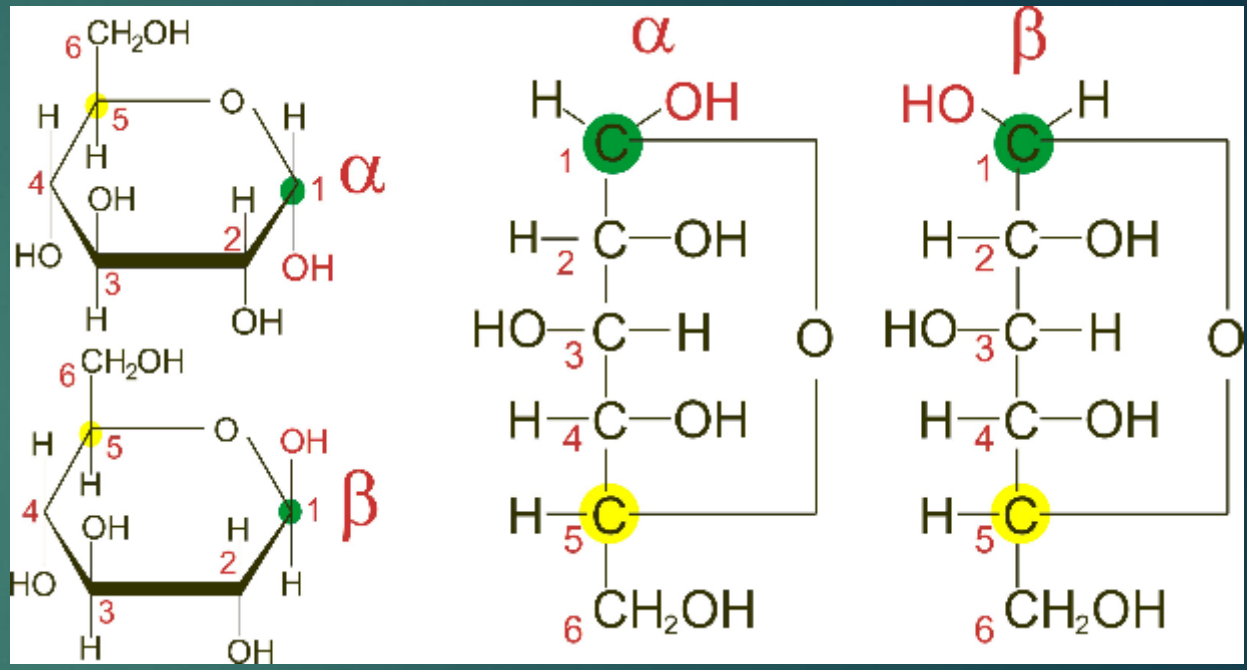
α – Sugars and β -- Sugars

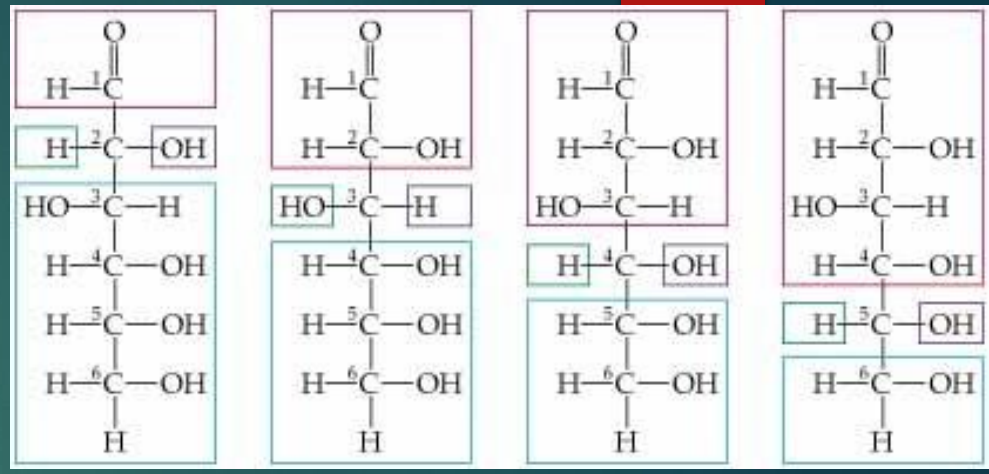
- Each pentose or hexose Sugars exist in α or β – form depending upon the –H or –OH group on C1

- If –OH group is found downward on C1 then the sugar is α – sugar

- If –OH group is found upward on C1 then the sugar is β – sugar



Stereoisomers



- **Definition:**

Those isomers in which –H and –OH groups are arranged in different pattern to the asymmetric carbon atoms are called Stereoisomers.

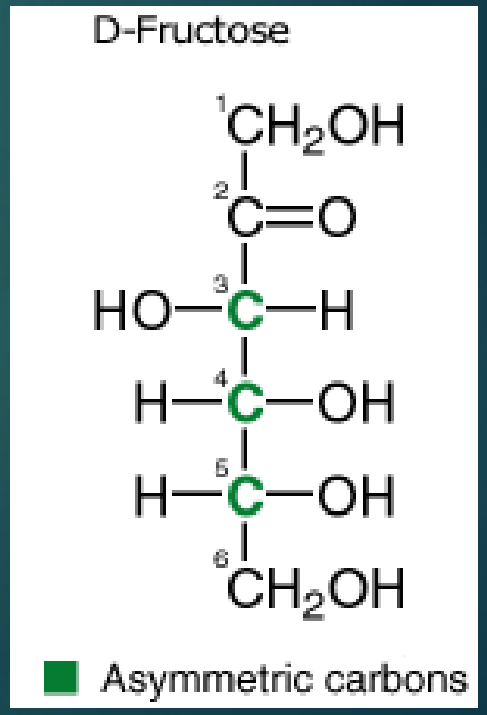
ASYMMETRIC CARBON:

It is the carbon that attaches to four different atoms (group of atoms) around it

Number of stereoisomers made by a molecule depends upon number of asymmetric carbons.

Formula = 2^n

Where n= Number of ASYMMETRIC CARBONS



Types of Stereoisomers

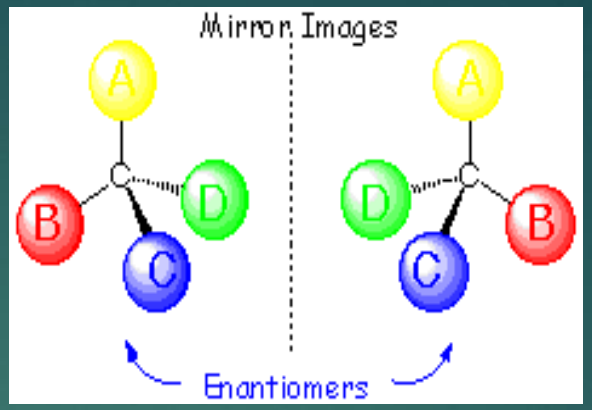
- Stereoisomers are classified into three groups

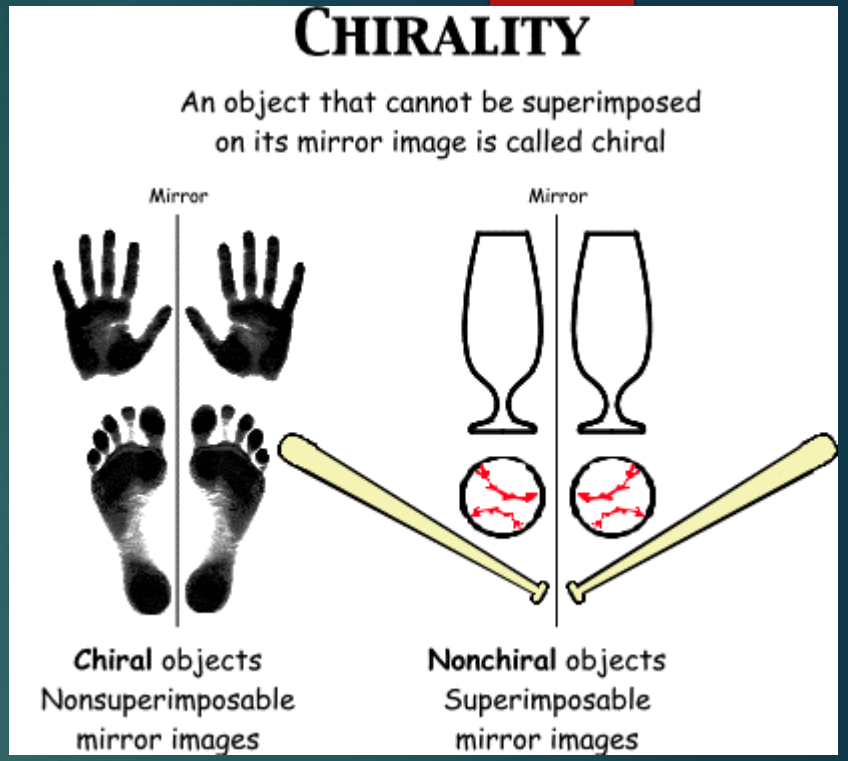
a. Enantiomers

b. Diastereoisomers

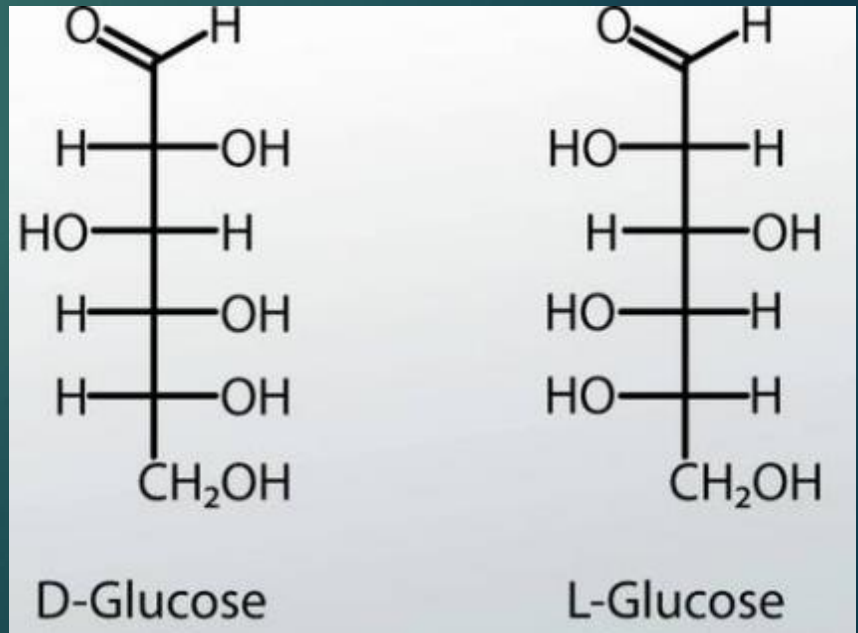
c. Epimers

Enantiomers



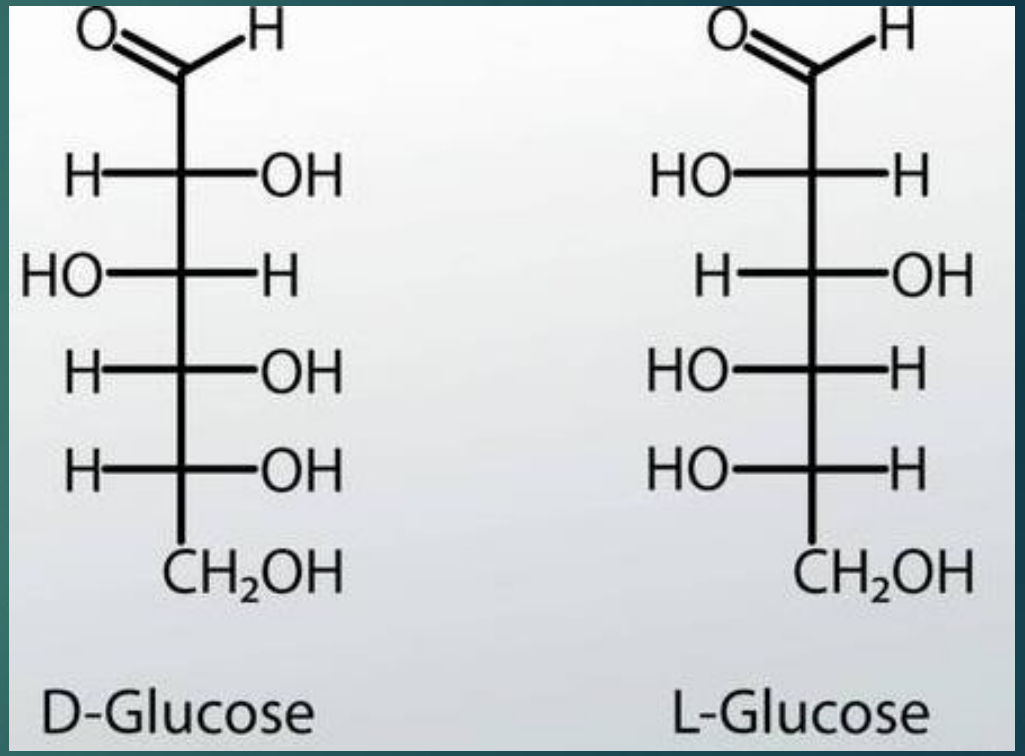


- **Non superimposable mirror images of one another**
- **non-superimposable** on one another means that the molecules cannot be placed on top of one another and give the same molecule. Chiral molecules can be enantiomers.



L (levo) and D(dextro) Molecules

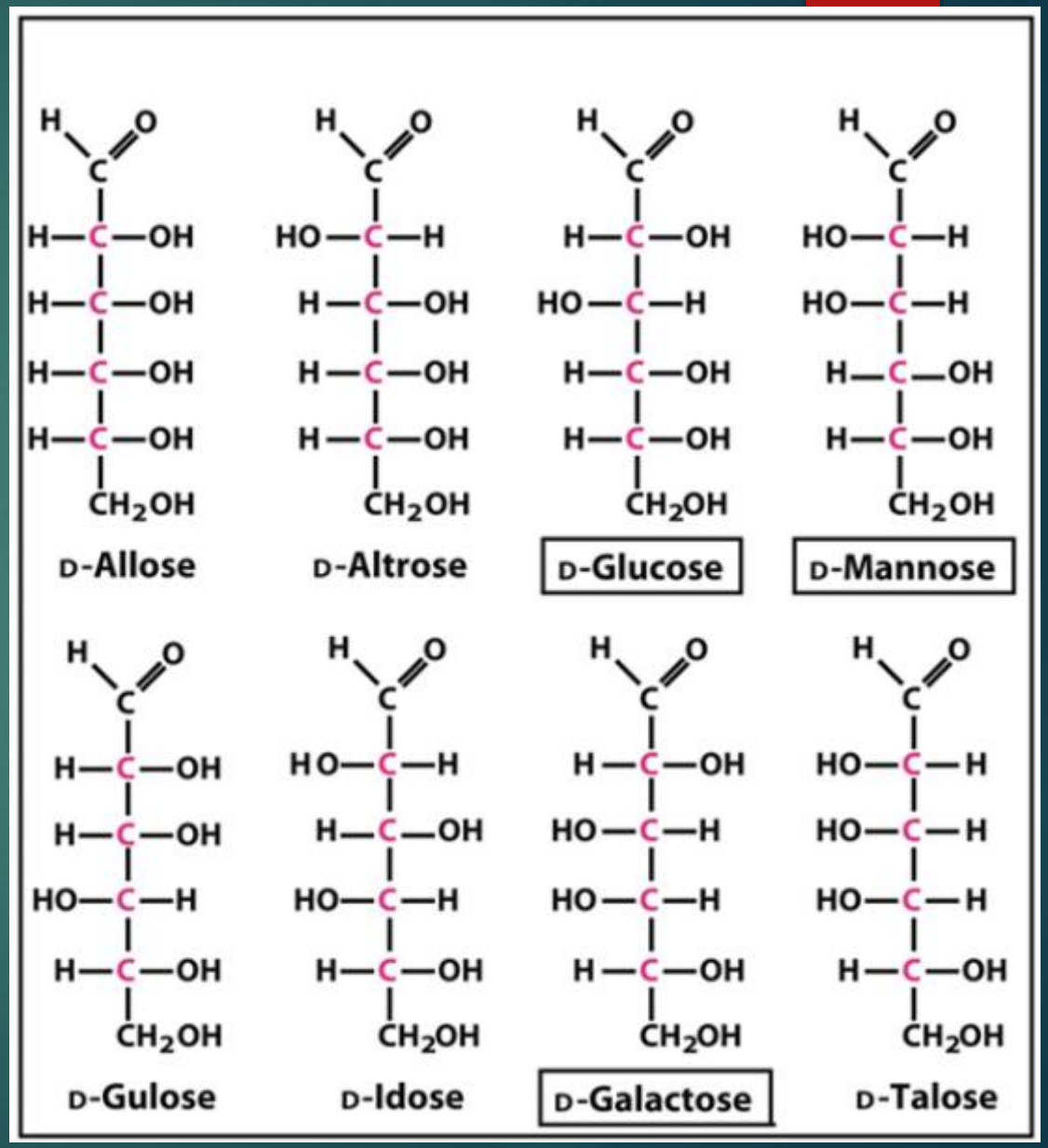
- When the hydroxyl groups on carbons 4 and 5 are to the left side of the Fischer projection, **glucose** is **L**-sugar.
- When the hydroxyl groups on carbons 4 and 5 are to the right side of the Fischer projection(2D), **glucose** is **D**-configuration.



Diastereoisomers

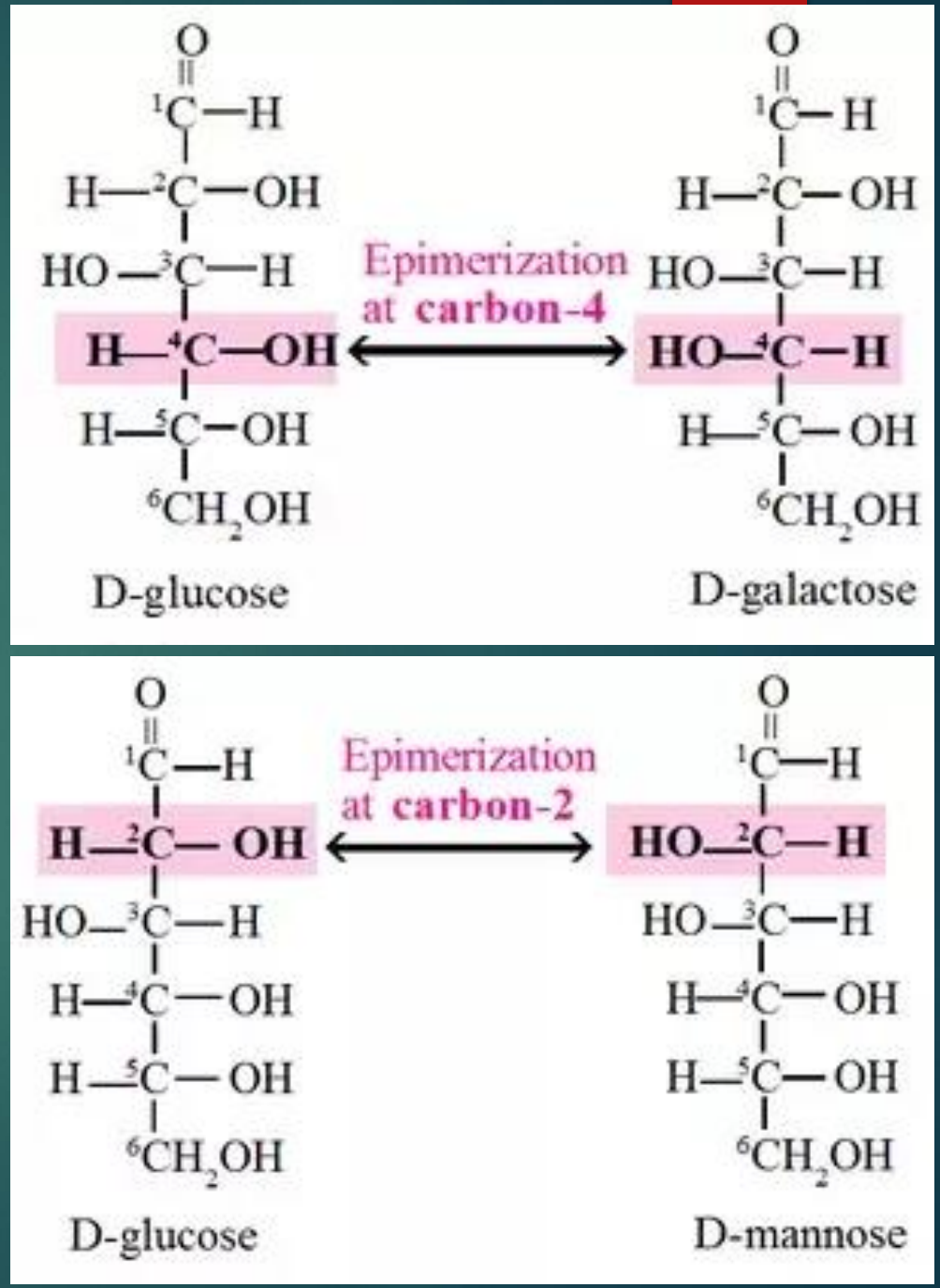
- Those stereoisomers which have different arrangement of –H and –OH groups on more than one asymmetrical carbon atoms.

- Example: D-Glucose and D-Altrose



Epimers

- They have different arrangement of –H and –OH only at one asymmetrical carbon.
- Example: D- glucose and D- mannose



Artificial Sweeteners

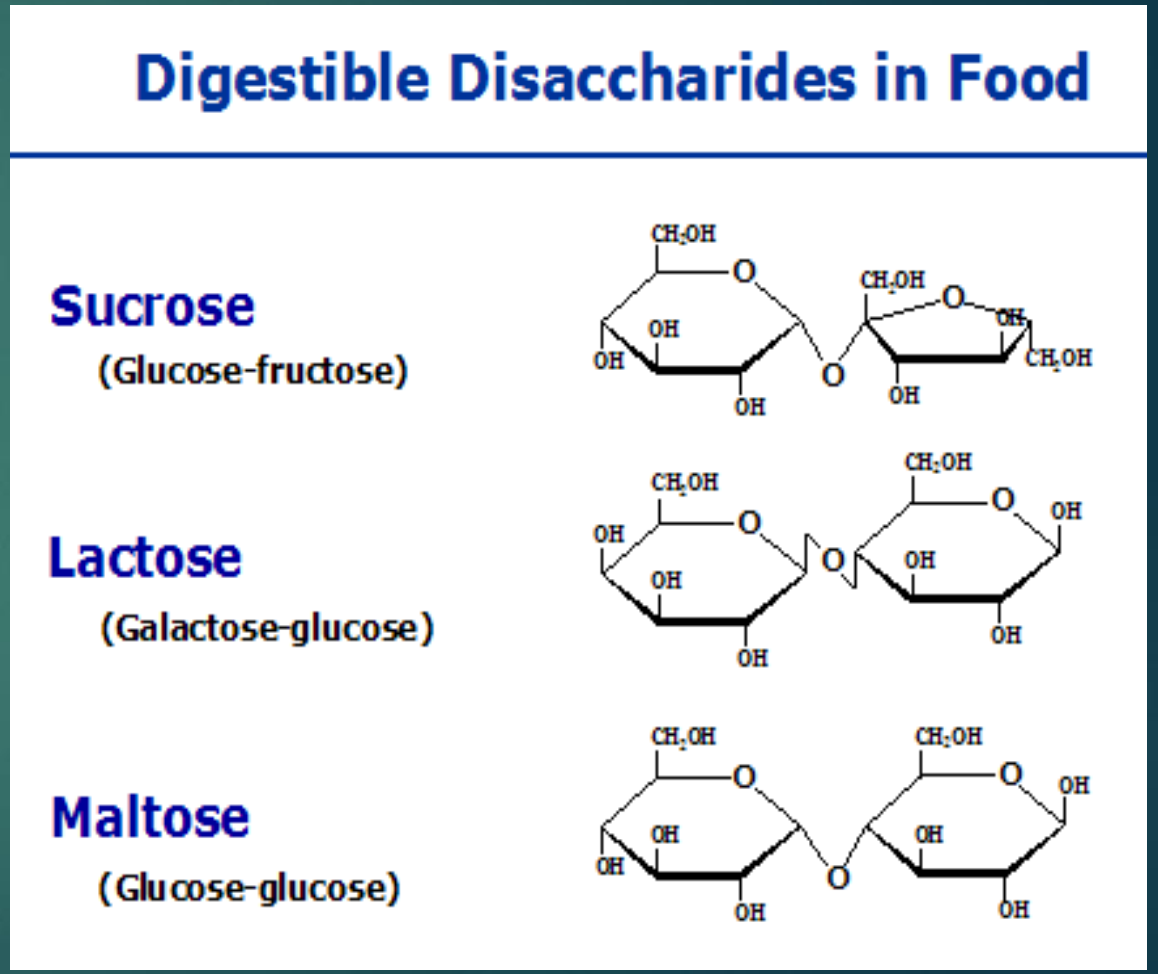
- Lab. Manufactured sugars are L sugars while naturally occurring sugars in bodies are D sugars
- Proteins (Enzymes and cell receptors) are made to react with specific right handed sugars only
- So left hand lab. made sweeteners are not digested and do not raise Blood Glucose Concentration

Oligosaccharides

- Contain derivatives of Monosaccharides
- Yield 2-10 monomers on hydrolysis
- Disaccharides (2 units), Tri-saccharides (3 units) and so on.

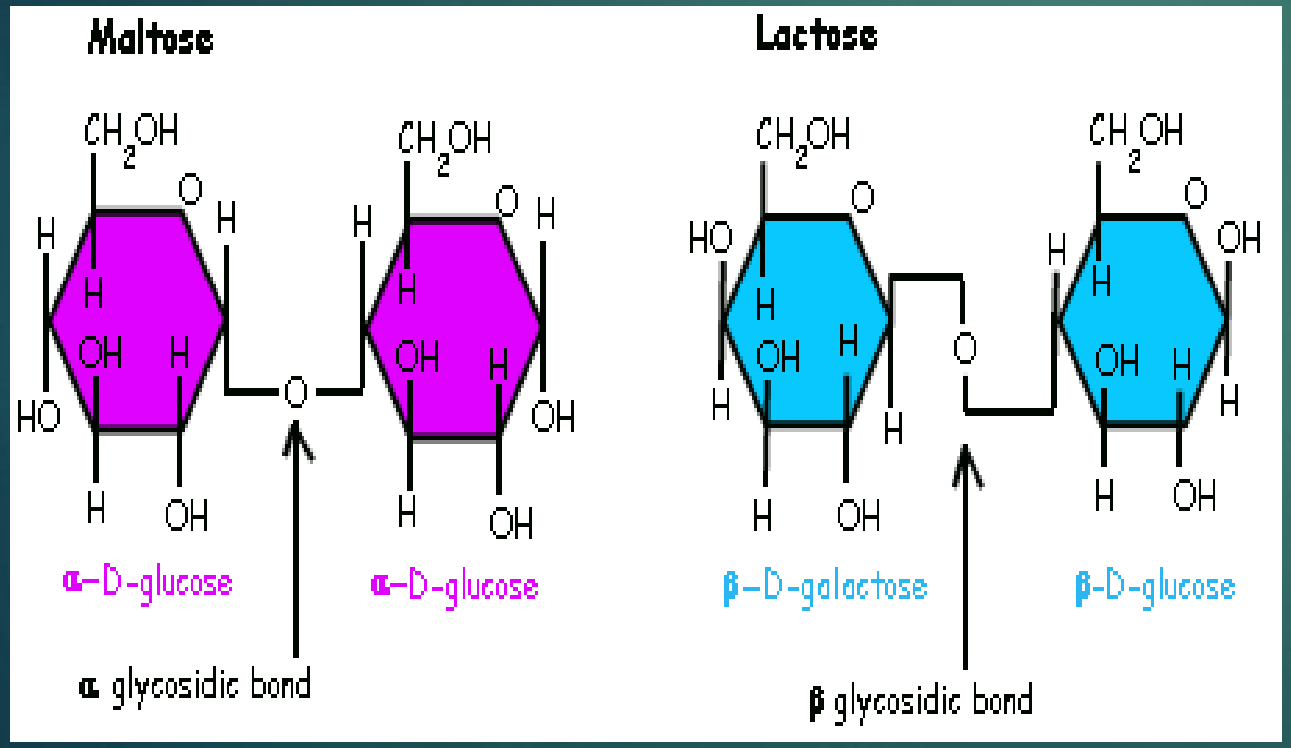
Disaccharides

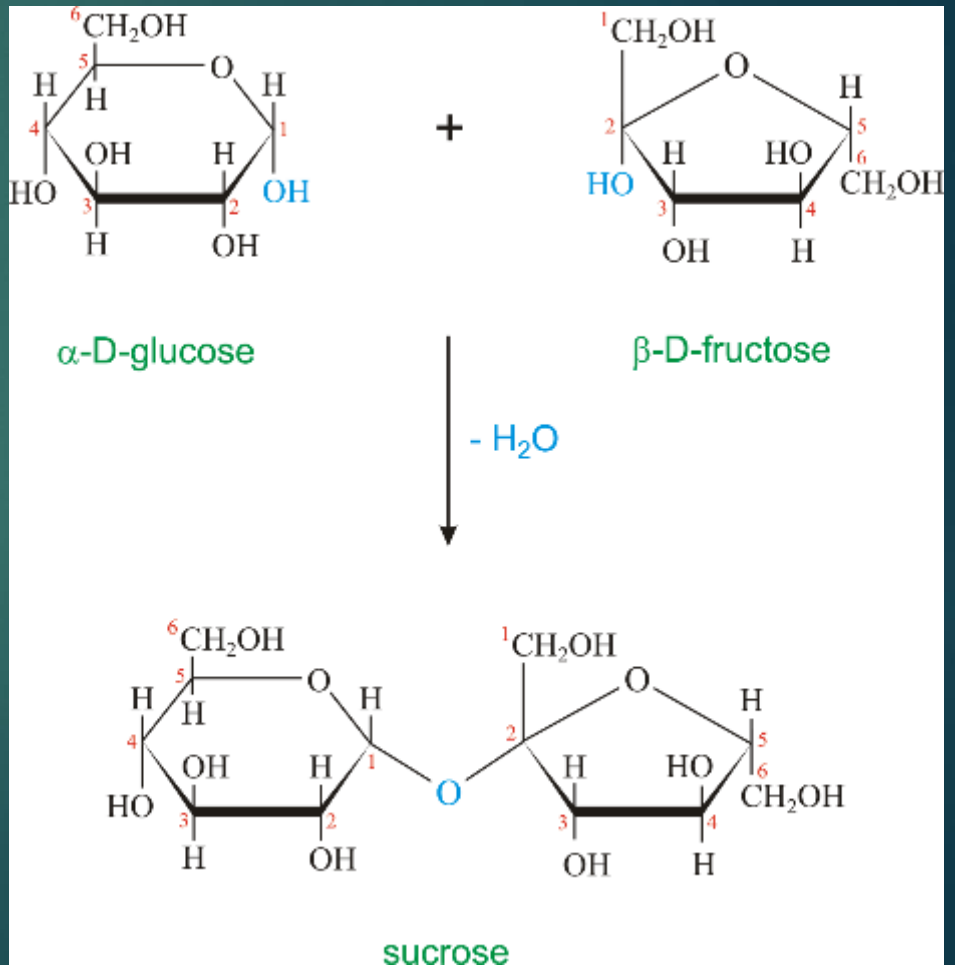
- Have 2-units
- Less sweet
- Less soluble
- Give 2 monosaccharides on hydrolysis
- General formula $C_{12}H_{22}O_{11}$



Glycosidic linkage

A **glycosidic bond** or **glycosidic linkage** is a type of covalent **bond** that joins a carbohydrate (sugar) molecule to another group, which may or may not be another carbohydrate.





PLENARY:

1. Define stereoismerism.
2. What are enantiomers?
3. Why do artificial sweeteners not raise the BGC ?
4. What is a glycosidic linkage?


STAY
HOME
STAY SAFE

Allah Hafiz