

Carbohydrates

Classification
 Monosaccharides
 Disaccharides
 Starches



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Carbohydrates

- Major source of energy from our diet
- Composed of the elements
 C, H and O
- Produced by photosynthesis in plants

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Types of Carbohydrates

- Monosaccharide
- Disaccharides
 Contain 2 monosaccharide units
- Polysaccharides
 Contain many monosaccharide units



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Monosaccharide

- Three Carbons = Triose
- Four Carbons = Tetrose
- Five Carbons = Pentose
- Six Carbons = Hexose

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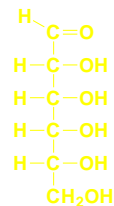
Monosaccharide

- Aldoses are monosaccharide with an aldehyde group and many hydroxyl (-OH) groups.
- Ketoses are monosaccharide with a ketone group and many hydroxyl (-OH) groups.

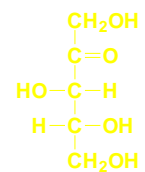
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Learning Check

Identify each as tetrose, pentose or hexose, and as aldose or ketose



A



B

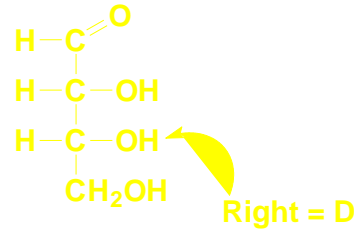
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D and L Notation

- D,L tells which of the two chiral isomers we are referring to.
- If the -OH group on the next to the bottom carbon atom points to the right, the isomer is a D-isomer; if it points left, the isomer is L.
- The D form is usually the isomer found in nature.

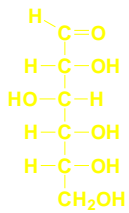
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D notation

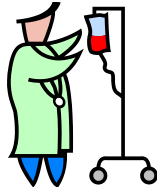


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Glucose

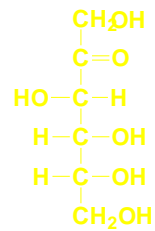


D-Glucose

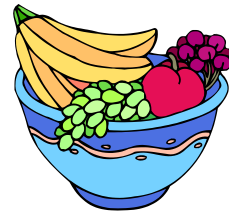


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Fructose

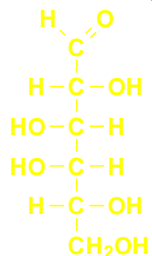


D-Fructose



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Galactose



D-galactose



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Important Disaccharides

• Maltose = Glucose + Glucose

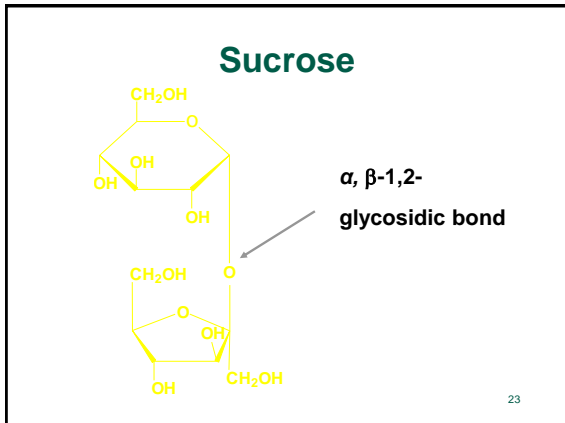
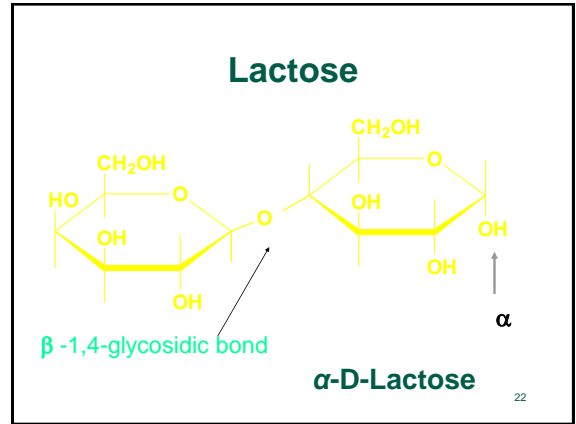
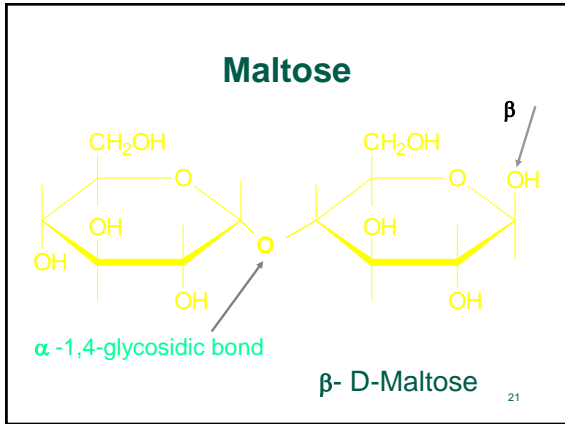
• Lactose = Glucose + Galactose



• Sucrose = Glucose + Fructose



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Learning Check

Identify the monosaccharides in each of the following:


A. lactose
 (1) glucose (2) fructose (3) galactose


B. maltose
 (1) glucose (2) fructose (3) galactose

C. sucrose
 (1) glucose (2) fructose (3) galactose

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Polysaccharides

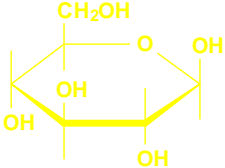
- Starch
 - Amylose
 - Amylopectin
- Glycogen
- Cellulose



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Polysaccharides

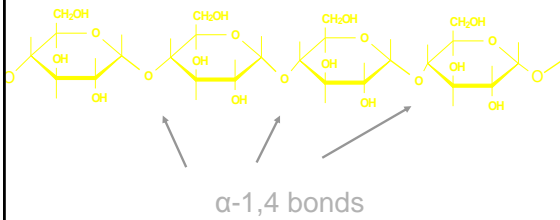
- Polymers of D-Glucose



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Amylose

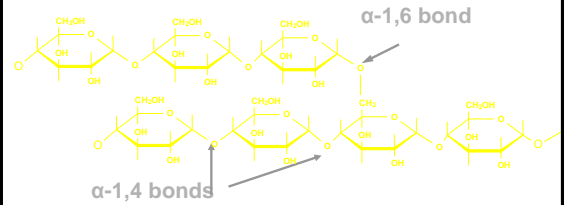
Polymer with α -1,4 bonds



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Amylopectin

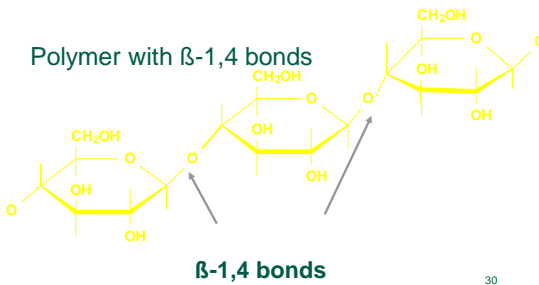
Polymer with α -1,4 and α -1,6 bonds branches



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Cellulose

Polymer with β -1,4 bonds



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Learning Check

Identify the polysaccharide in each as:

1) starch 2) glycogen 3) cellulose

A.



B.



C.



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