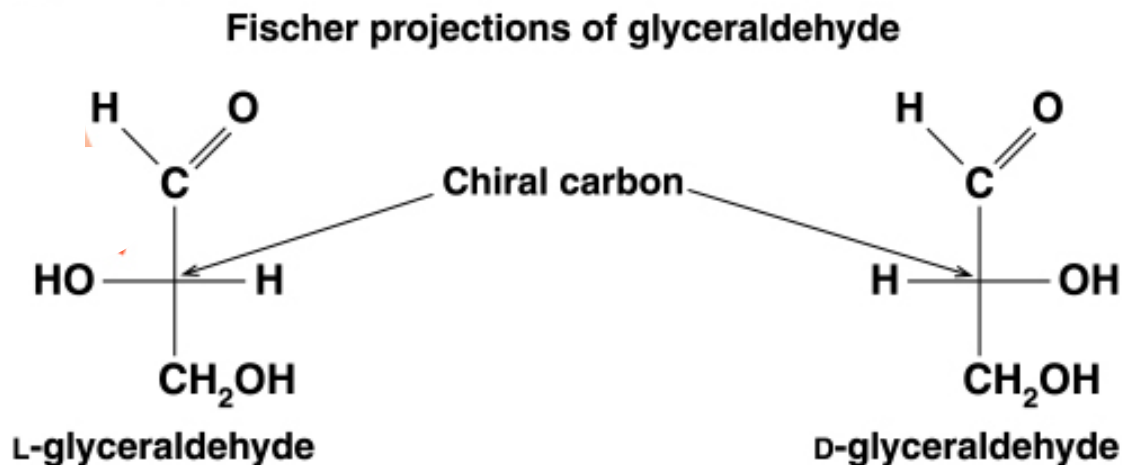


Structures of Monosaccharides

Fischer Projections

A Fischer projection

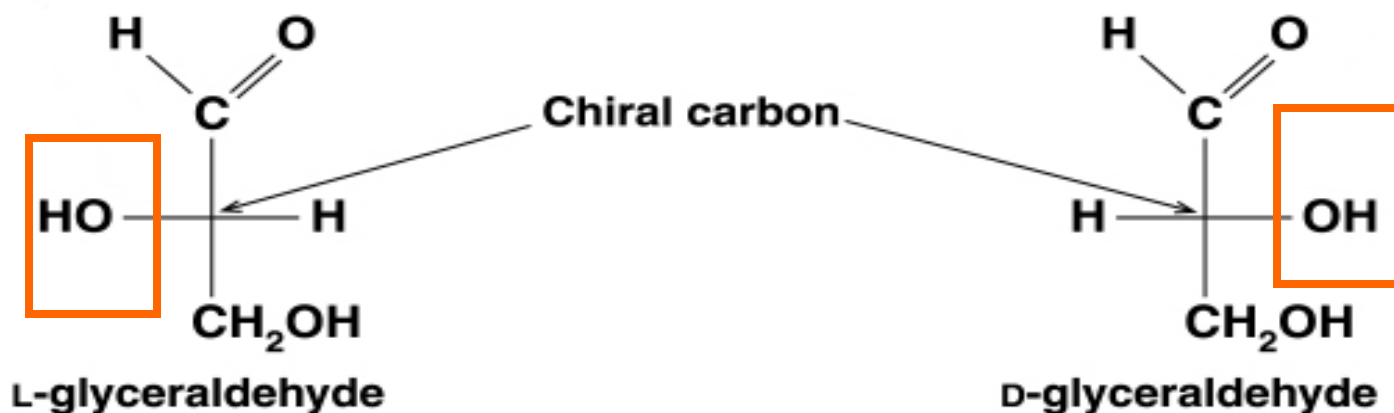
- Is used to represent carbohydrates.
- Places the most oxidized group at the top.
- Shows chiral carbons as the intersection of vertical and horizontal lines.



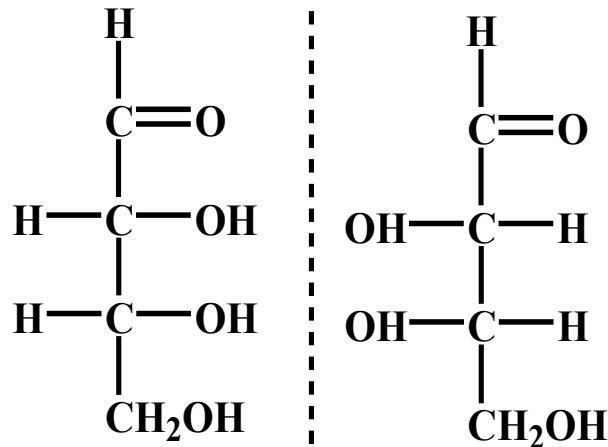
D and L Rotations

In a Fischer projection, the -OH group on the

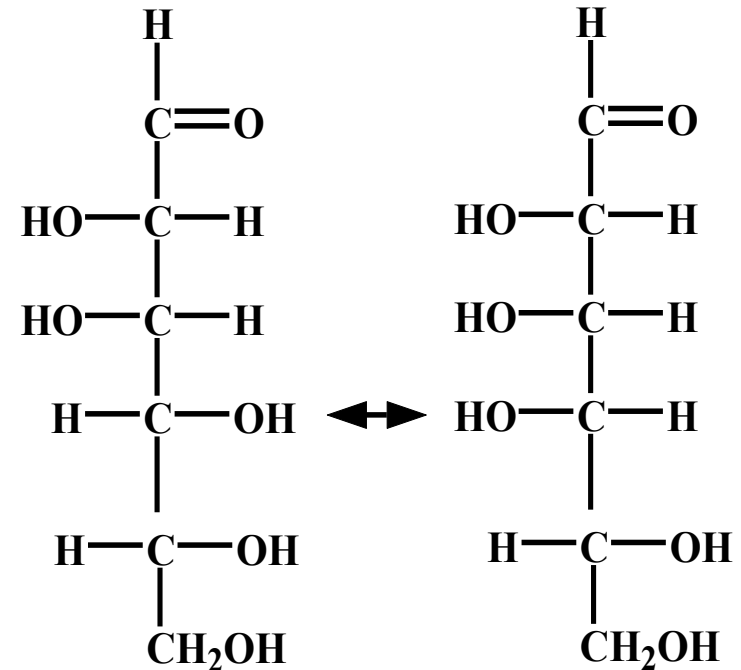
- Chiral carbon *farthest from the carbonyl group* determines an L or D isomer.
- Left is assigned the letter **L** for the L-isomer.
- Right is assigned the letter **D** for the D-isomer.
- Four chiral centers, $2^n = 2^4 = 16$ stereoisomers



Enantiomers and epimers



these two aldotetroses are enantiomers.
They are stereoisomers that are mirror
images of each other

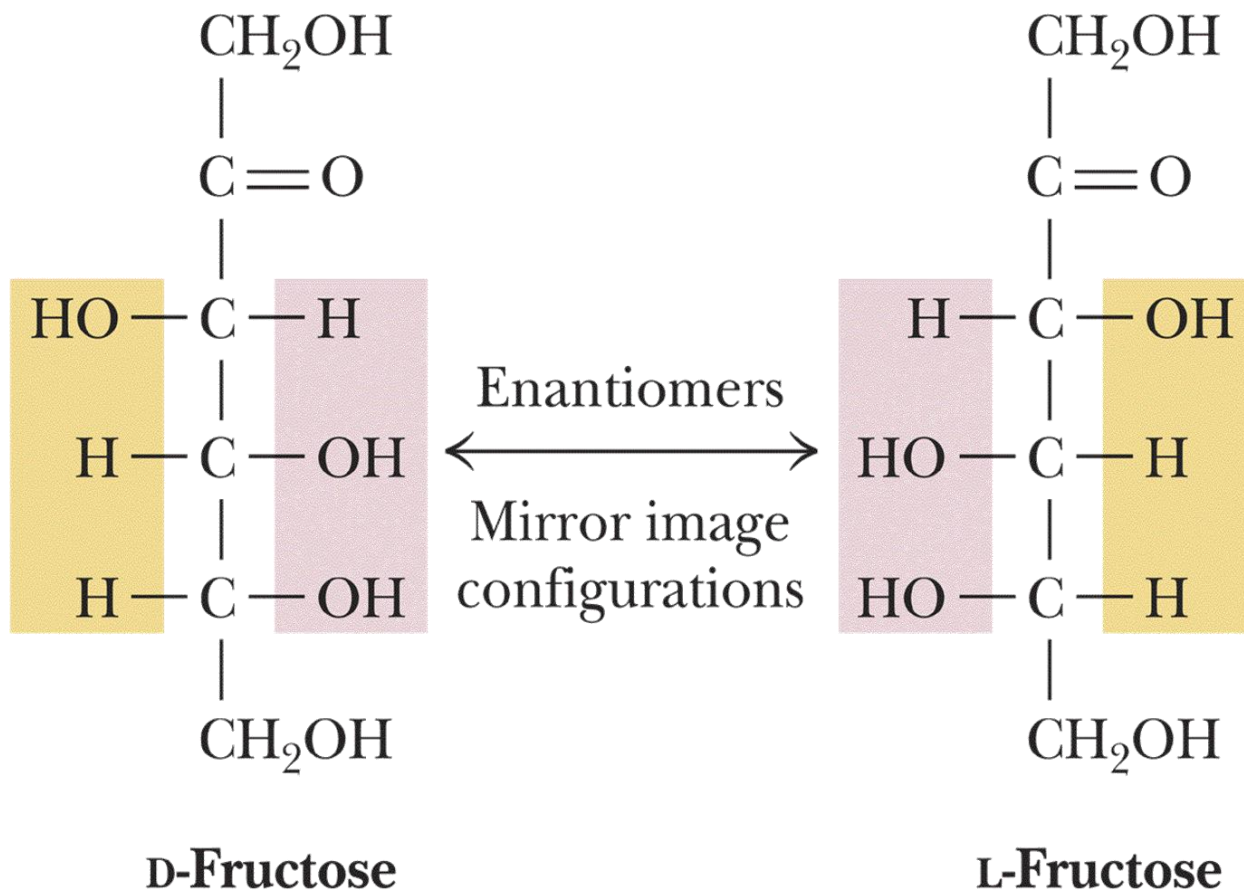


these two aldohexoses are C-4 epimers.
they differ only in the position of the
hydroxyl group on one asymmetric carbon
(carbon 4)

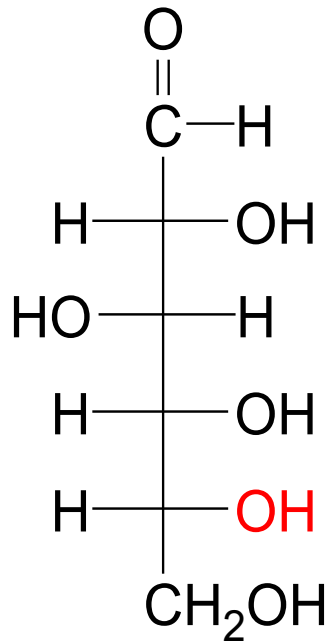
Enantiomers

- Pairs of stereoisomers
- Designated by D- or L- at the start of the name.
- They are mirror images
- that can't be overlapped.

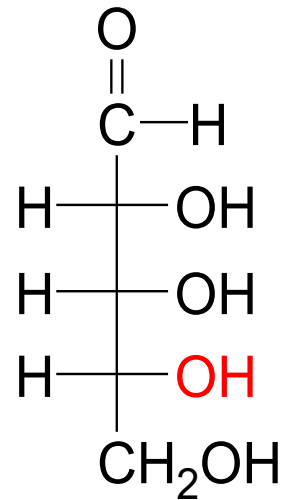




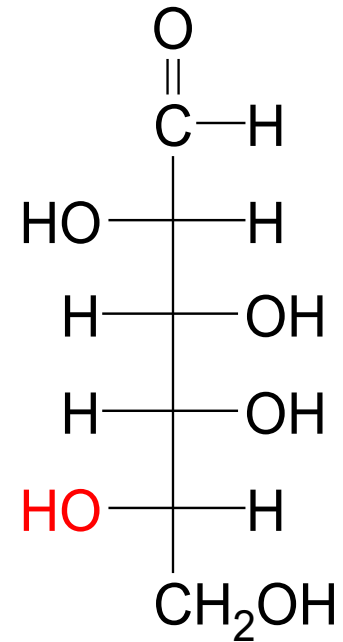
Examples of D and L Isomers of Monosaccharides



D-glucose

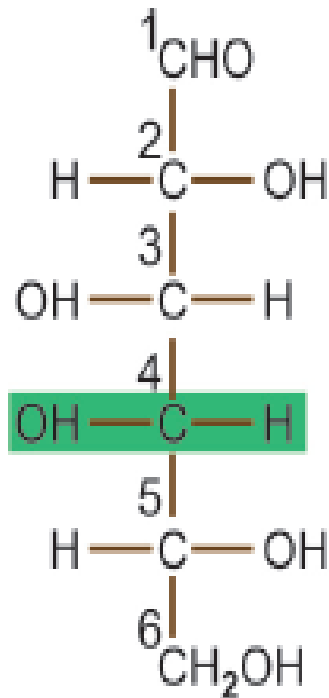


D-ribose

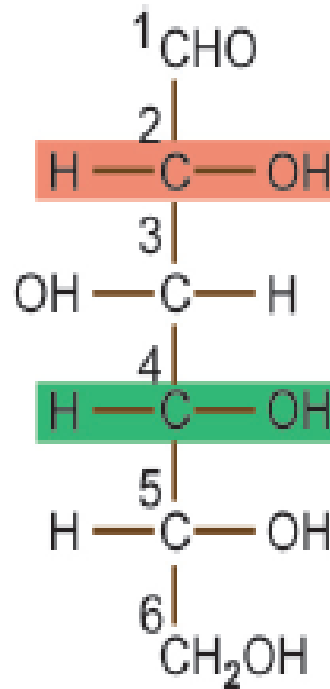


L-galactose

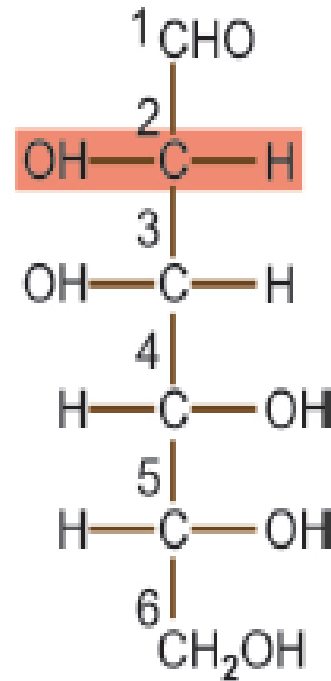
Epimers – stereoisomers that differ only in configuration about one chiral center.



D-Galactose



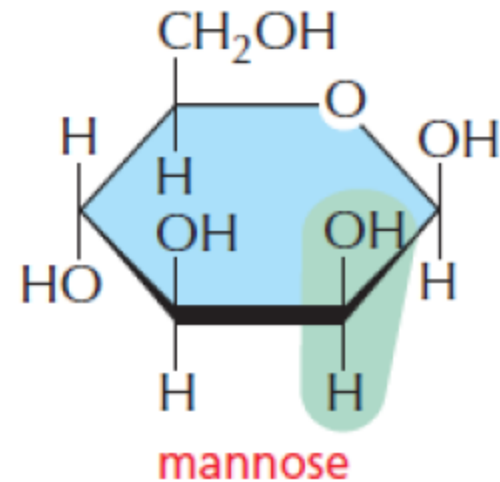
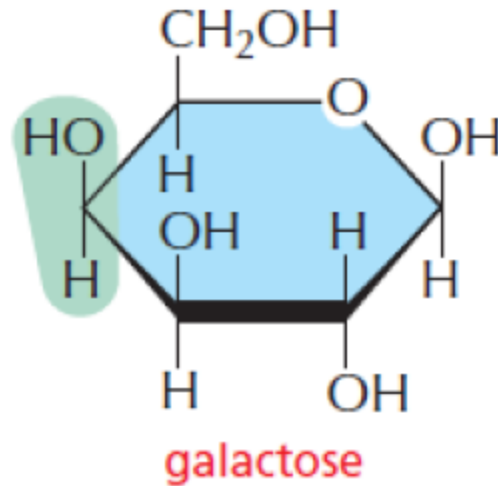
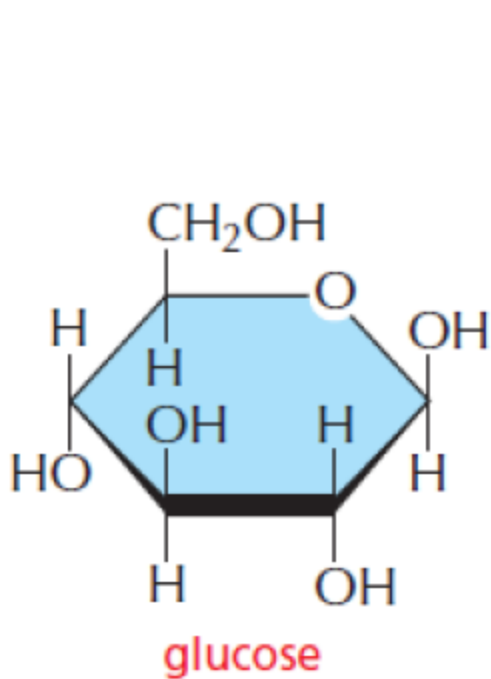
D-Glucose



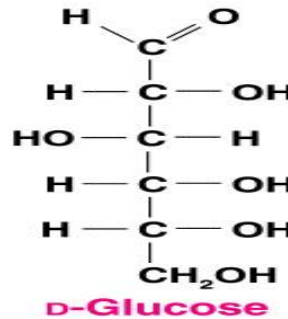
D-Mannose

Figure 2.4: Epimers of glucose

Epimers – stereoisomers that differ only in configuration about one chiral center.

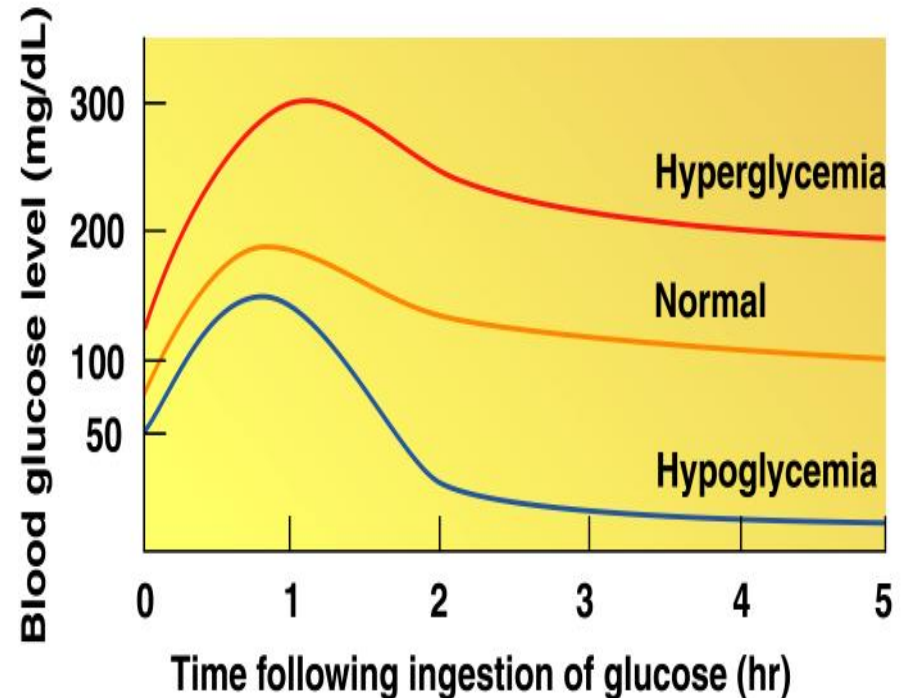


D-Glucose



D-glucose is

- Found in fruits, corn syrup, and honey.
- An aldohexose with the formula $\text{C}_6\text{H}_{12}\text{O}_6$.
- Known as blood sugar in the body.
- The monosaccharide in polymers of starch, cellulose, and glycogen.
- In the body,
- Blood Glucose Level:
- Glucose has a normal blood level of 70-100 mg/dL.
- A glucose tolerance test measures blood glucose for several hours after ingesting glucose.



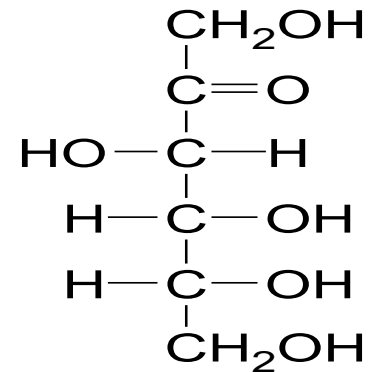
Timberlake, General, Organic, and Biological Chemistry. Copyright © Pearson Education Inc., publishing as Benjamin Cummings

D-fructose

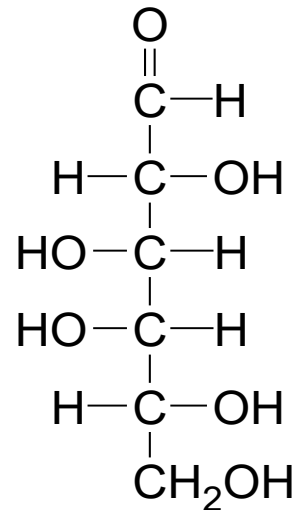
- Is a ketohexose $C_6H_{12}O_6$.
- Is the sweetest carbohydrate.
- Is found in fruit juices and honey.
- Converts to glucose in the body.

D-galactose is

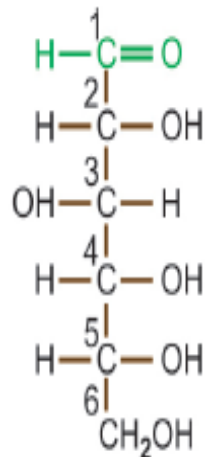
- An aldohexose $C_6H_{12}O_6$.
- Not found free in nature.
- Obtained from lactose, a disaccharide.
- A similar structure to glucose except for the $-OH$ on C4.



D-Fructose

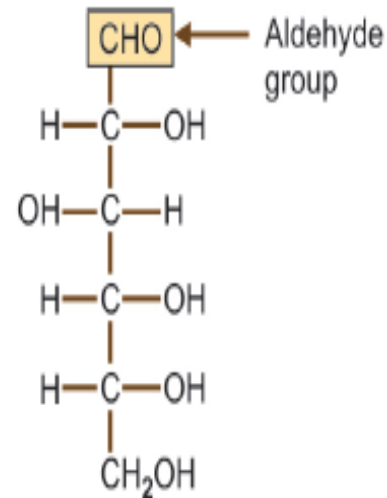


D-Galactose

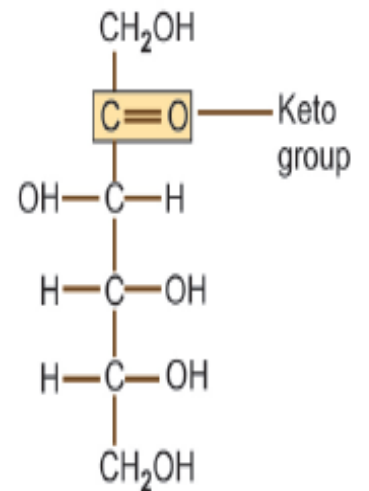


D-Glucose

**Straight chain structure of D-glucose
(Fisher projection formula)**



**Glucose (C₆H₁₂O₆),
(Aldose)**



**Fructose (C₆H₁₂O₆),
(Ketose)**