Glyceraldehyde, the simplest carbohydrate, exhibits properties of a chiral or optical isomer compound. This molecule forms the basis for the designation of the isomers of all of the carbohydrates.

**Introduction**

Glyceraldehyde can exist in two isomeric forms that are mirror images of each other which are shown below. The absolute configuration is defined by the molecule on the far left as the D-glyceraldehyde. With the aldehyde group in the "up" direction, the -OH group must project to the right side of the molecule for the D isomer. Chemists have used this configuration of D-glyceraldehyde to determine the optical isomer families of the rest of the carbohydrates. All naturally occurring monosaccharides belong to the D optical family. It is remarkable that the chemistry and enzymes of all living things can tell the difference between the geometry of one optical isomer over the other.

Monosaccharides are assigned to the D-family according to the projection of the -OH group to the right on the chiral carbon that is the farthest from the carbonyl (aldehyde) group. This is on carbon # 5 if the carbonyl carbon is # 1.

Note: For whatever reason, the ball and stick model does not completely match the projections of the -OH groups on carbons # 2 and 4. It is in the way that the flat Fischer model has been defined.
How many chiral carbons can you find? List them. If necessary Review Chiral Compounds to find the definitions. Then check the answer from the drop down menu.

Answer

**Compare Glucose and Galactose**

Examine the structures of glucose and galactose carefully. Which \(-\text{OH}\) group determines that they both are the D isomer? Then check the answer from the drop down menu.

Answer

Isomers have different arrangements of atoms. Which carbon bonding to \(-\text{OH}\) and \(-\text{H}\) is different in glucose vs. galactose? This single difference makes glucose and galactose isomers. Then check the answer from the drop down menu.

Answer
Contributors

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