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Conformation of Monosaccharides

According to Haworth Projection, sugar molecules appear to be planar. This assumption is nearly correct for furanose rings (Five-membered rings), which are almost planar in nature. However, a six-membered ring (Pyranose ring) cannot be planar because it would lead to excessive strain in the molecule.

To avoid this train, six-membered rings non-planar conformations. This concept was first proposed by Haworth in 1929, who also introduced the term conformation, meaning the three-dimensional arrangement of atoms in a single chemical structure.

Chair and Boat Conformation

→ Studies by Reeves (1950) using cuprammonium complex formation, showed that pyranose sugars and their derivatives generally adopt a chair conformation. Similar to cyclohexane. Although a boat conformation is also possible, it is much less stable.

The chair conformation is more stable because it has

a. Minimum steric strain.
b. Minimum hydrogen - hydrogen interactions.

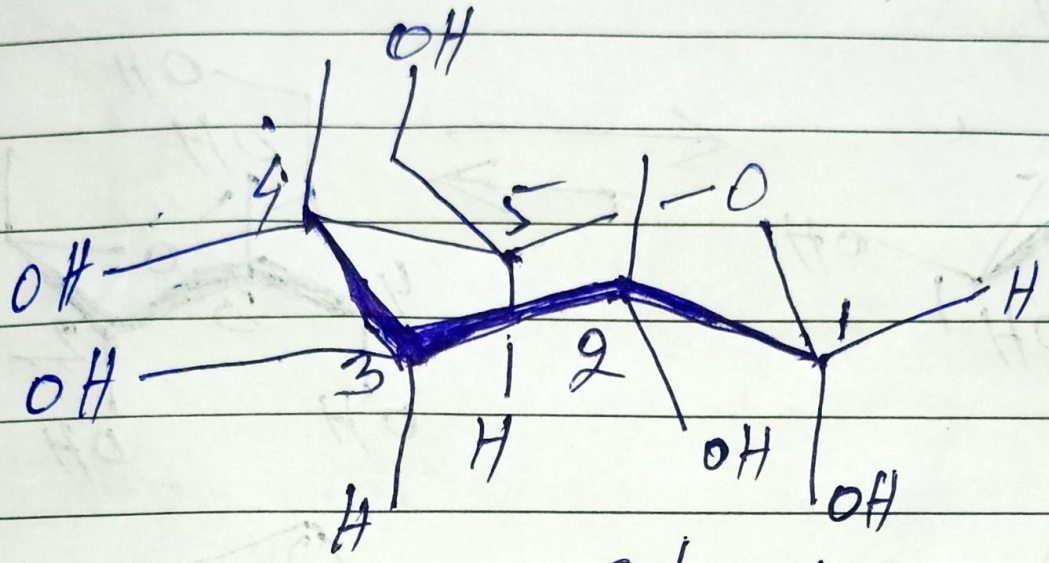
Hence monosaccharides prefer the chair form over the boat form.

Chair Conformation of D-Glucose

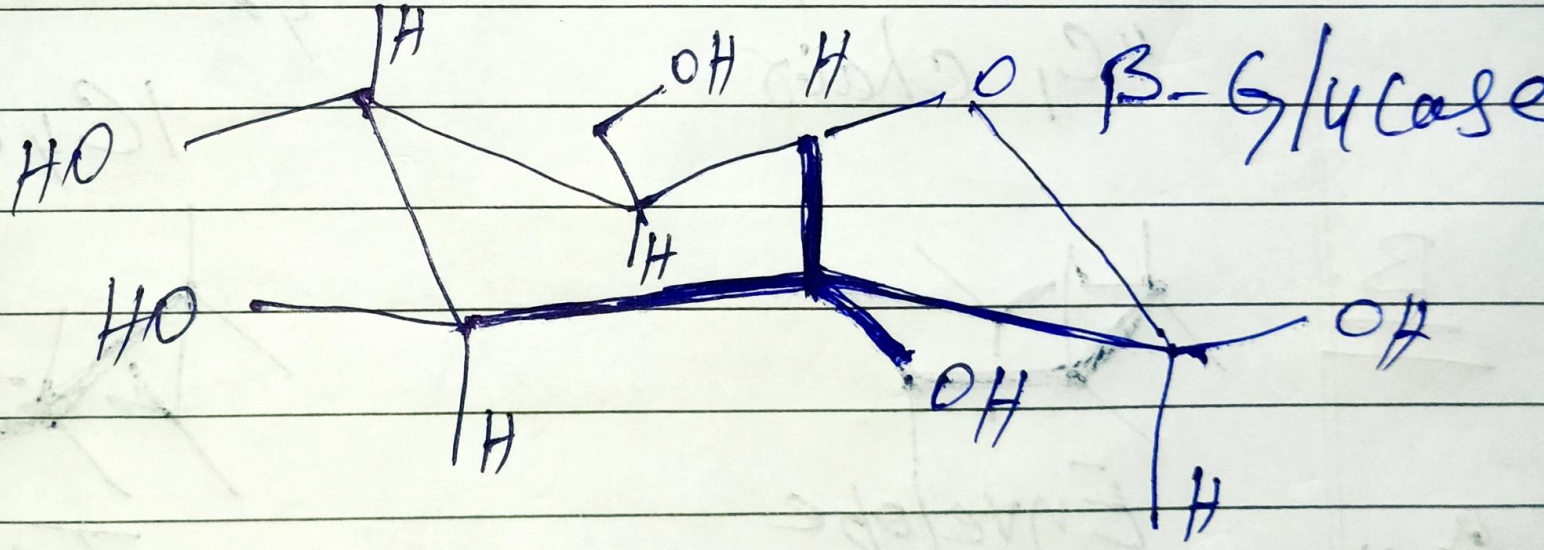
D - Glucose exists mainly in two anomeric forms -

a. α - D - Glucose
b. β - D - Glucose

These two forms differ in the orientation of the -OH group at the anomeric carbon (C$_1$)



α – D – Glucopyranose



β-Glucose