

Class 12 Chemistry • Biomolecules

10.1.2.2 Fructose

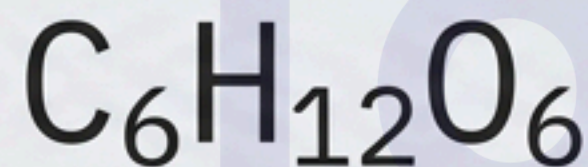
The Structure and Stereochemistry
of a Ketohexose

Fructose: The Fruit Sugar

Natural Source

A natural monosaccharide found in fruits, honey, and vegetables. Often obtained alongside glucose via the hydrolysis of sucrose. Used in pure form as a sweetener.

Molecular Profile



D-Series

Laevorotatory (-)

Formally written as
D-(-)-Fructose.

Structural Class

Ketohexose

[Keto] = Ketone group at C2

[Hex] = 6 Carbon chain

[Ose] = Sugar

The Linear Blueprint of D-(-)-Fructose

Legend

Ketonic Functional Group

$>\text{C}=\text{O}$ (Ketonic functional group at carbon 2)

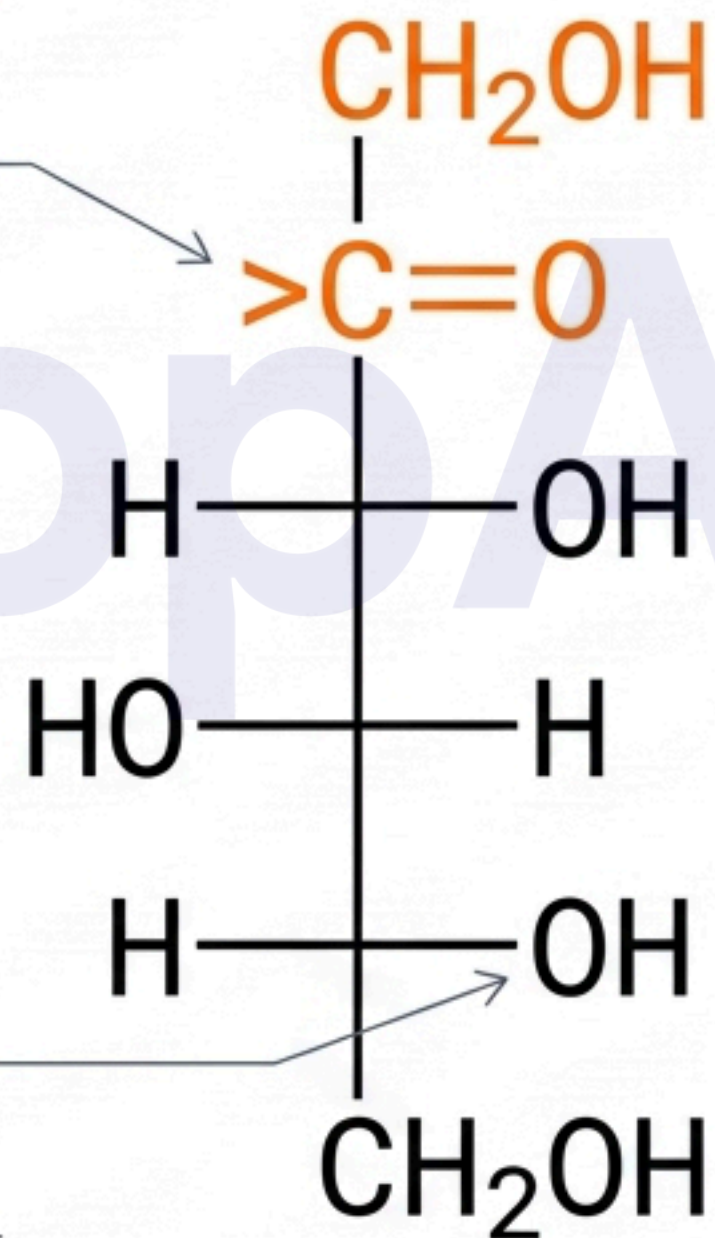
Carbon Backbone

6 carbons linked in a continuous straight chain.

D-Configuration

-OH on the right side dictates the primary D-configuration.

Drafting Board





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$$E=mc^2$$



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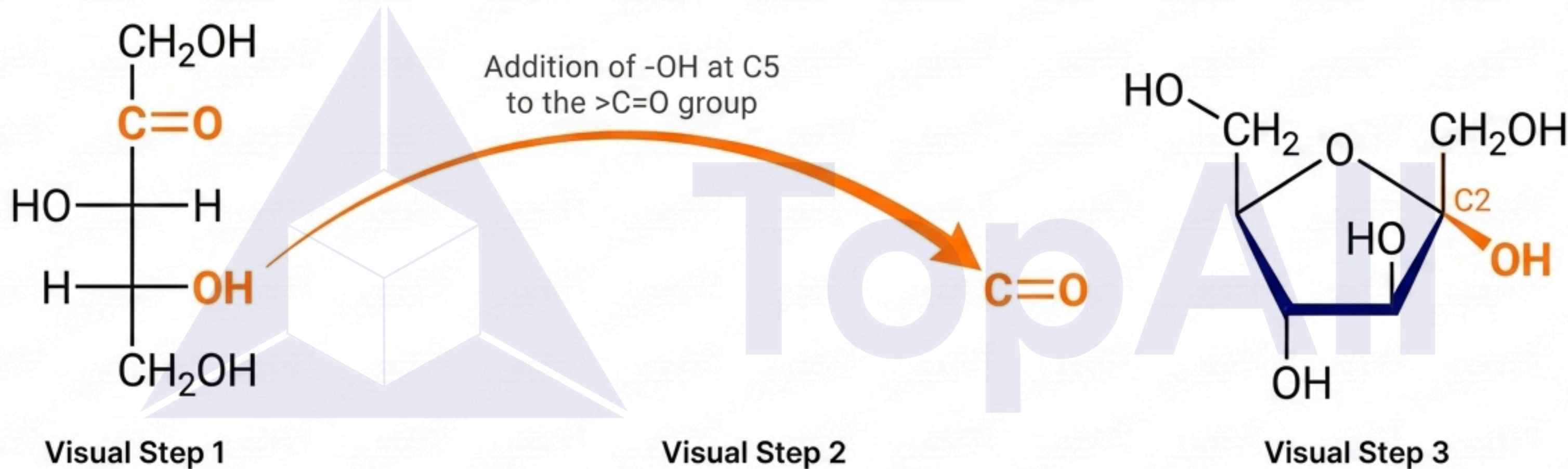
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Key Highlights

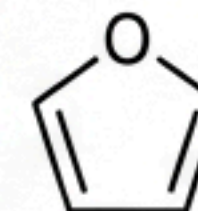
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Folding into the Furanose Ring



Process-Flow Card

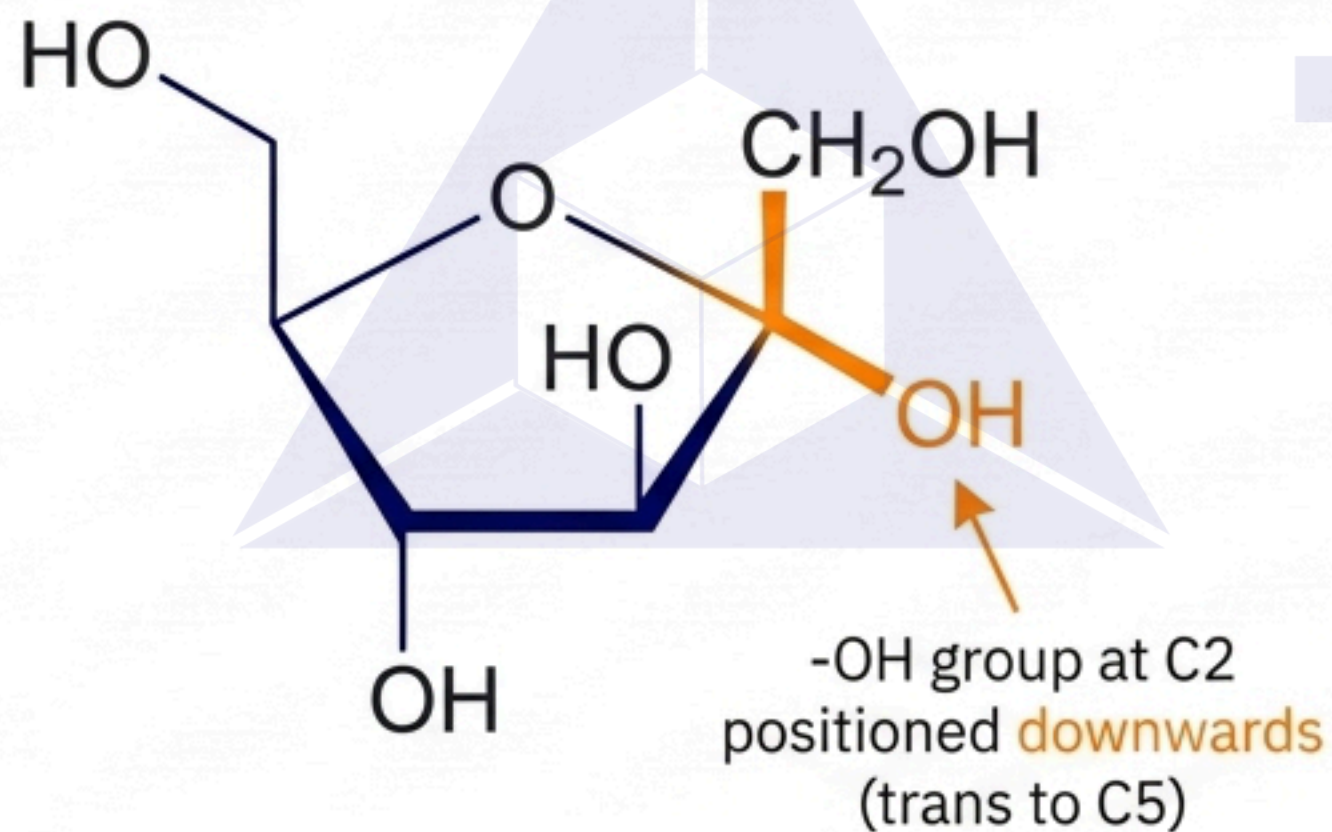


Named Furanose
by analogy to the
compound Furan.

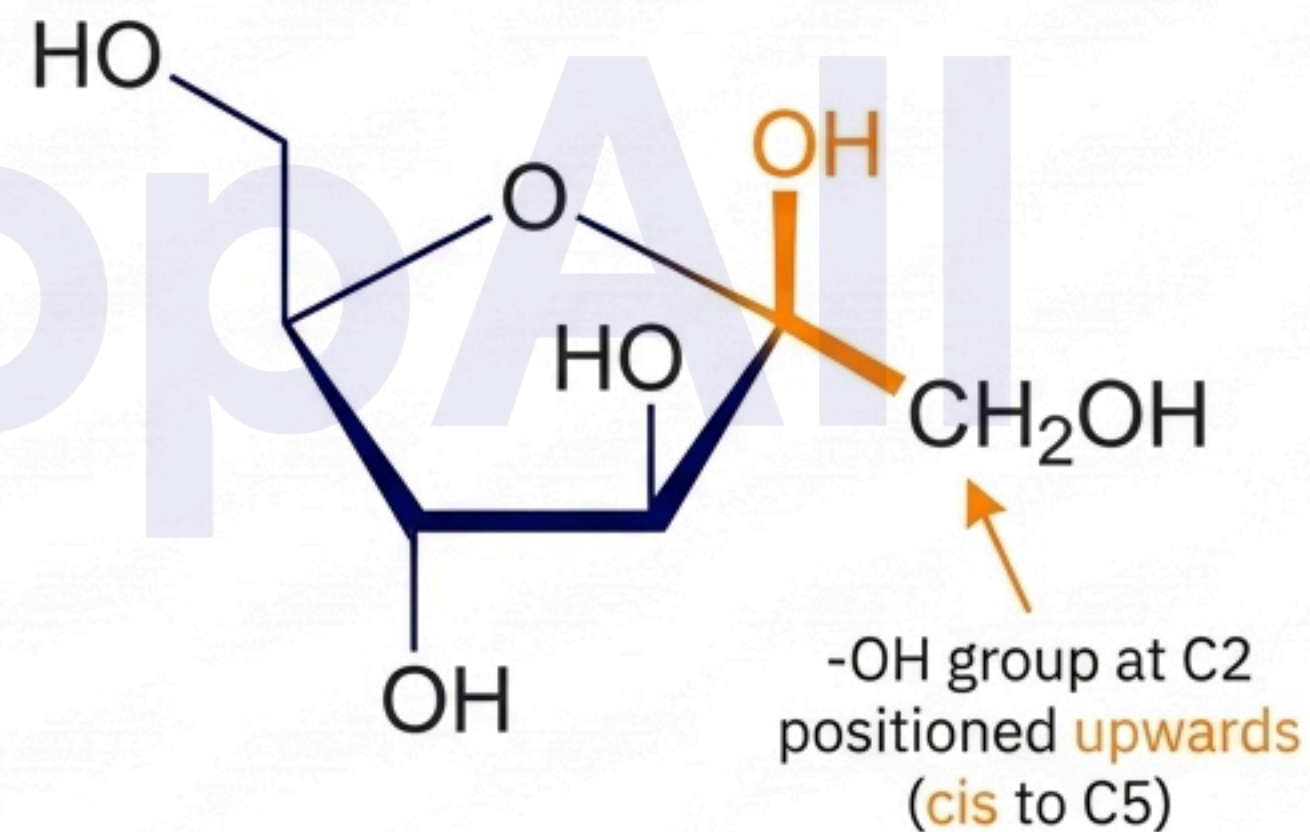
Reference Badge

The Two Anomers of Fructose

α -D-(-)-Fructofuranose



β -D-(-)-Fructofuranose



Anomers: Cyclic isomers differing only in the configuration of the hydroxyl group at the anomeric carbon (C2).

Structural Comparison: Glucose vs. Fructose

Feature	D-(+)-Glucose	D-(-)-Fructose
Molecular Formula	$C_6H_{12}O_6$	$C_6H_{12}O_6$
Functional Group	Aldehyde ($-CHO$) at C1	Ketone ($>C=O$) at C2
Classification	Aldohexose	Ketohexose
Optical Rotation	Dextrorotatory (+)	Laevorotatory (-)
Cyclic Ring Shape	Pyranose (6-membered)	Furanose (5-membered)



Key Takeaway: Despite sharing the exact same molecular formula, the position of their carbonyl group dictates entirely different 3D architectures, behaviors, and properties.



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