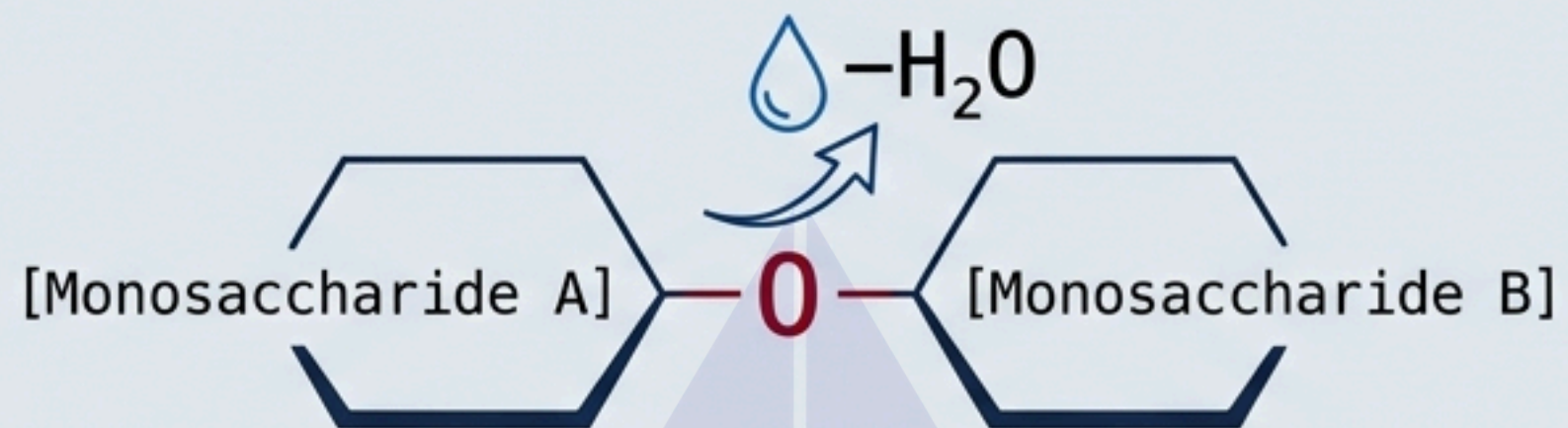


UNIT 10 • BIOMOLECULES

Disaccharides: Linkages & Invert Sugars

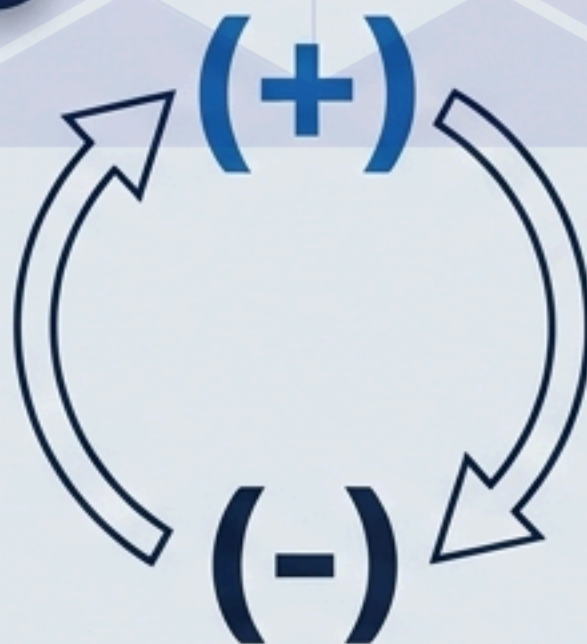
Decoding the structural locks and optical math of JEE's most frequently tested carbohydrates.

Glycosidic Linkage



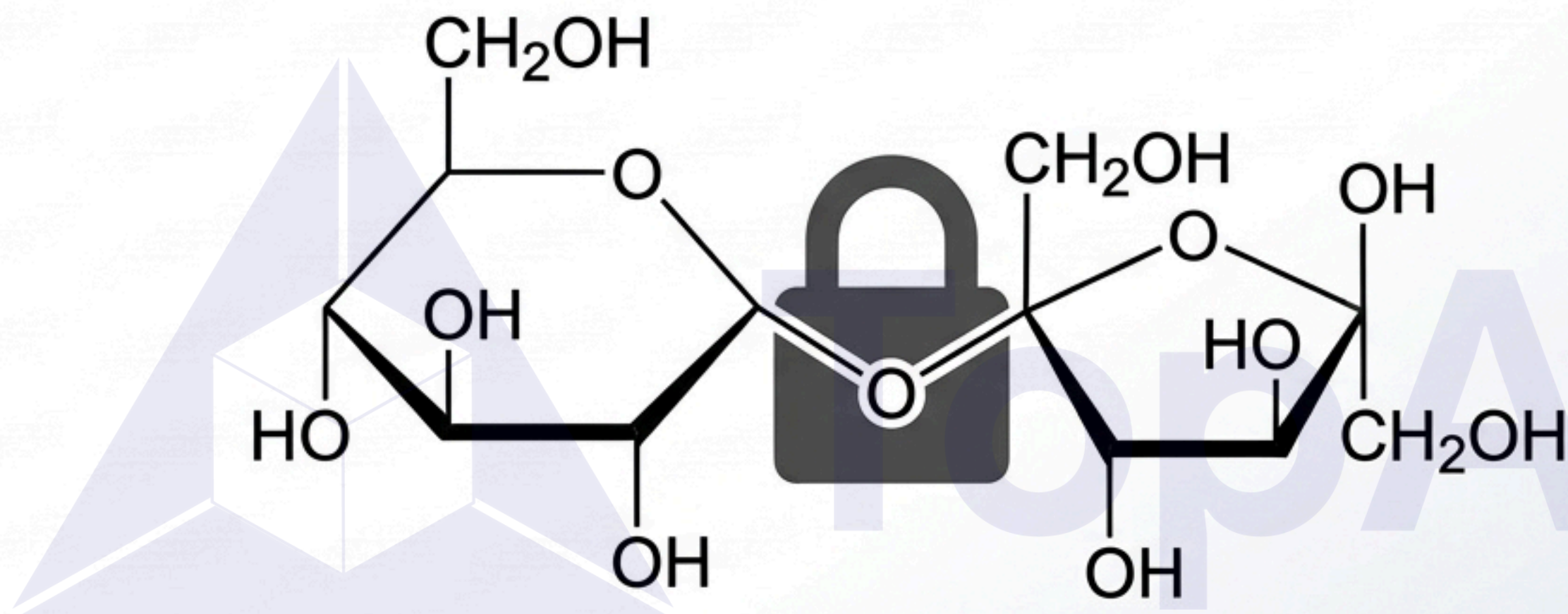
The oxide bridge formed between two monosaccharides by the loss of a water molecule.

Invert Sugar



The product of sucrose hydrolysis that flips the net optical sign from dextrorotatory to laevorotatory.

Sucrose: The Locked System



[α -D-Glucose C1]  [β -D-Fructose C2]

NON-REDUCING

Both reducing groups (aldehydic C1 of glucose and ketonic C2 of fructose) are tied up in the glycosidic bond. The system is structurally locked.



You've Learned the Theory. Let's Test Them Now.

$$E=mc^2$$



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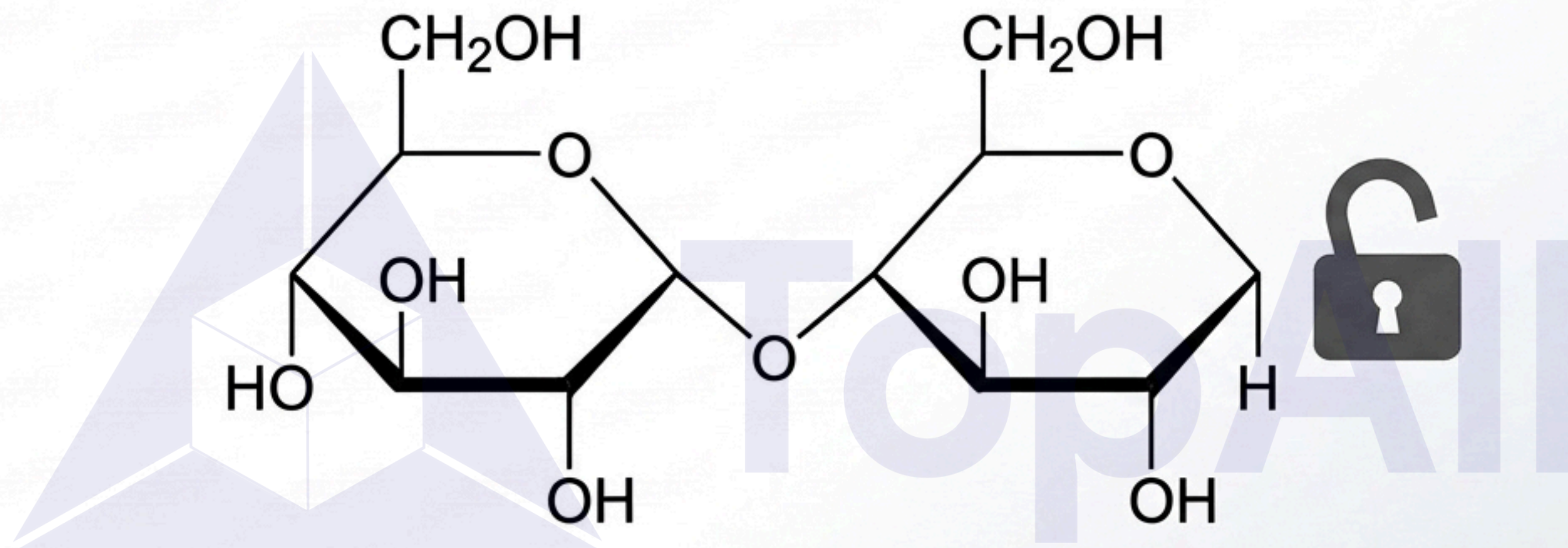
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Maltose: The Open Latch



[α -D-Glucose C1]  [α -D-Glucose C4] ... [C1 Free]

REDUCING

While C1 of the first glucose is bonded, the second glucose retains a free -CHO group at C1 in solution. The latch is open.

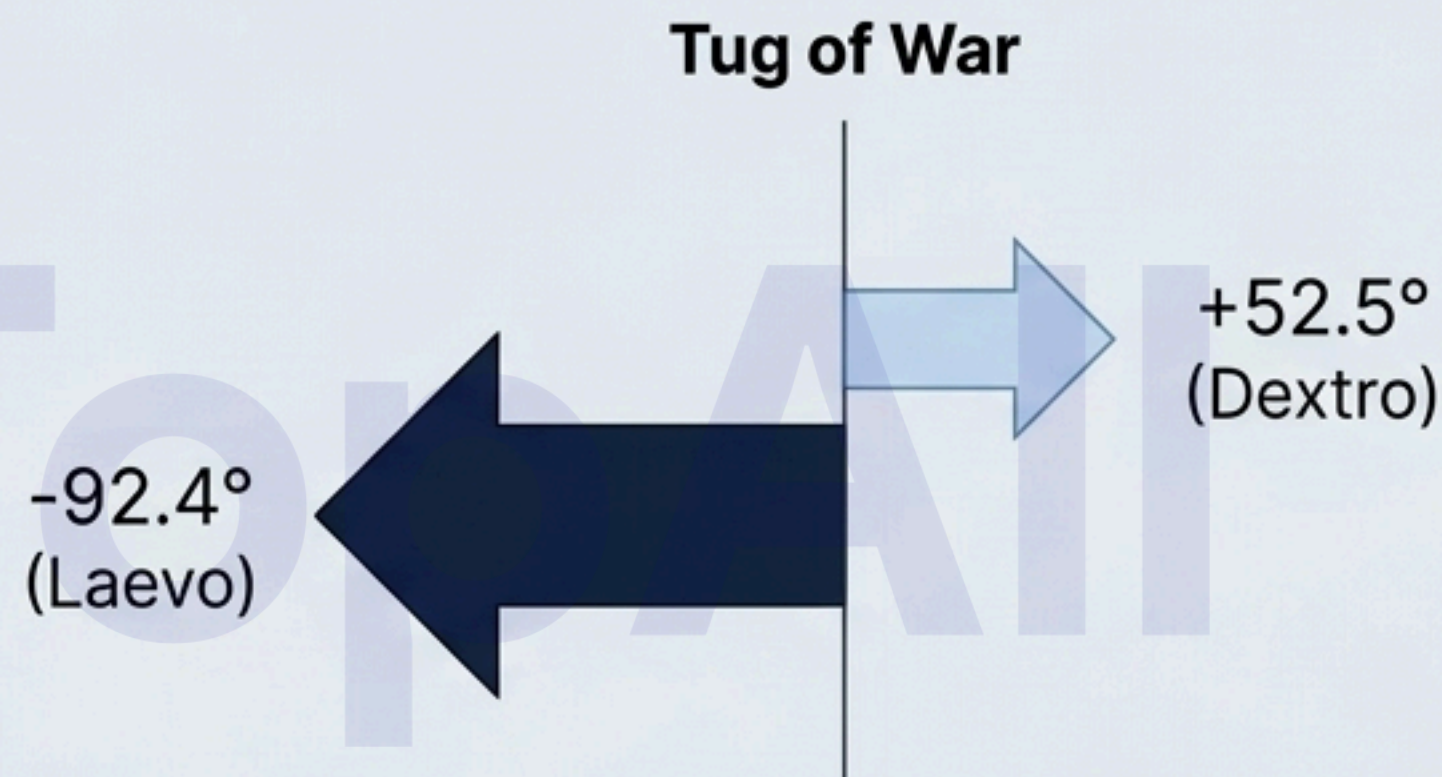
The Physics of Invert Sugar

Formula Bank

Sucrose Hydrolysis $\rightarrow$ D-(+)-Glucose +
D-(-)-Fructose

[Glucose Rotation] = $+52.5^\circ$

[Fructose Rotation] = -92.4°



The laevorotation of fructose chemically overpowers the dextrorotation of glucose. The net mixture flips from (+) to (-).

EXAM RADAR

Watch for this:

Exam questions often try to trick you into believing that the individual monosaccharides change their optical nature during hydrolysis.

✗ Trap: Hydrolysis alters the internal structure of glucose to make it negative.

✓ Truth: The 'invert' phenomenon is strictly a **magnitude comparison**. The negative magnitude of the newly freed fructose simply exceeds the positive magnitude of the freed glucose. No structural changes occur to the individual monomers.

Key Takeaways

- ✓ **Reducing nature** depends purely on the **physical lock**: free vs. bonded C1/C2 anomeric carbons. (Sucrose = Locked/Non-reducing, Maltose = Open/Reducing).
- ✓ **Optical inversion** is a game of mathematical dominance ($+52.5^\circ$ vs -92.4°), not structural transformation.



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