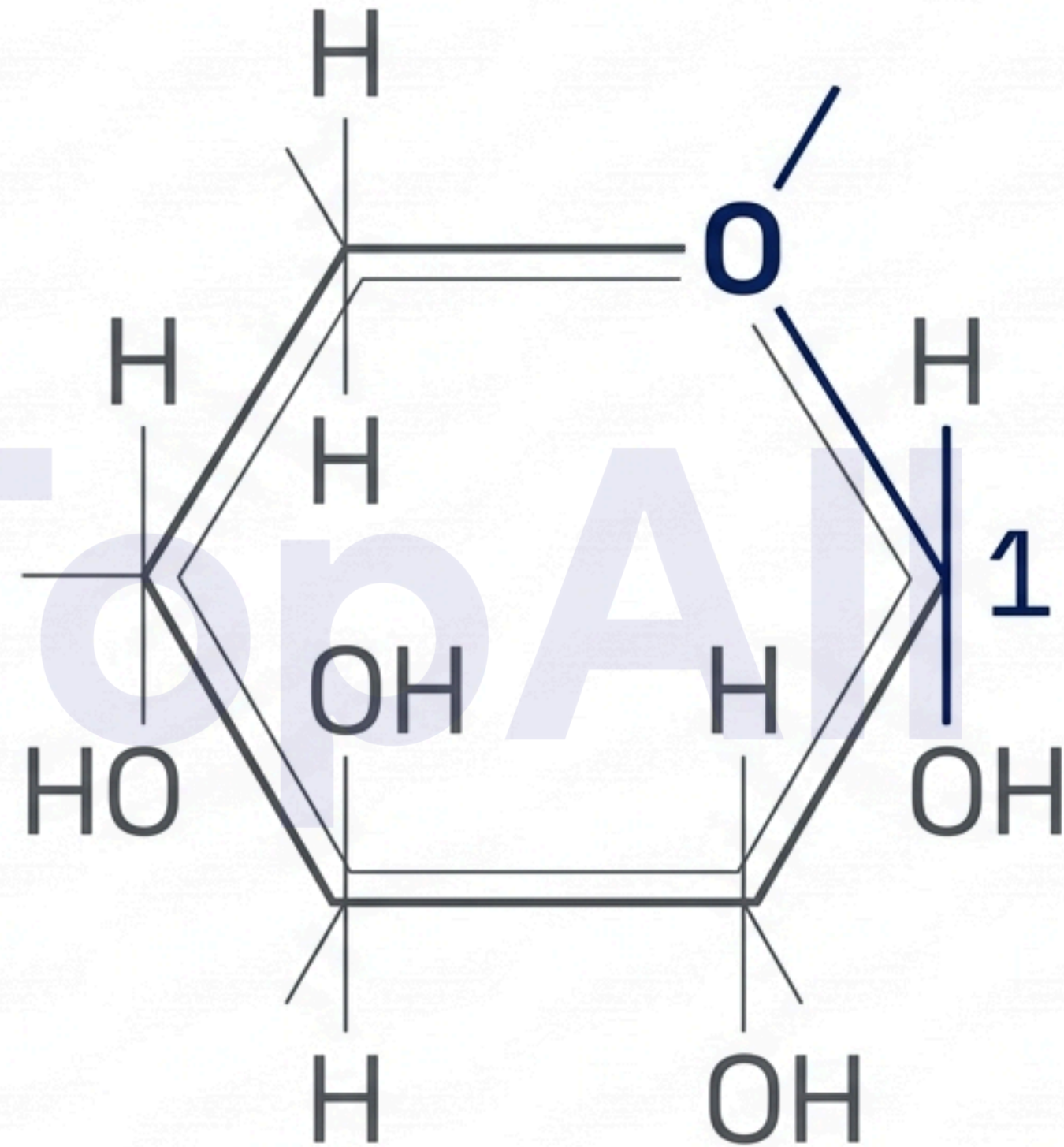


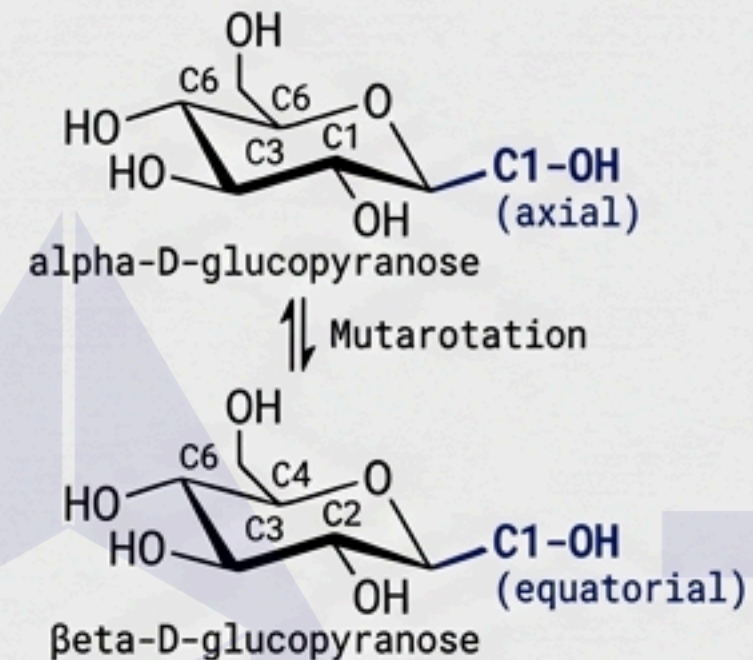
Cyclic Structure of Glucose & Fructose



The Structural Vocabulary

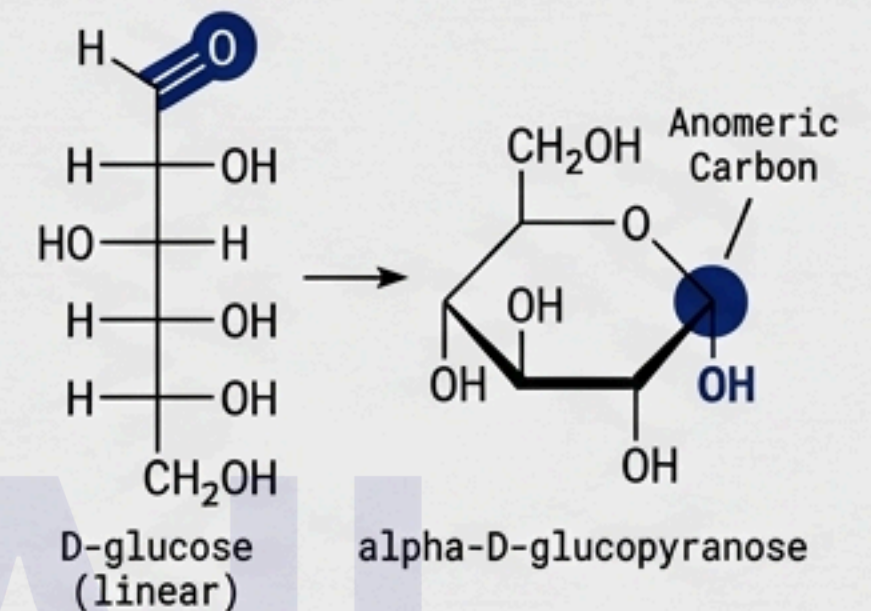
Anomers

Isomers that differ only in the spatial configuration of the hydroxyl group at C1.



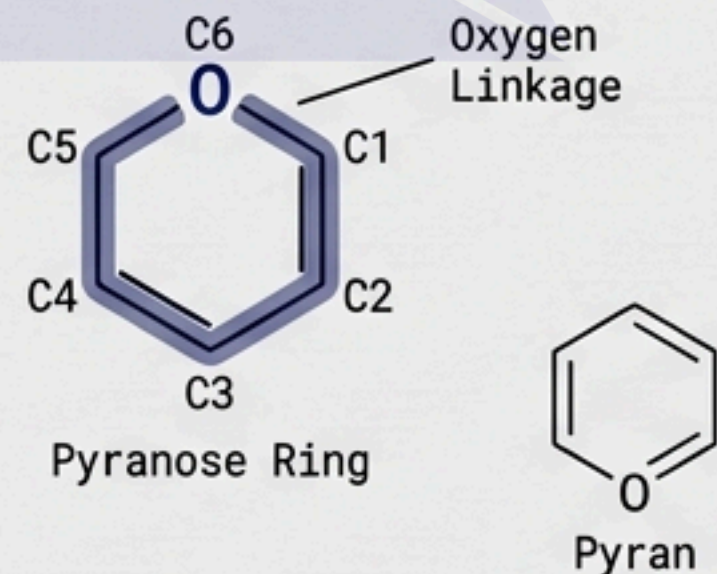
Anomeric Carbon

The specific carbon atom that was originally the aldehyde or ketone carbonyl carbon before cyclisation occurred.



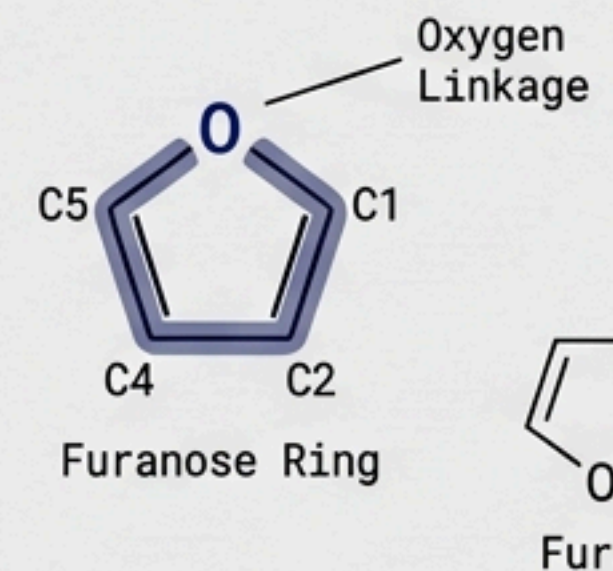
Pyranose

A six-membered cyclic structure containing five carbon atoms and one oxygen atom (analogous to the heterocyclic compound pyran).

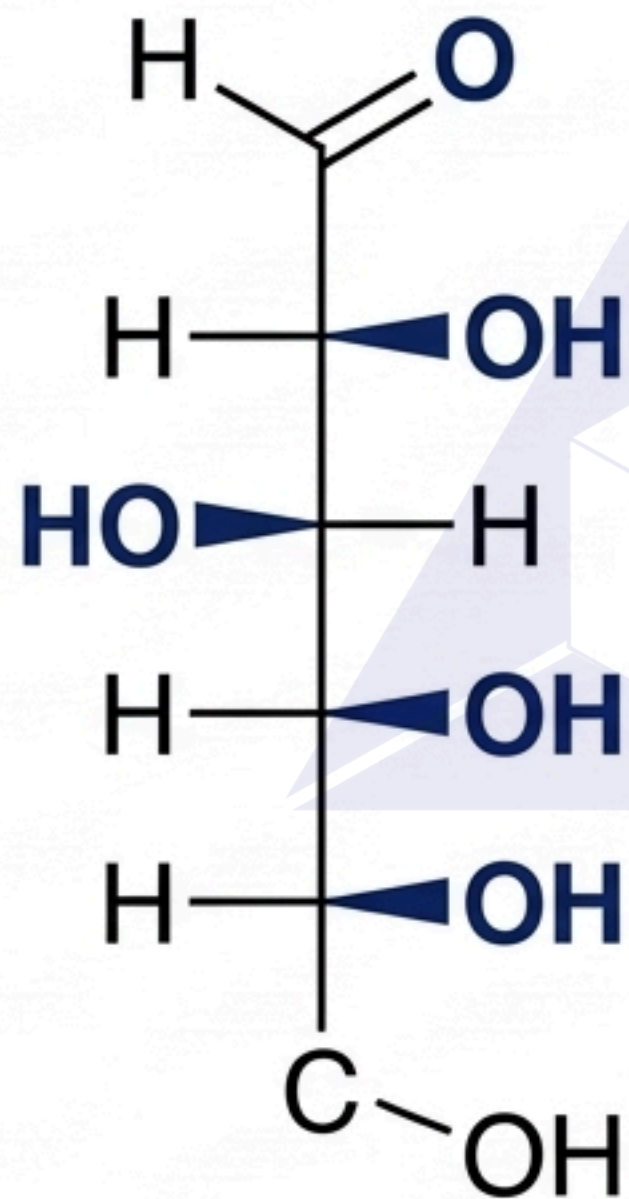


Furanose

A five-membered cyclic structure containing four carbon atoms and one oxygen atom (analogous to furan).



The Open-Chain Anomalies



Expected: Aldehyde reaction.

Result: **NO** Schiff's test & **NO** NaHSO₃ addition product.

Expected: Free -CHO presence.

Result: Glucose pentaacetate is **INERT** to hydroxylamine.

Expected: Uniform solid.

Result: Exists in **TWO** distinct crystalline forms: **α** (m.p. 419 K) and **β** (m.p. 423 K).



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

$$E=mc^2$$



Turn theory into marks with **unlimited MCQs, smart analysis, and focused revision.**

Practice Now



At prep.topall.app

Key Highlights

- » Free Study Material, Videos & Infographics
- » Push Your Limits with Level-Based Challenges
- » Climb the Leaderboard Among Fellow Aspirants
- » Practice Unlimited MCQs for NEET & JEE
- » Get Clear Explanations, Not Just Marks
- » Track Your Performance Smarter



The Cyclisation Mechanism

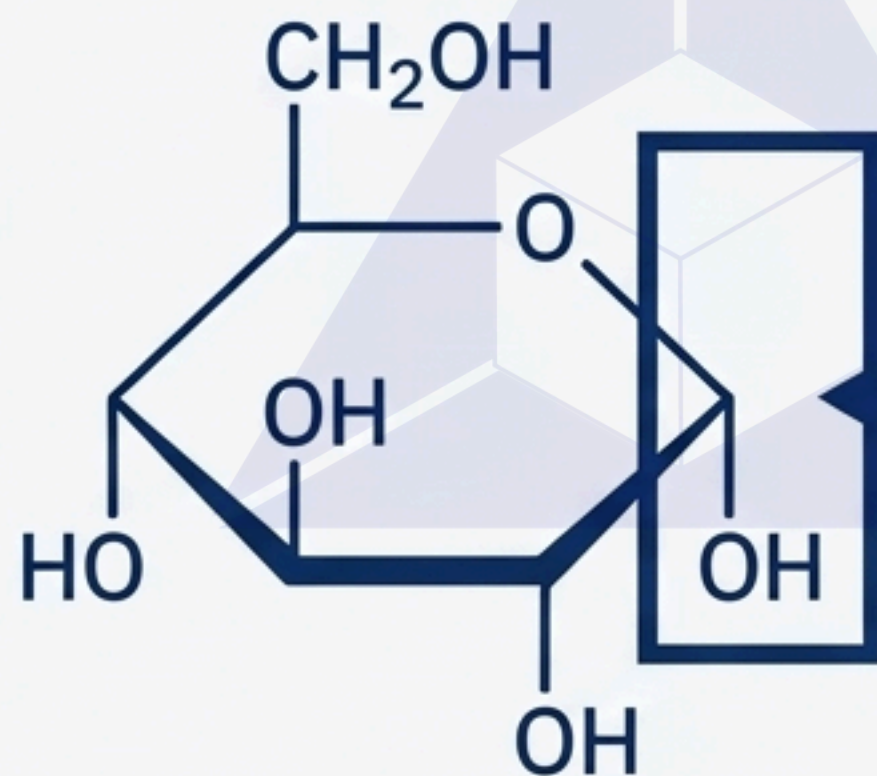


Intramolecular attack forms a stable cyclic hemiacetal, eliminating the free aldehyde group.

The Consequence: α vs β Anomers

α -D-Glucose

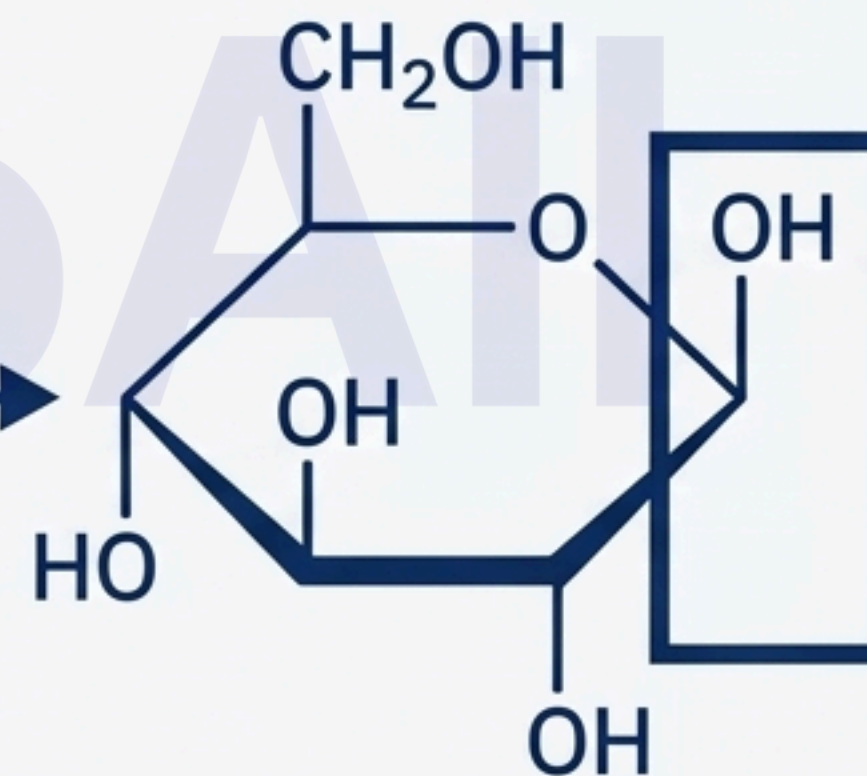
$T_m = 419 \text{ K}$



[ANOMERIC
CARBON: C1]

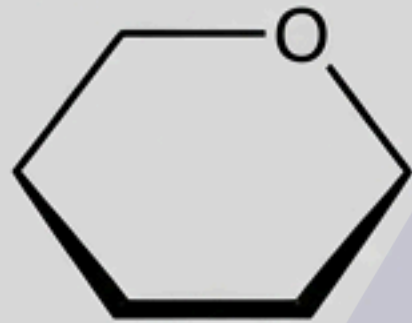
β -D-Glucose

$T_m = 423 \text{ K}$

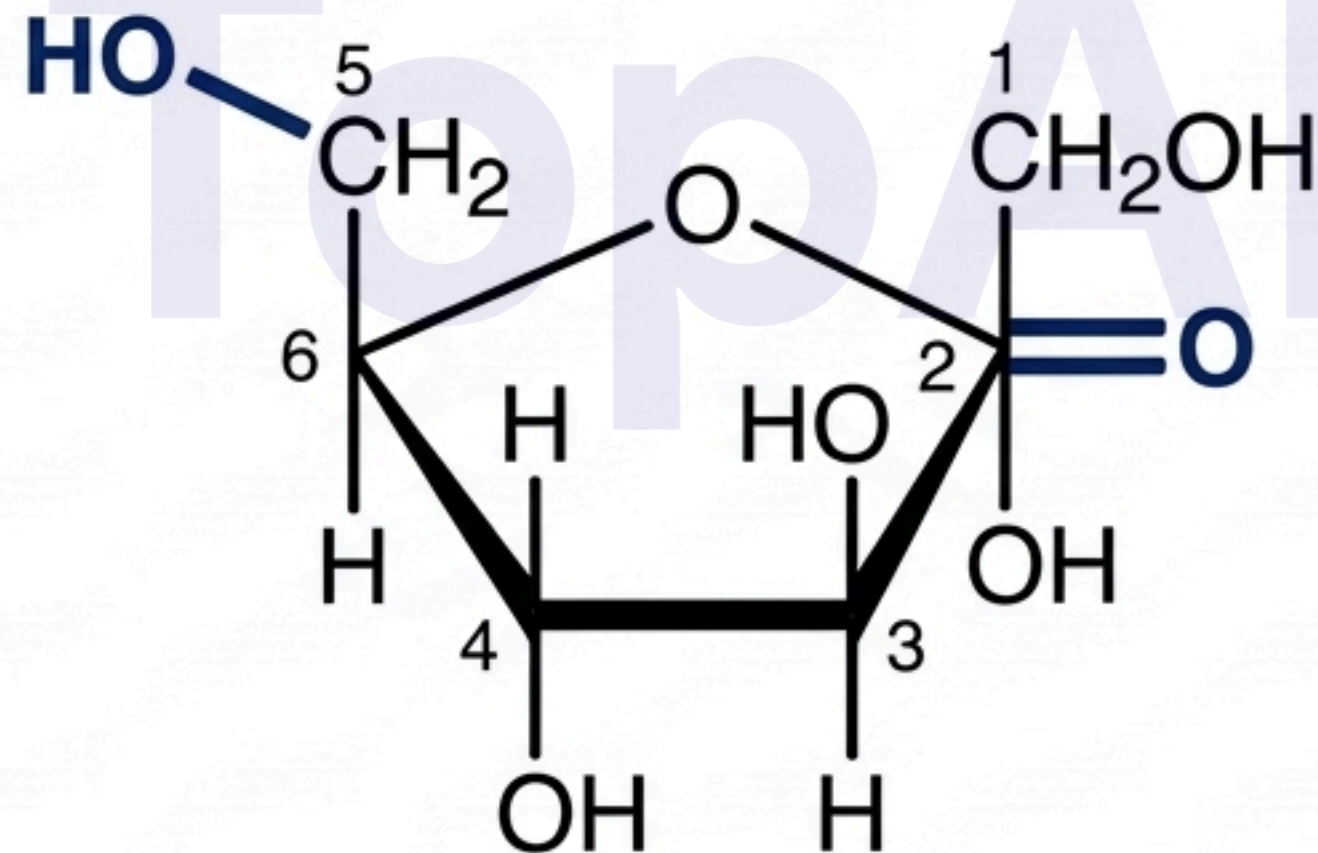


Fructose: The Furanose Variant

Aldohexose (C1=O) + C5-OH $\rightarrow$ 6-membered Pyranose



Ketohexose (C2=O) + C5-OH $\rightarrow$ 5-membered Furanose



Exam Trap Alert

Watch for this:

When asked to identify the evidence for glucose's cyclic structure, examiners will often list only one or two isolated anomalies in the distractor options.

To strictly prove the necessity of the cyclic hemiacetal, you must identify the option that groups **ALL THREE** diagnostic failures together.

A single anomaly is insufficient to rule out other open-chain isomers.

- ☒ 1. Schiff's/NaHSO₃
- ☒ 2. Hydroxylamine inertness
- ☒ 3. Anomeric forms

Conclusion

- **Hemiacetal cyclisation** (C5-OH attacking the carbonyl) perfectly resolves the three chemical anomalies that the open-chain model failed to explain.
- **Anomers** (α and β) are distinct crystalline configurations that differ solely in their spatial arrangement at the newly formed **anomeric carbon** (C1 for glucose, C2 for fructose).



You've Learned the Theory.

Now Let's Test It.

Reading notes gets you knowledge.

Practicing MCQs gets you marks.

That's exactly what TopAll Pro is built for.

Try TopAll Pro Now

What TopAll Pro Does Differently

-  **Stuck? Snap it. Solve it. — Doubts AI**
Photo → step-by-step solution in seconds, 24/7
-  **Your AI Coach finds your blind spots**
Concept-level weakness detection — not just chapter-level
-  **4.5 Lakh+ questions. Never run out.**
13× more content than any other prep app in India
-  **Build your own test in 60 seconds**
Pick a chapter, set difficulty — AI does the rest instantly.
-  **AI Recommendation that helps you improve**
AI Recommendation Analysis your Tests and tell you where you need to improve.



Practice the moment you finish studying
Jump in while the concept is still fresh in your head

4.5L+
MCQs

1.5L+
Students

AI Powered
In-Depth Analysis