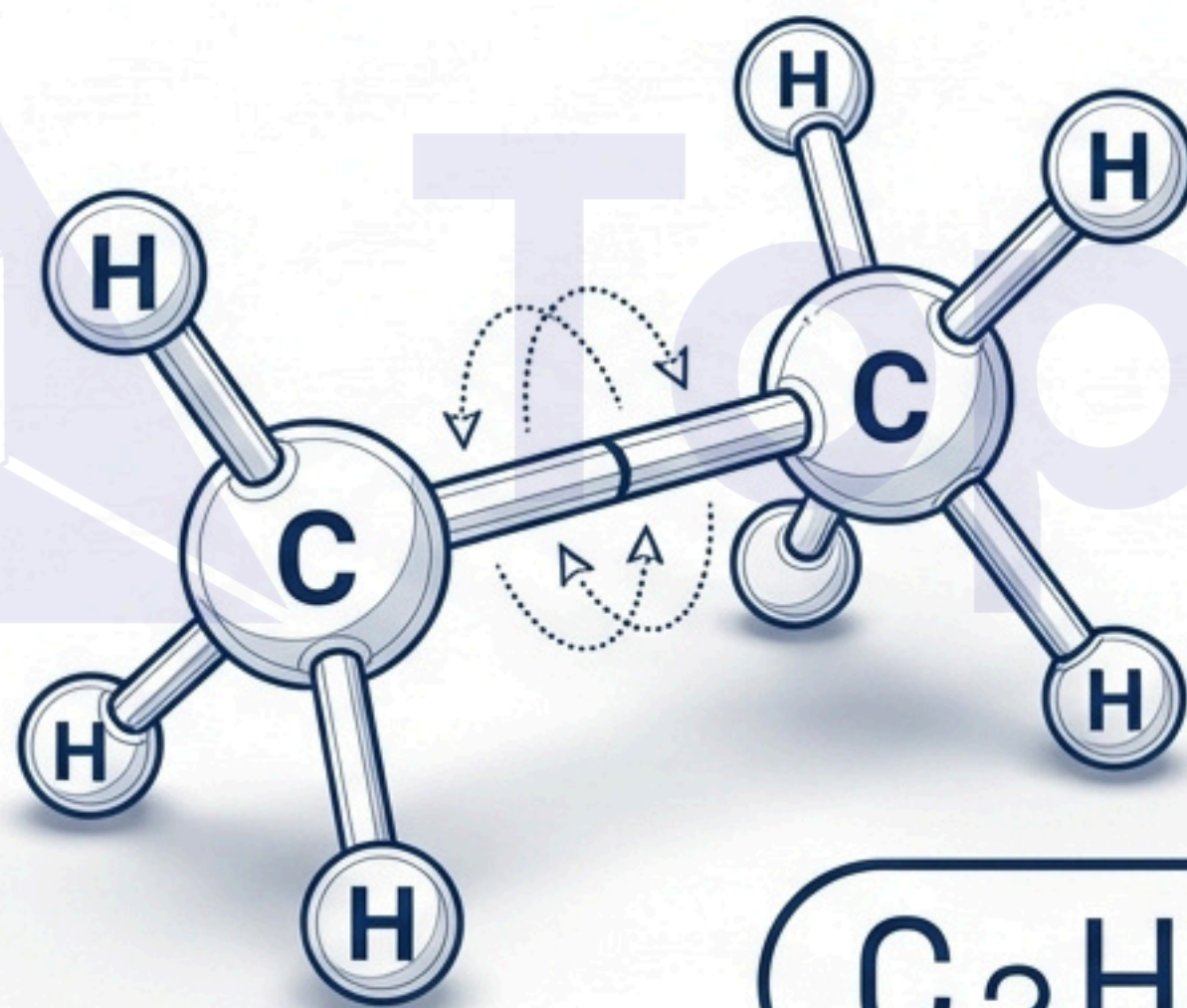


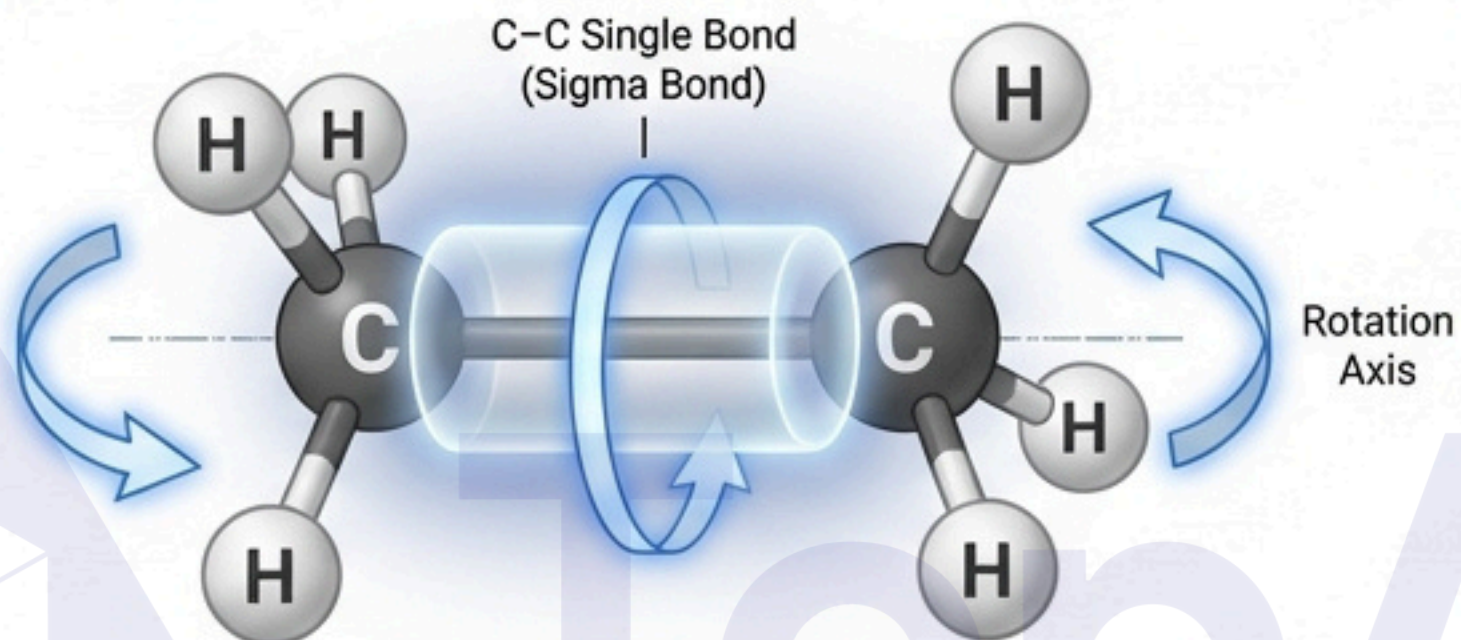
CONFORMATIONS OF ETHANE

3D spatial dynamics, torsional strain, and the energy landscape of C₂H₆.



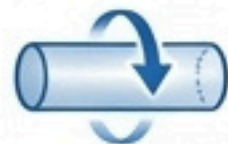
What Are Conformations?

Mechanical Diagram



The Mechanism

The symmetrical electron distribution of a sigma bond permits rotation around the C-C single bond axis.



The Result

Rotation creates different spatial arrangements of atoms in space, seamlessly converting into one another.



Vocabulary

These arrangements are interchangeably called **conformations**, **conformers**, or **rotamers**.

- ✓ Conformations
- ✓ Conformers
- ✓ Rotamers

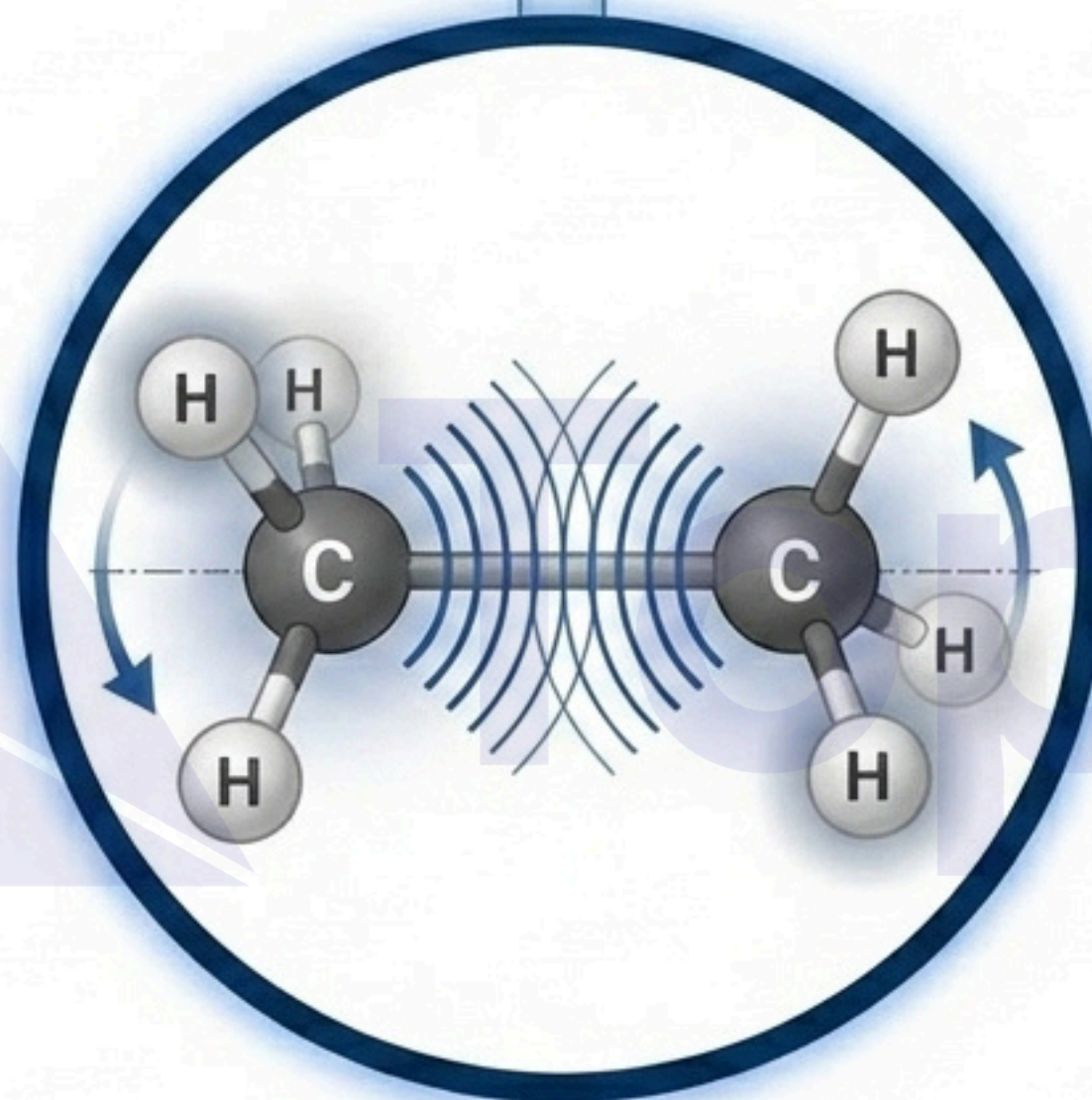
Exam Recap Chip

Note: There are an infinite number of possible conformations by rotating around C-C single bonds.

Free Rotation vs. Hindered Rotation

Theoretical Free Rotation

Because the C-C bond is a single sigma bond, classical models suggest completely unhindered 360° rotation.



Hindered Rotation

Rotation is restricted by a 1-20 kJ/mol energy barrier.

Definition: Torsional Strain — The weak repulsive interaction between adjacent electron clouds that hinders completely free rotation.



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



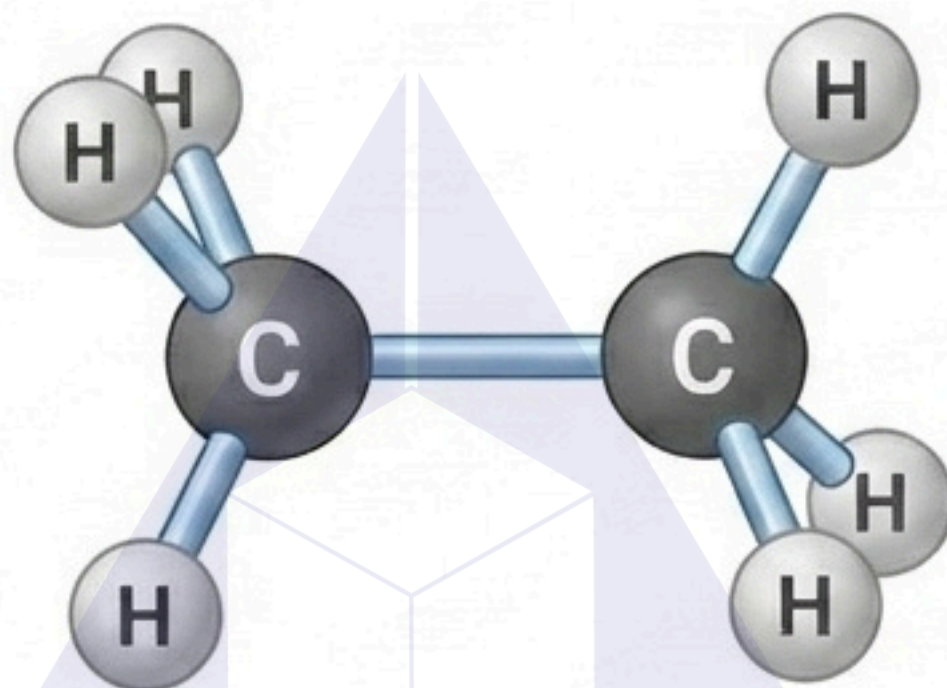
At prep.topall.app

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

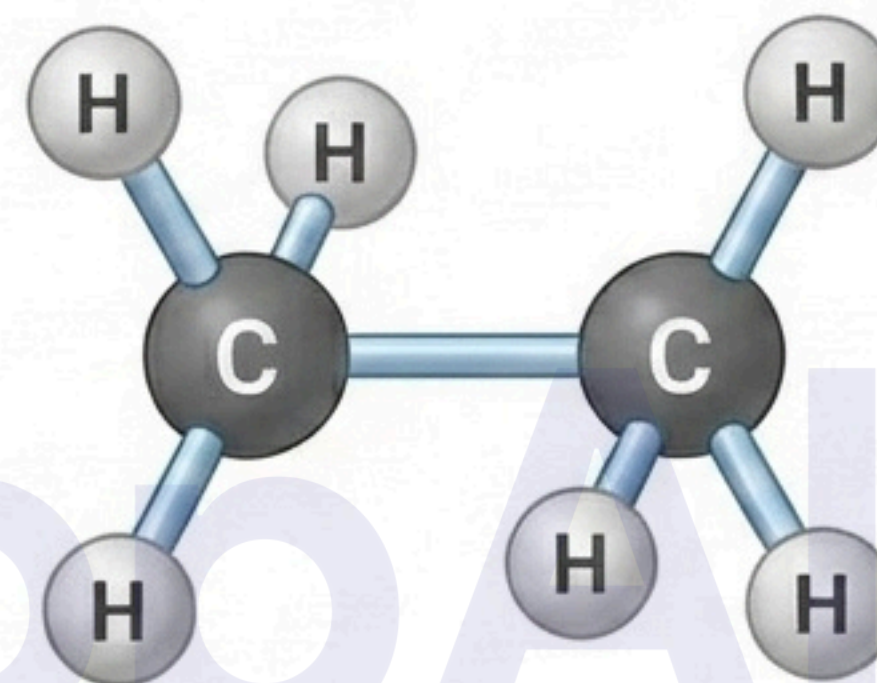


Eclipsed and Staggered Forms



- Hydrogens as close as possible
- Maximum Repulsion
- Maximum Torsional Strain

Skew Conformation:
Any intermediate spatial arrangement between the Eclipsed and Staggered extremes.



- Hydrogens as far apart as possible
- Minimum Repulsion
- Minimum Torsional Strain

Exam Recap Panel

Constant Variables: In all conformations (eclipsed, staggered, or skew), the bond angles and bond lengths remain exactly the same.

Sawhorse Projections

1

The Axis

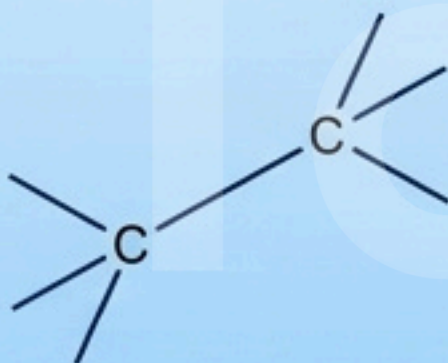
View the molecule along the molecular axis. Draw the central C–C bond as a tilted straight line (front carbon lower, rear carbon upper).



2

The Bonds

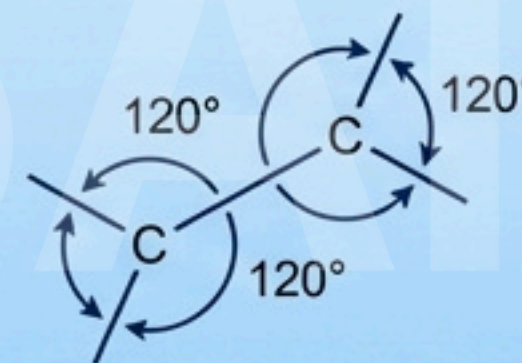
Attach three lines to each carbon corresponding to the hydrogen atoms.



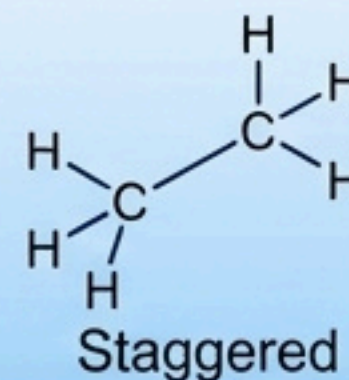
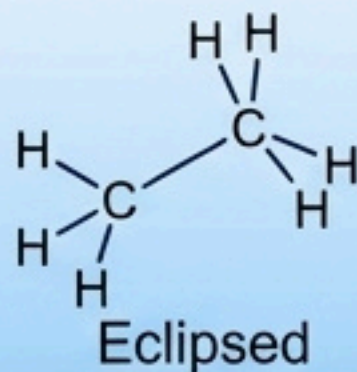
3

The Angles

Ensure the three lines on each carbon are inclined at a 120° angle to each other.



The Results

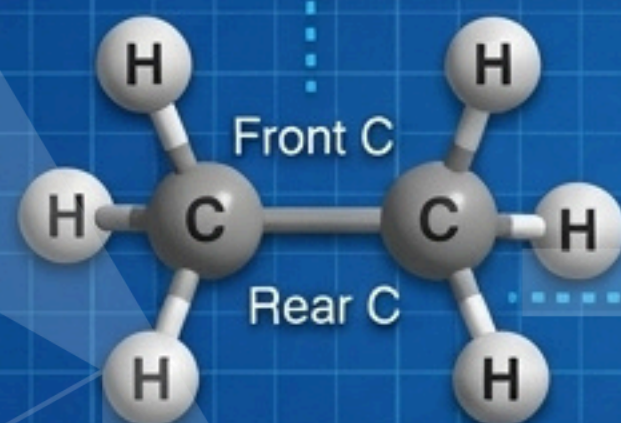


Newman Projections



TopAll

Anatomy of a Projection



Translation lines



Front Carbon

= Represented by a Point
(dot with 3 radiating lines)

Rear Carbon

= Represented by a Circle
(with 3 shorter radiating lines)

Eclipsed Newman

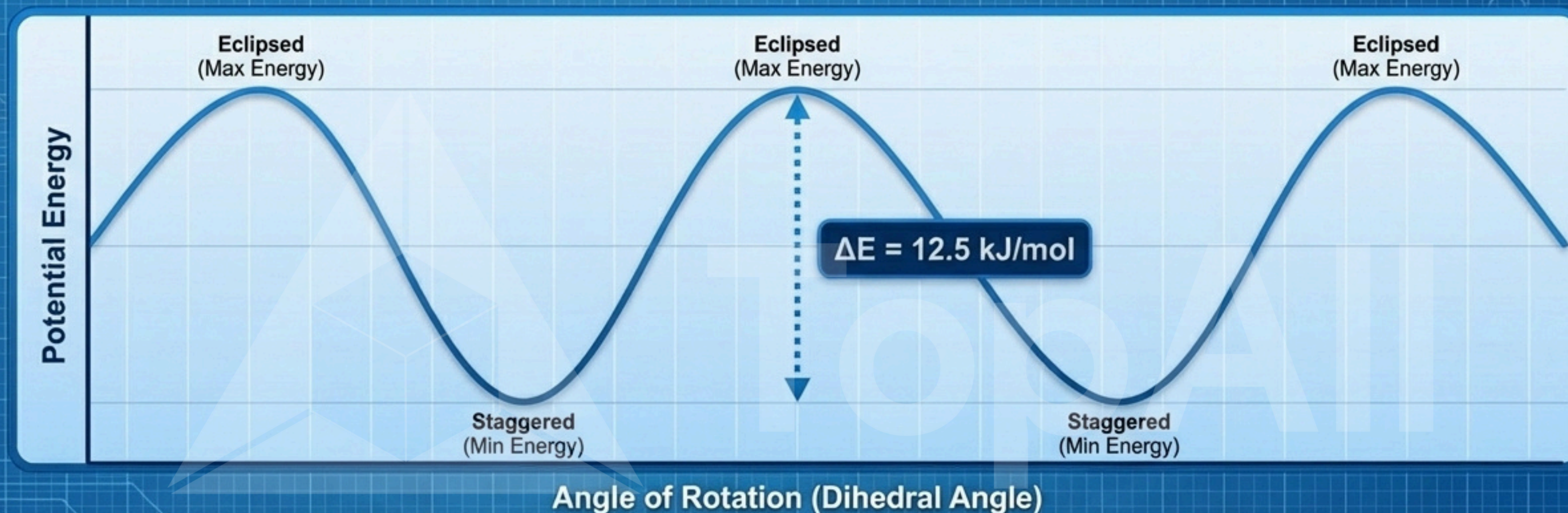


Note: Rear lines are drawn slightly offset purely for visibility.

Staggered Newman



The Relative Stability Landscape



Why we cannot isolate them

- The energy difference is extremely small (12.5 kJ/mol). At room temperature, thermal kinetic energy easily overcomes this barrier via molecular collisions.
- Conclusion: The molecule is in constant rotation. While it prefers the staggered state, individual conformational isomers cannot be isolated.



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