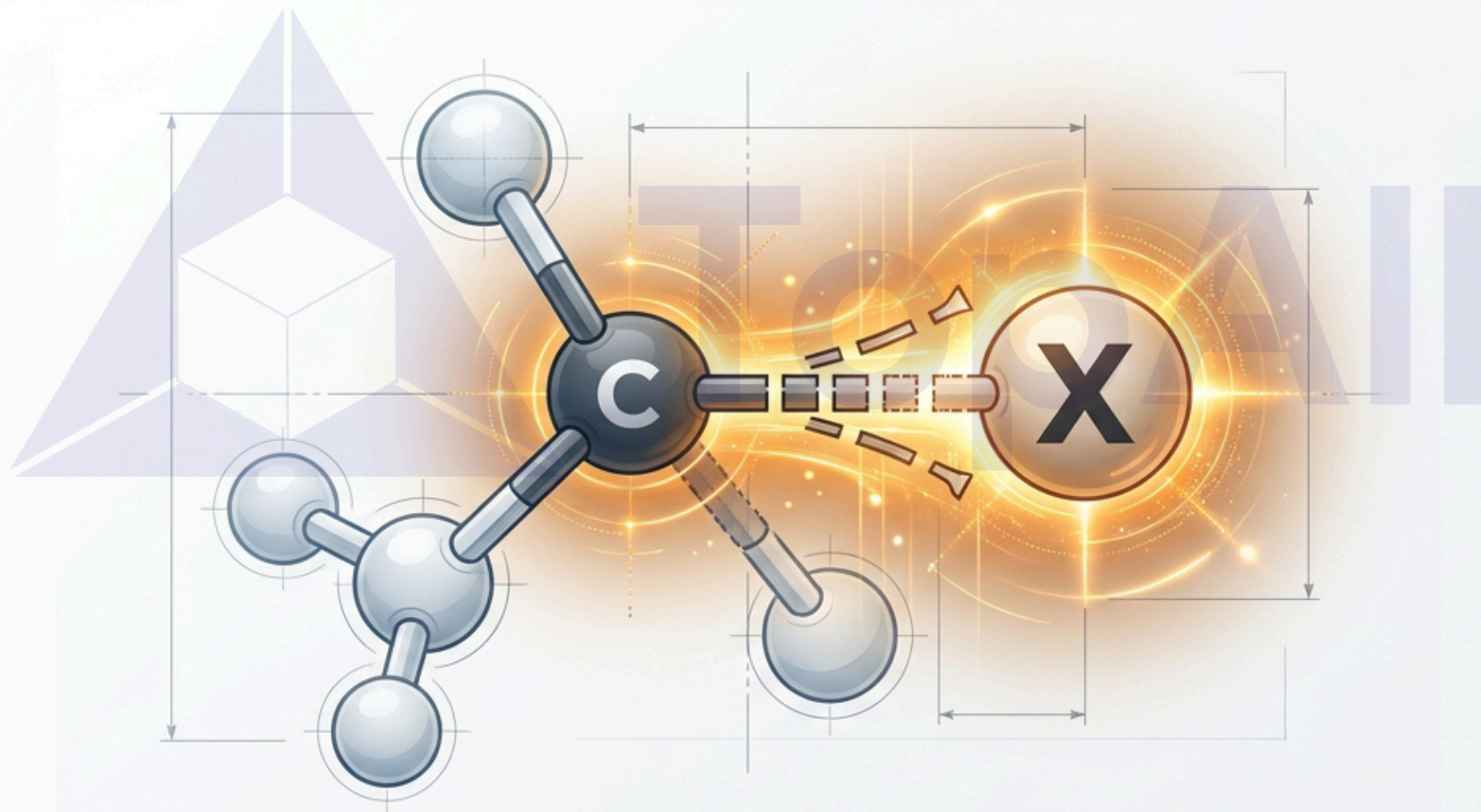


SN1: First the Leaving Group Leaves

A Molecular Blueprint of Unimolecular Nucleophilic Substitution.



Decoding the SN1 Acronym

Substitution



One group replaces another at the molecular center.

Nucleophilic



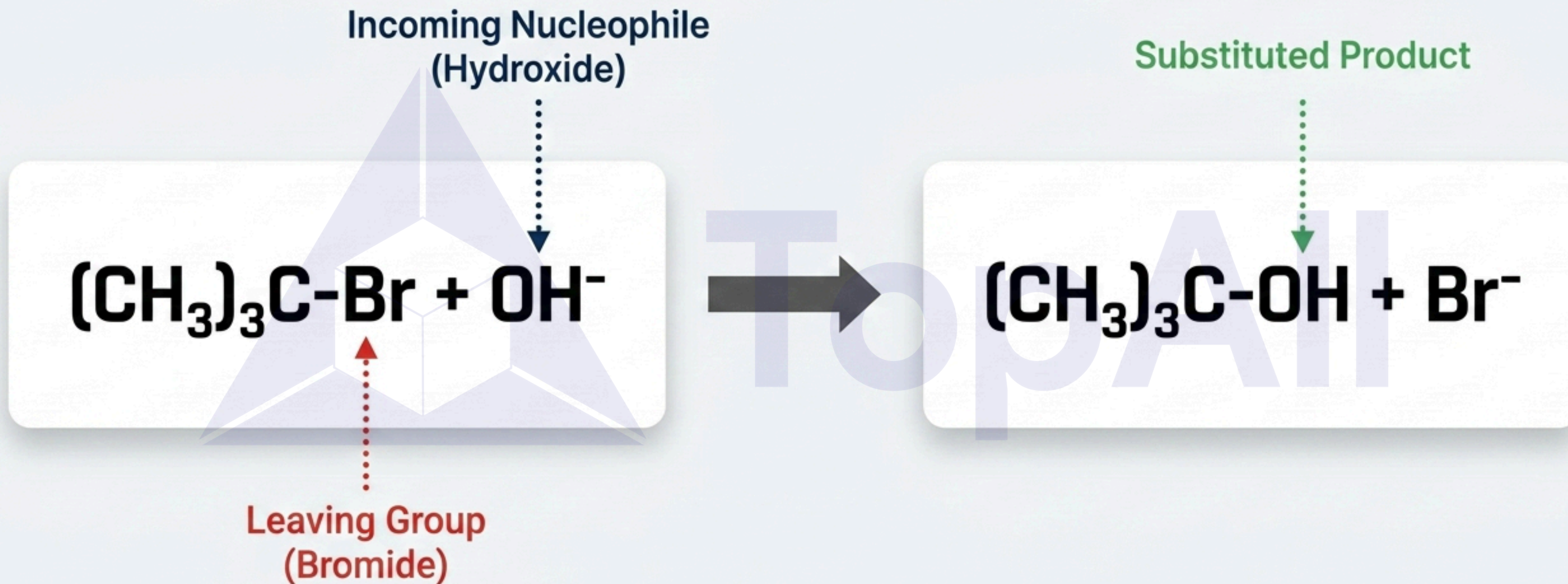
The incoming attacker is an electron-rich species (nucleophile) seeking a positive center.

Unimolecular



The reaction rate depends only on the concentration of the substrate. First-order kinetics.

The Case Study: Formation of tert-Butyl Alcohol



Overall Reaction: tert-Butyl bromide + Hydroxide ion $\rightarrow$ tert-Butyl alcohol + Bromide ion.



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

$$E=mc^2$$



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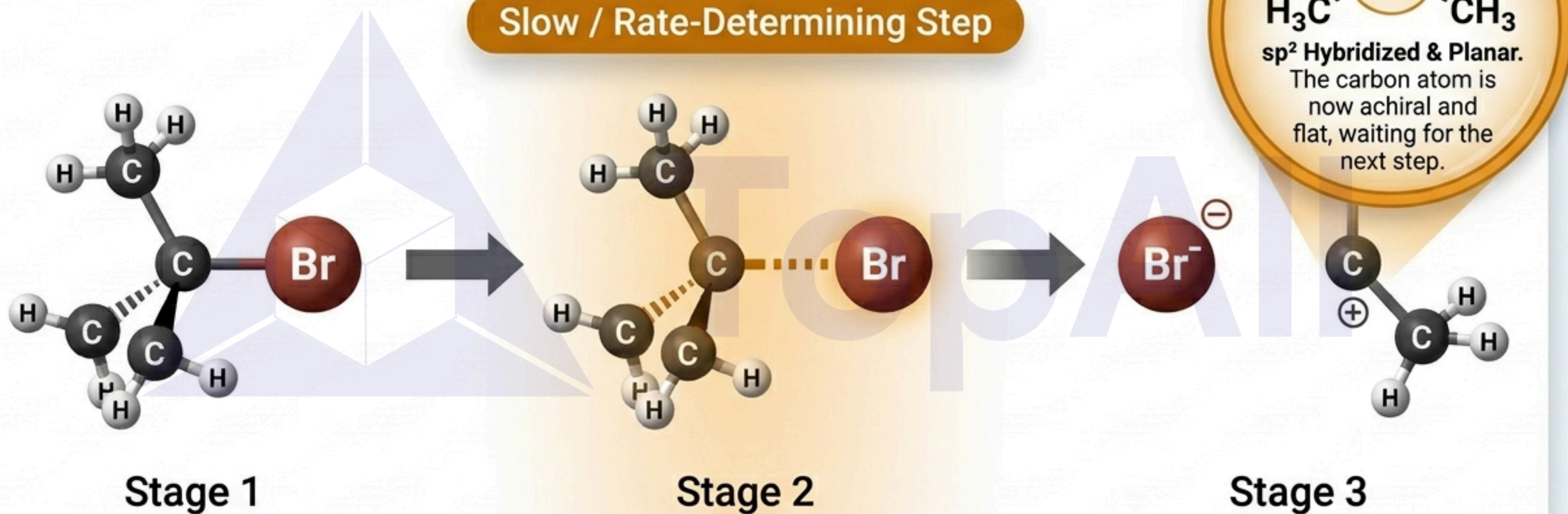
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Key Highlights

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- » 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
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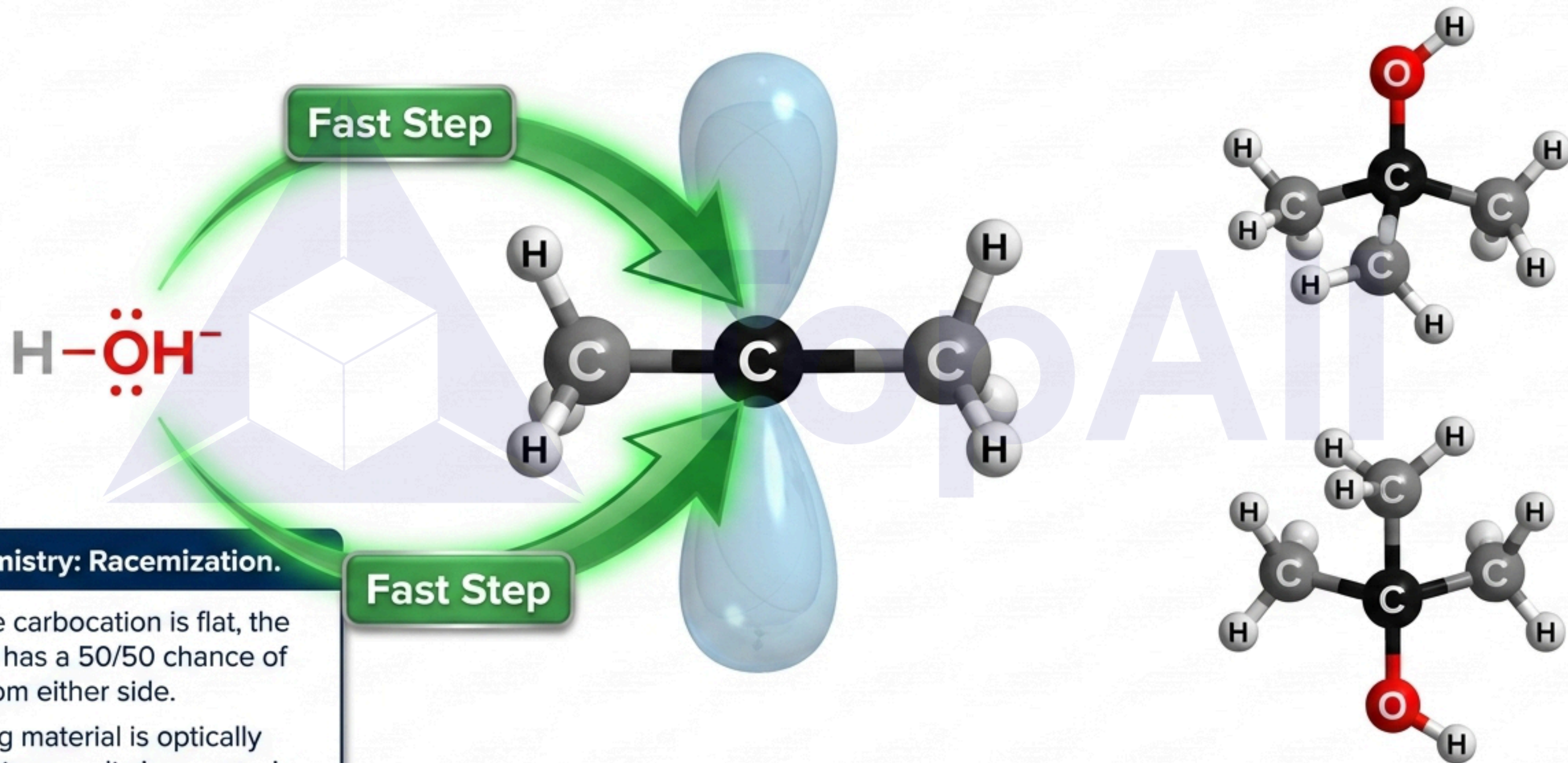


Step 1: The Slow Cleavage



$$\text{Rate} = k[(\text{CH}_3)_3\text{CBr}]$$

Step 2: Nucleophilic Attack

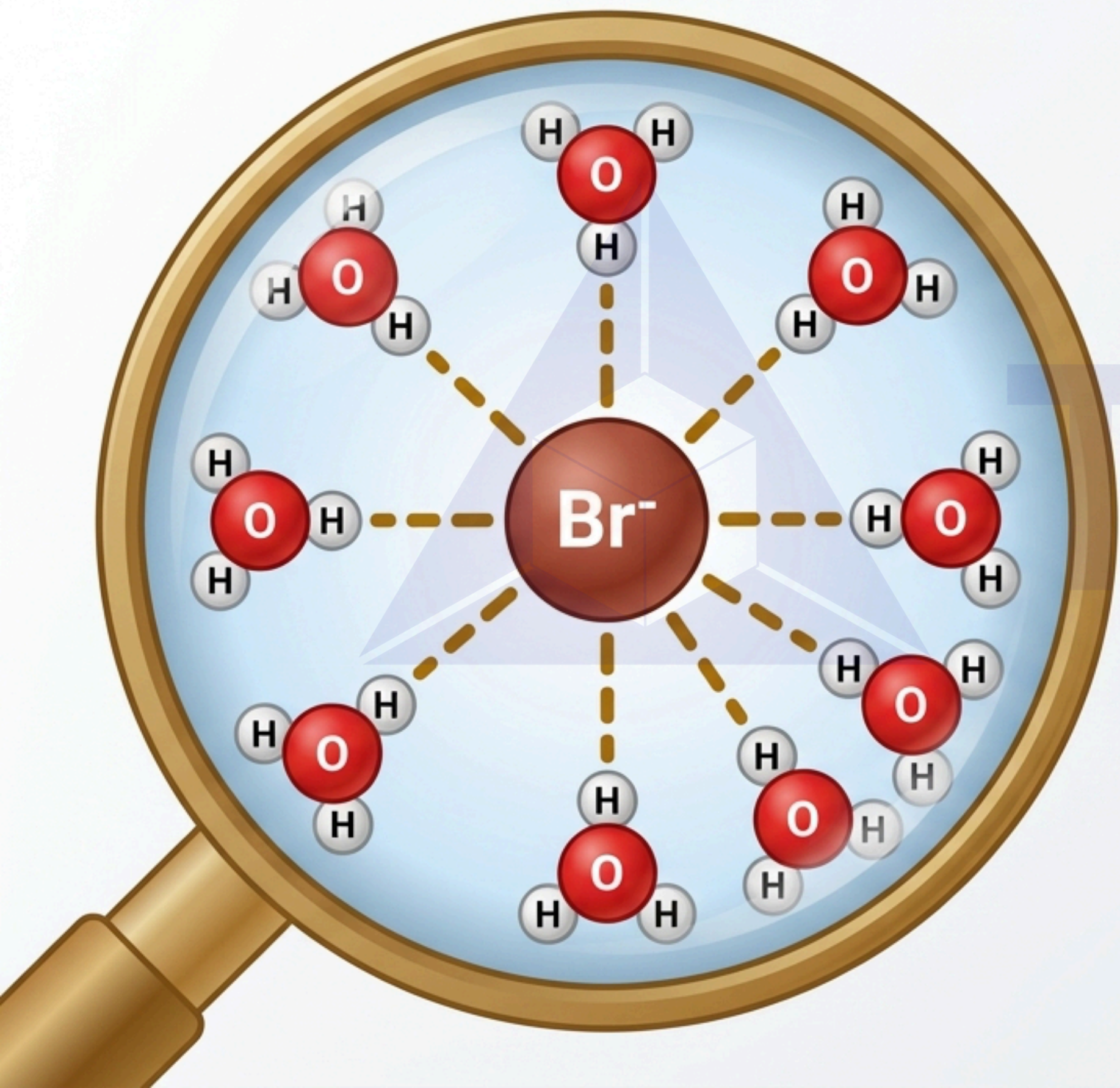


Stereochemistry: Racemization.

Because the carbocation is flat, the nucleophile has a 50/50 chance of attacking from either side.

If the starting material is optically active, this step results in a racemic mixture (inversion + retention).

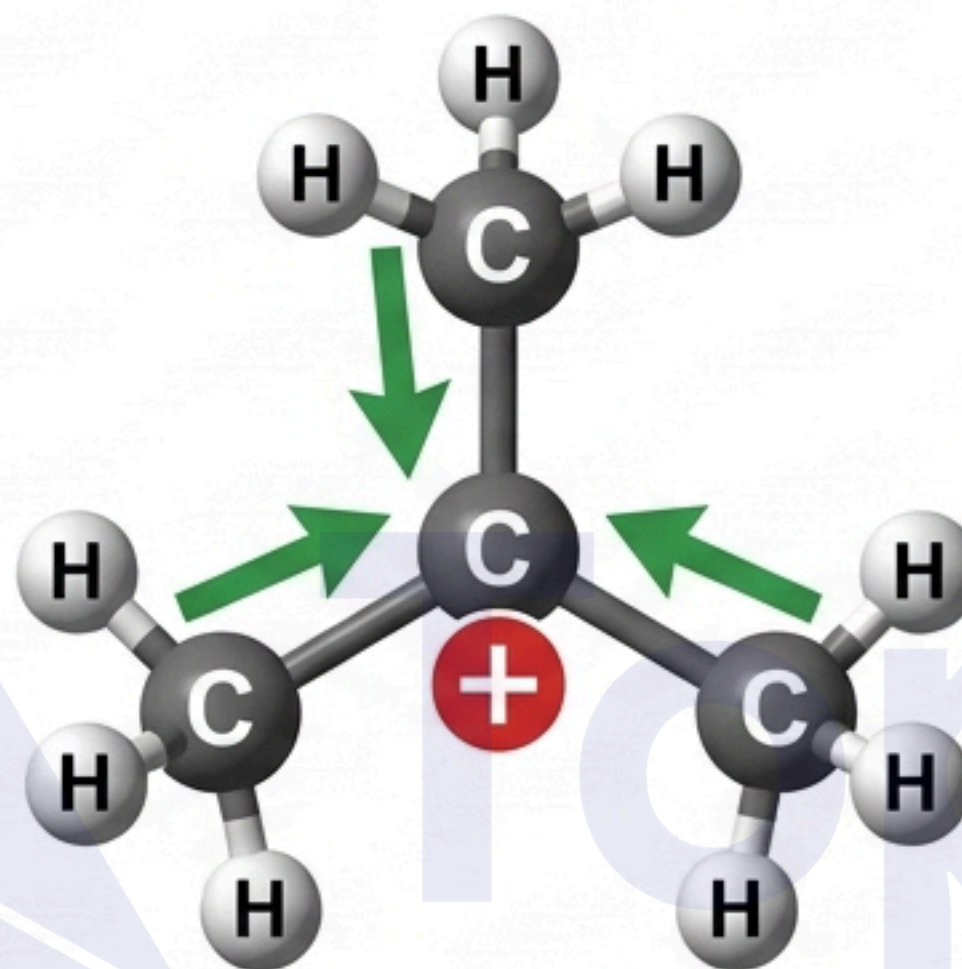
The Enabler: Polar Protic Solvents



Solvation Energy

$\text{S}_{\text{N}}1$ reactions require polar protic solvents (water, alcohols, acetic acid). The solvent uses hydrogen bonding to surround and stabilize the leaving halide ion. This solvation provides the necessary energy to break the tough C-X bond in Step 1.

The Rule of Stability: Carbocations



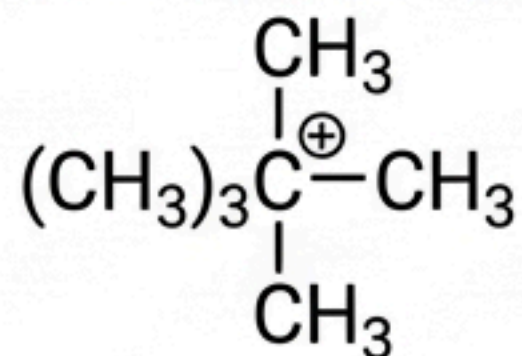
The Inductive Effect

Alkyl groups are electron-donating. They push **electron density** toward the electron-deficient positive center, dispersing the charge and stabilizing the fragile intermediate.

Greater stability of the carbocation = greater ease of formation = a faster S_N1 reaction rate.

Predicting the Speed: Reactivity Order

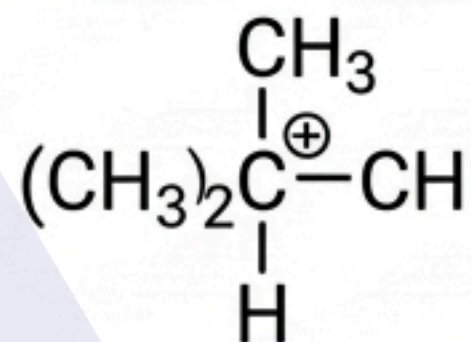
Tertiary (3°)



Fastest

Highly stable intermediate.
Dominates $\text{S}_{\text{N}}1$.

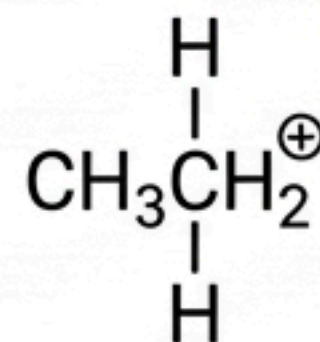
Secondary (2°)



Moderate

Can undergo $\text{S}_{\text{N}}1$ or $\text{S}_{\text{N}}2$ depending on solvent.

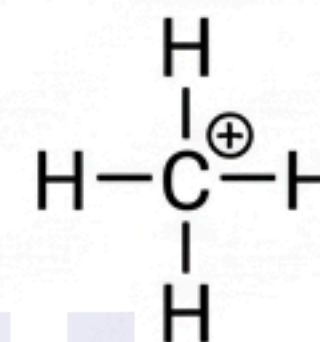
Primary (1°)



Slow / Rare

Unstable intermediate.
Highly unlikely to use $\text{S}_{\text{N}}1$.

Methyl



Does Not Occur

Too unstable to form.

Increasing $\text{S}_{\text{N}}1$ Reactivity

Allylic and Benzylic halides also show high $\text{S}_{\text{N}}1$ reactivity due to resonance stabilization.



You've Learned the Theory.

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