

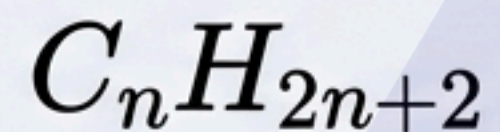


ONE DOUBLE BOND CHANGES EVERYTHING

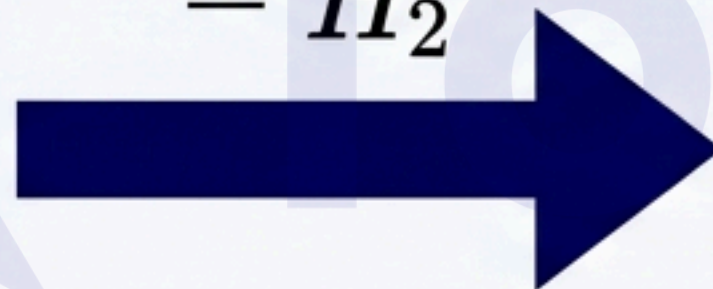
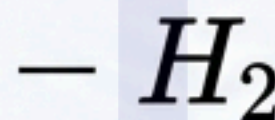
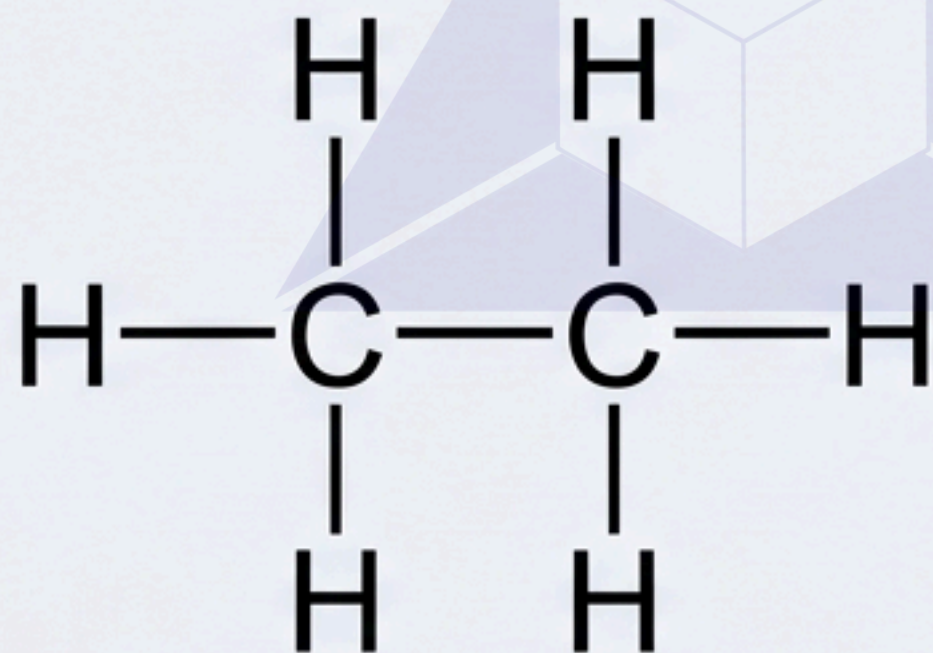
Alkenes | The C=C Family

MOLECULAR BLUEPRINT: ALKANE TO ALKENE TRANSFORMATION

Alkane



Ethane (C₂H₆)

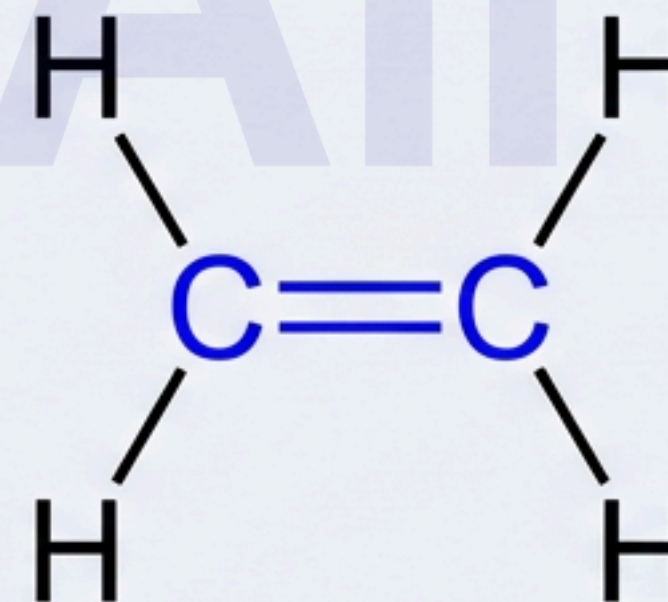


Formation of π bond

Alkene



Ethene (C₂H₄)



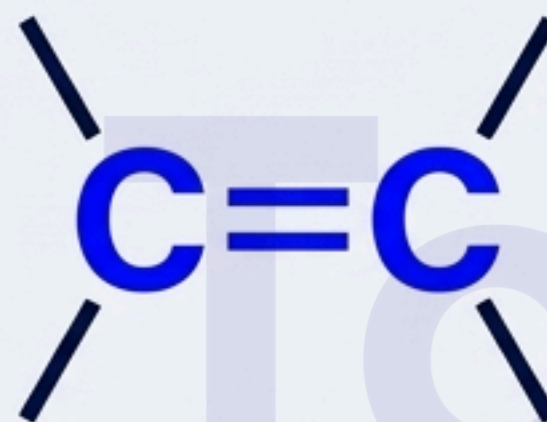
MOLECULAR BLUEPRINT: DEFINING ALKENES

UNSATURATED HYDROCARBON



Contains fewer hydrogen atoms than its maximum capacity (compared to alkanes).

THE ACTIVE SITE



Characterized by the presence of at least one carbon-carbon double bond, which dictates its chemical reactivity.

OLEFINS



Historical name meaning "oil-forming." The first member (ethene) formed an oily liquid when reacted with chlorine gas.



**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



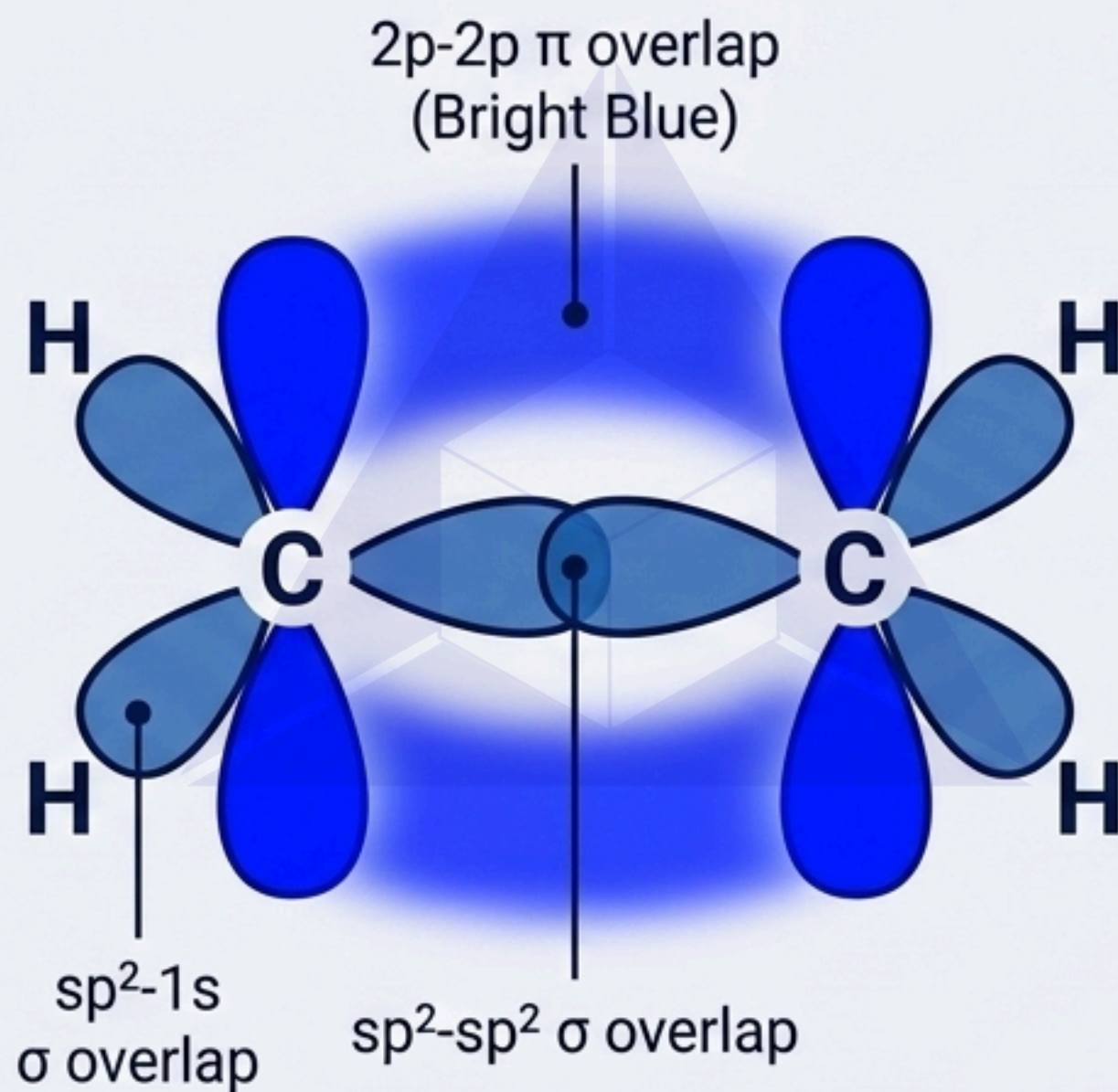
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Key Highlights

- » 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



MOLECULAR BLUEPRINT: C=C BOND ARCHITECTURE



ANATOMY OF THE C=C BOND

The σ (Sigma) Bond

Formed by head-on overlapping of sp^2 hybridized orbitals. (**Strong**).

The π (Pi) Bond

Formed by lateral sideways overlapping of unhybridized 2p orbitals. (**Weak and mobile**).

Bond Length

C=C (134 pm) is shorter than C-C (154 pm).

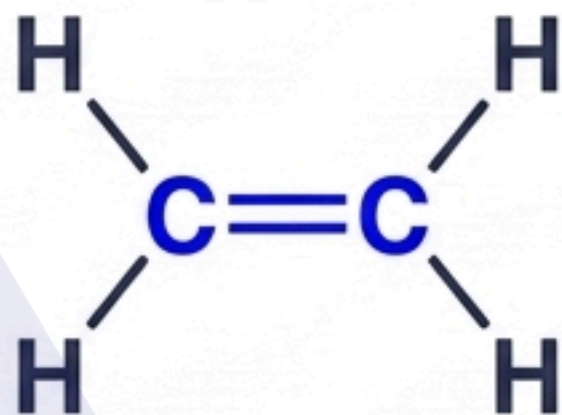
Bond Enthalpy

C=C (681 kJ/mol) is stronger than C-C (348 kJ/mol), but the π bond itself is **easily attacked by electrophiles**.

MOLECULAR BLUEPRINT: STRUCTURAL DIVERSITY OF ALKENES

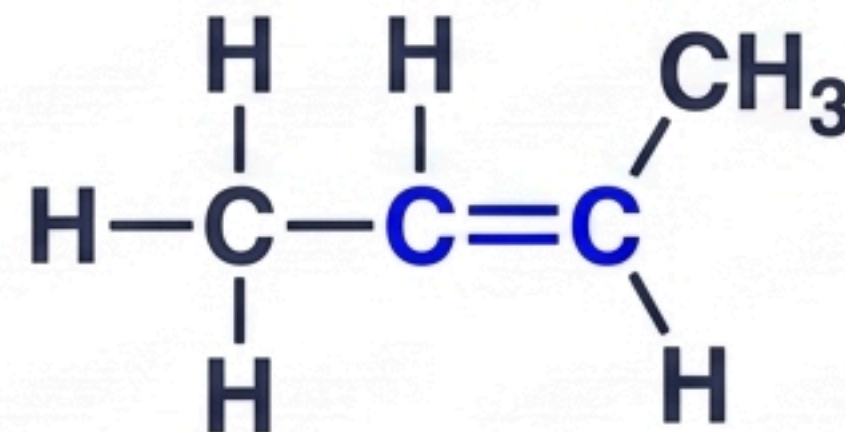
Ethene

(C₂H₄)



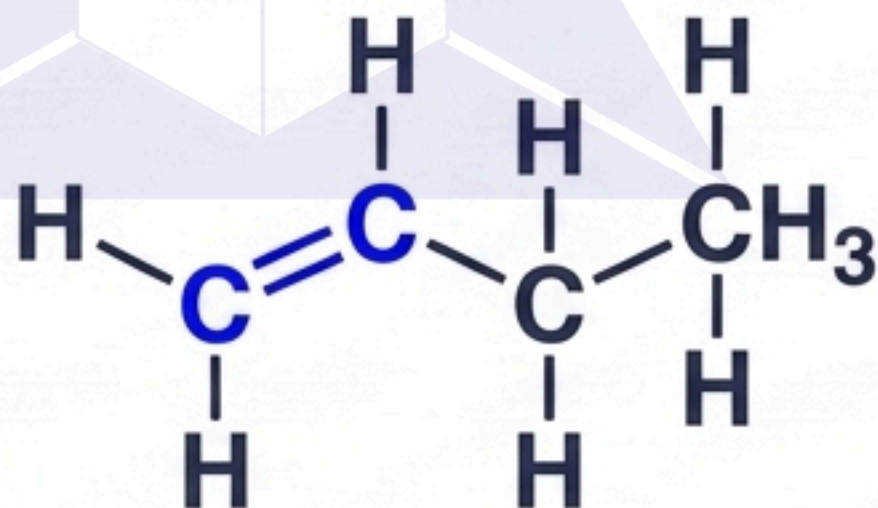
Propene

(C₃H₆)



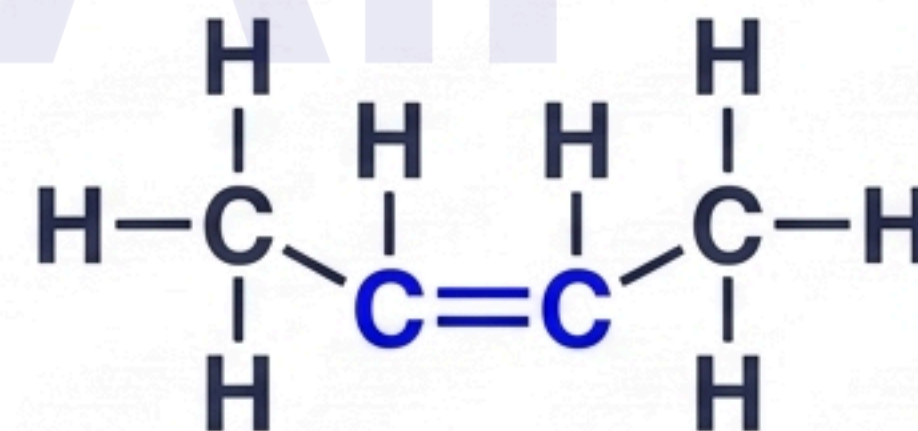
But-1-ene

(C₄H₈)



But-2-ene

(C₄H₈)



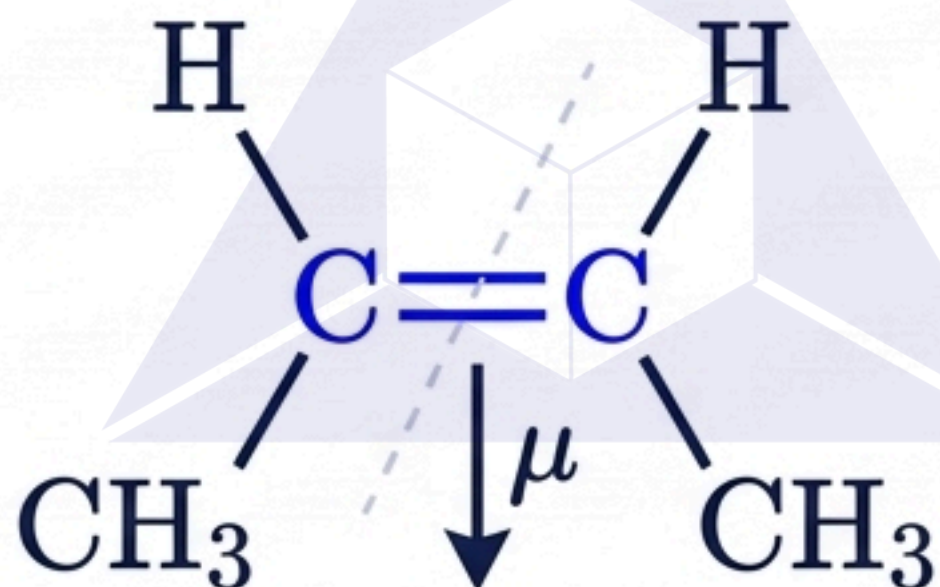
Notice: But-1-ene and But-2-ene are Position Isomers.

THE SPATIAL REALITY: GEOMETRICAL ISOMERISM



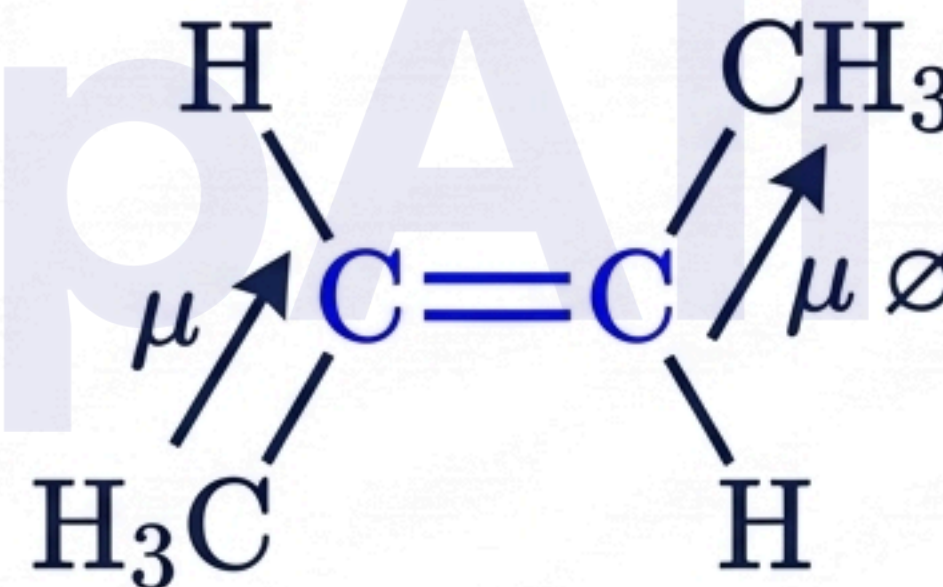
Rotation around a C=C bond is restricted. This creates distinct spatial configurations when different groups are attached.

cis-isomer



- Identical groups on the same side.
- Dipole moment (μ) = 0.33 D (Polar).

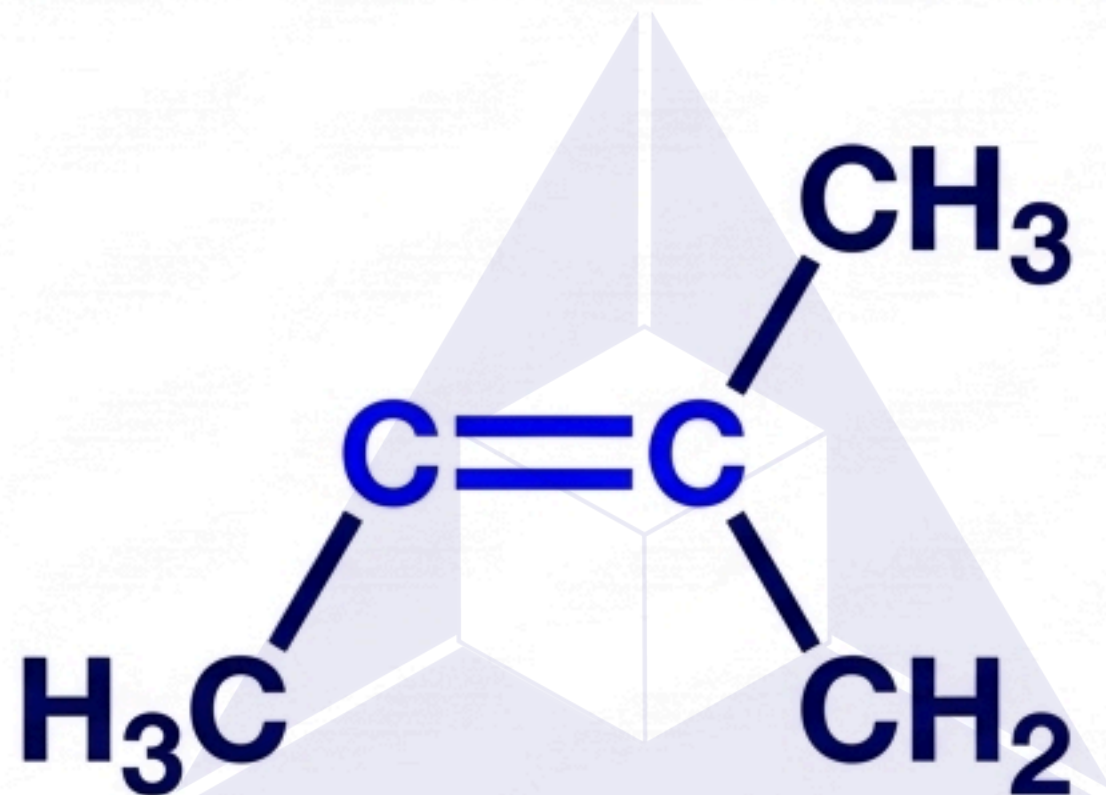
trans-isomer



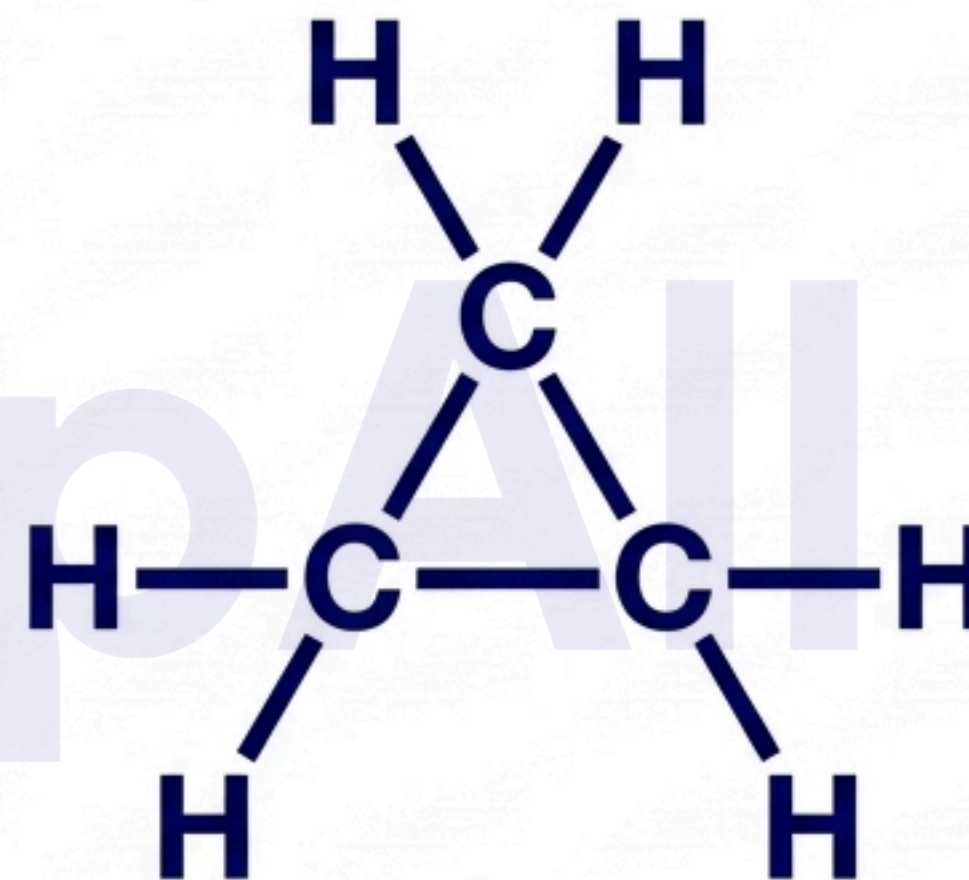
- Identical groups on opposite sides.
- Dipole moment (μ) = 0 (Non-polar, bond moments cancel out).

JEE TRAP: THE ISOMER ILLUSION

Alkene (C_3H_6)



Cycloalkane (C_3H_6)



Molecular formula C_nH_{2n} alone does not prove the presence of an alkene. It simply indicates one degree of unsaturation. This can manifest as a double bond OR a closed ring. Always check for cyclic isomers!

CORE MASTERY CHECKLIST

- ✓ **Identity:** Alkenes are unsaturated hydrocarbons (olefins) with general formula C_nH_{2n} (for a single double bond).
- ✓ **Geometry:** The **C=C** bond relies on sp^2 hybridized carbons forming a planar structure with a lateral π electron cloud.
- ✓ **Reactivity:** The exposed, weaker π bond acts as a mobile electron source, making alkenes prime targets for electrophilic attack.
- ✓ **Isomerism:** Alkenes exhibit structural isomerism (chain/position) AND geometrical isomerism (cis/trans due to restricted rotation).
- ✓ **Physical Trait:** *cis* isomers are generally polar, while *trans* isomers are non-polar (canceling dipole moments).



You've Learned the Theory.

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