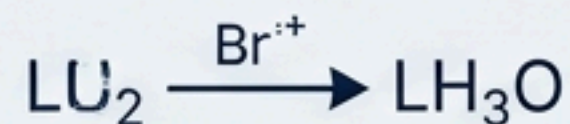
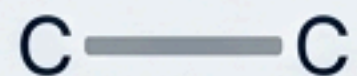
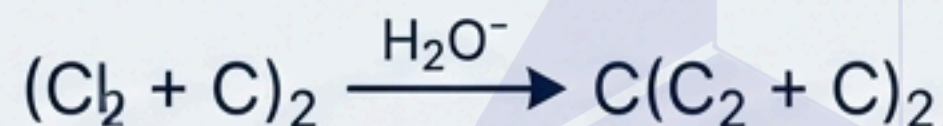
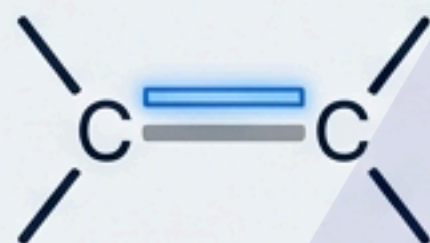


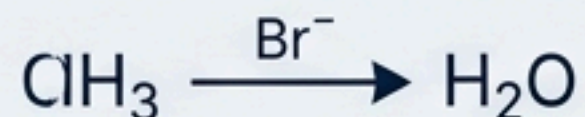
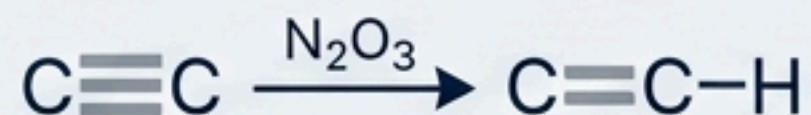
Elective bond • engineering



Steps-2: c- $\pi$  double bond



Steps-3:  $\pi$  triple bond

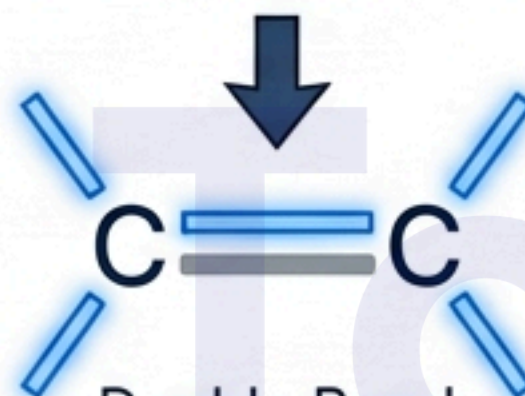


# HOW DO YOU BUILD A $\text{C} \equiv \text{C}$ BOND?

Preparation of Alkynes



Single Bond



Double Bond

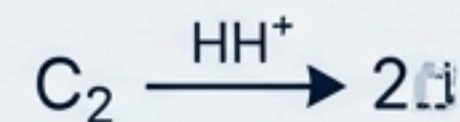
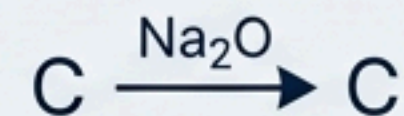


Triple Bond

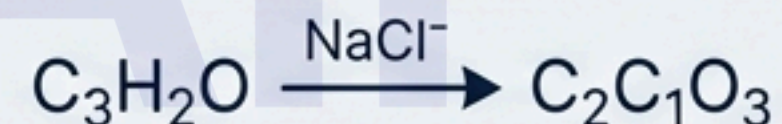


**The Architect's Rule:** Multiply bonds by subtracting atoms.

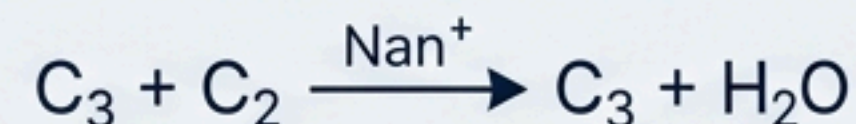
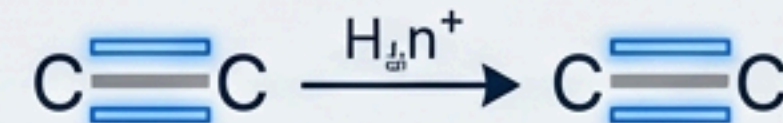
Sigma bond formation



Steps-3:  $\pi$ - $\pi$  double bond

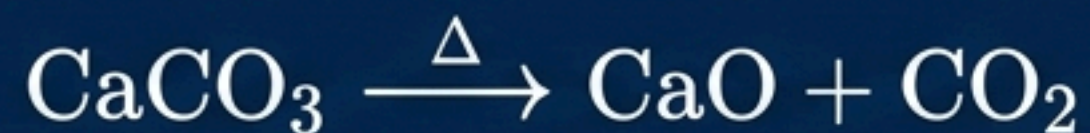


Steps-4: new triple bond



## The Macroscopic Route: Calcium Carbide

Step 1: Thermal Decomposition



Step 2: High-Temp Reduction



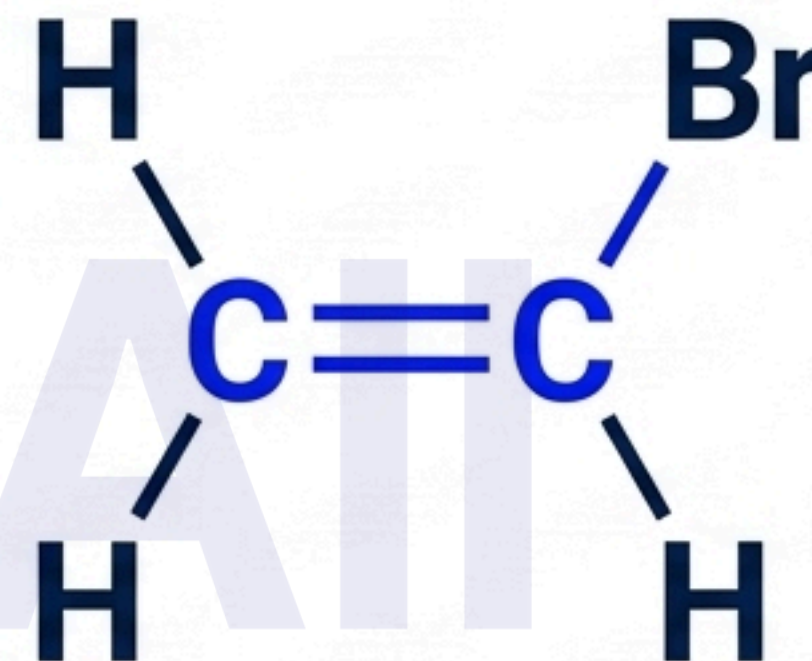
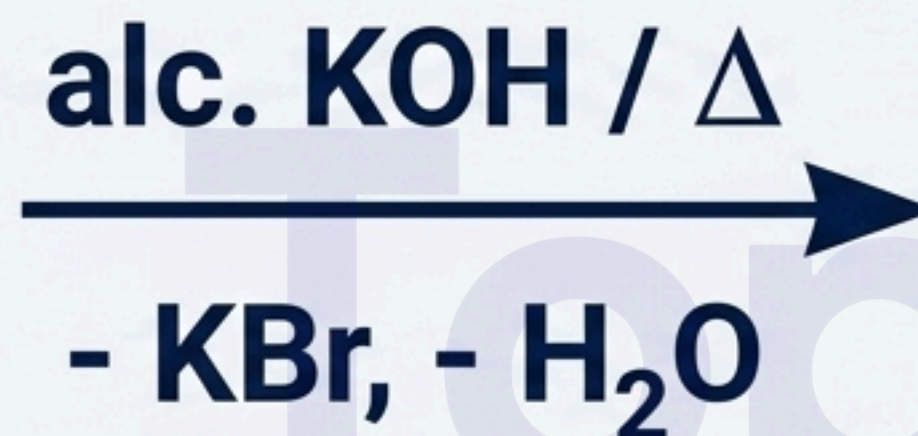
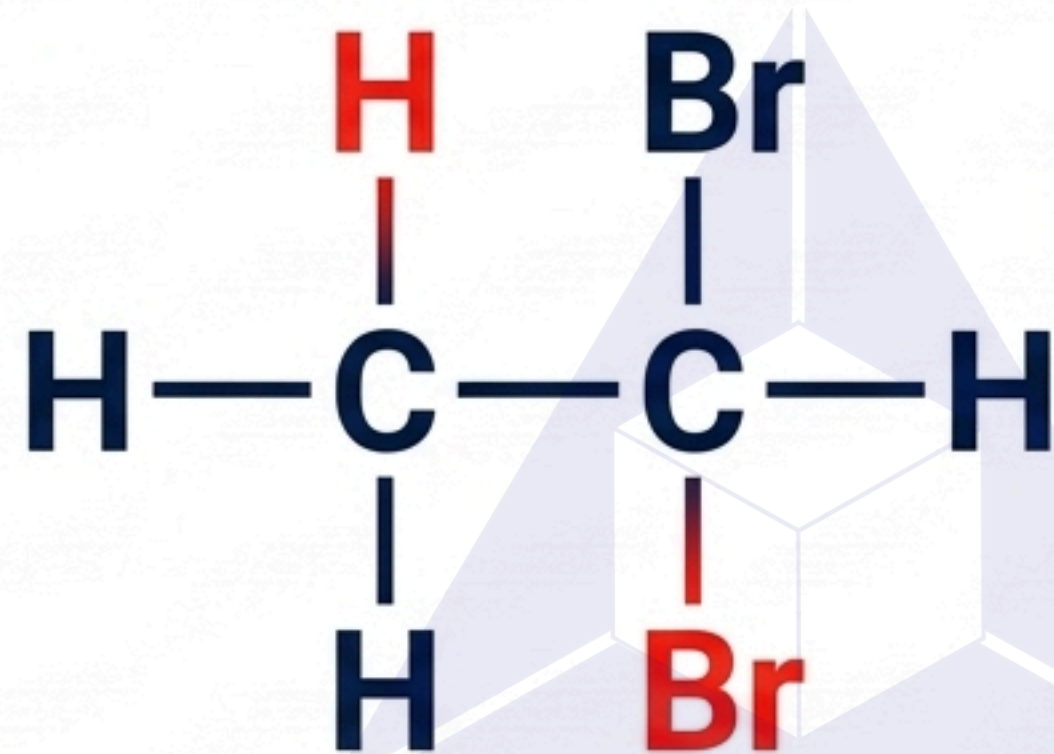
Step 3: Hydrolysis



### Industrial Preparation of Ethyne

A brute-force macroscopic 'rock and water' method specifically used for producing ethyne (acetylene) on an industrial scale, primarily for oxyacetylene welding.

# The Microscopic Route: Vicinal Dihalides (Step 1)



**First Elimination:** Creating the alkene-type unsaturation (C–C  $\rightarrow$  C=C).



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

$$E=mc^2$$



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**Practice Now**



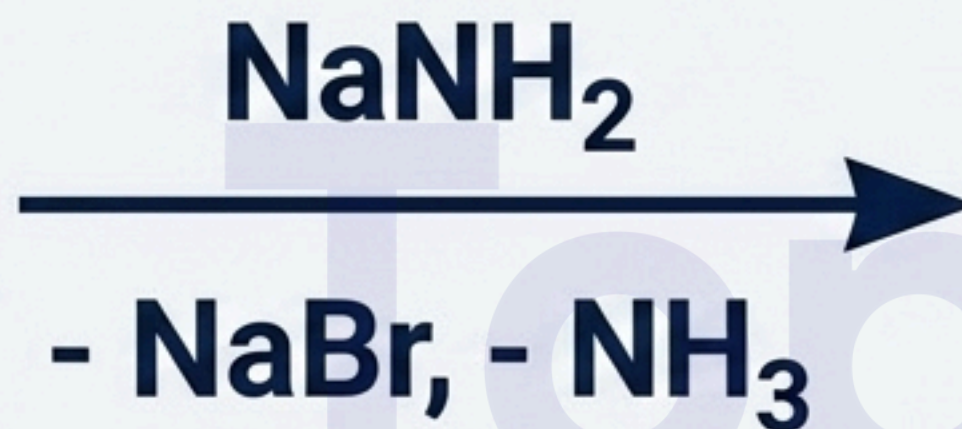
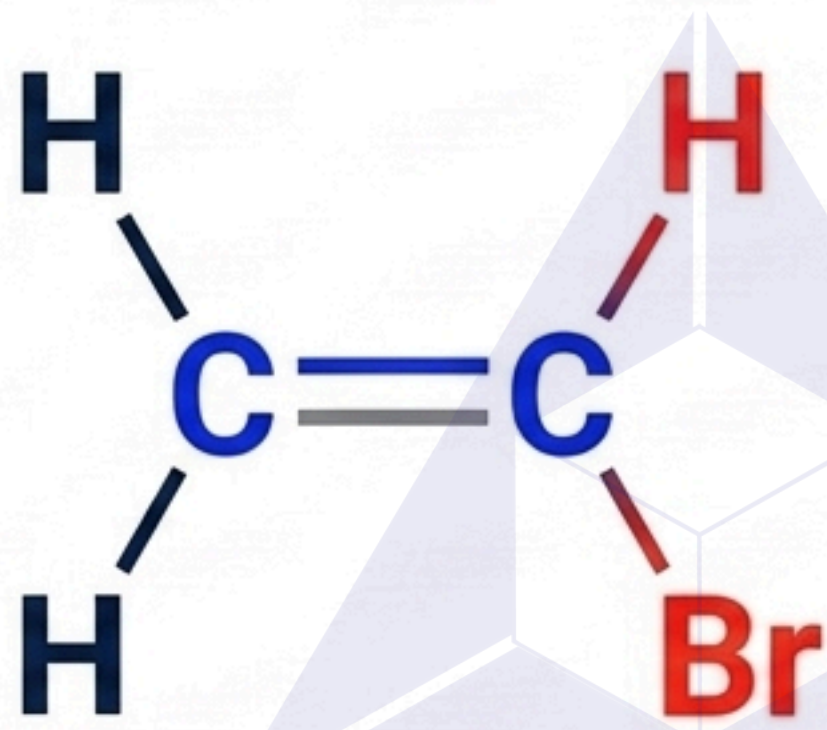
At [prep.topall.app](https://prep.topall.app)

## 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



## Forcing the Triple Bond (Step 2)



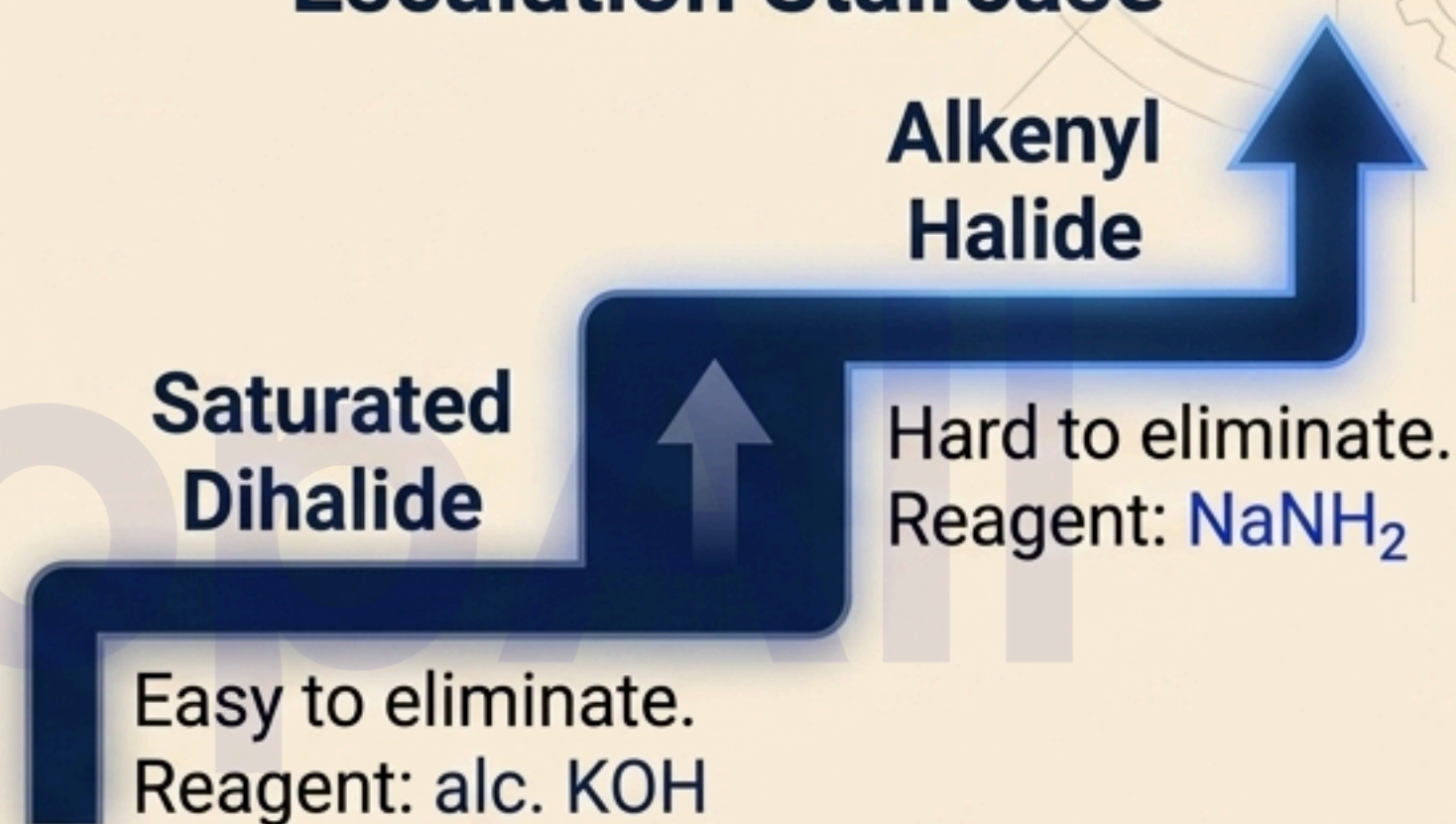
**Second Elimination: Forcing the final  $\pi$ -bond**  
 ( $\text{C}-\text{C} \rightarrow \text{C}\equiv\text{C}$ ).

# **JEE TRAP: The Reagent Escalation**

 **Wrong:** Vicinal Dihalide  $\rightarrow$   
 (excess alc. KOH)  $\rightarrow$  Alkyne

 **Right:** Vicinal Dihalide  $\rightarrow$   
 (1. alc. KOH, 2. NaNH<sub>2</sub>)  $\rightarrow$  Alkyne

## Escalation Staircase



### Mechanistic Logic

**Why the stronger base?** In an alkenyl halide, the halogen is attached to an  $sp^2$  hybridized carbon. The C-X bond acquires partial double-bond character due to resonance, making it highly resistant to cleavage by standard KOH. Sodamide (NaNH<sub>2</sub>) is required to force the final elimination.

# Master Reaction Map: Alkyne Synthesis



## Green Key Takeaways

### Route 1: Industrial Scale

**Purpose:** Ethyne production only.

**Core Mechanism:** Hydrolysis of Calcium Carbide.

**Reaction:**



### Route 2: Laboratory Scale

**Purpose:** General synthesis for higher alkynes.

**Core Mechanism:** Double Dehydrohalogenation.

**Reaction:**





# You've Learned the Theory.

## Now Let's Test It.

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