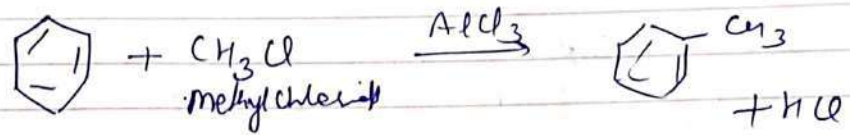


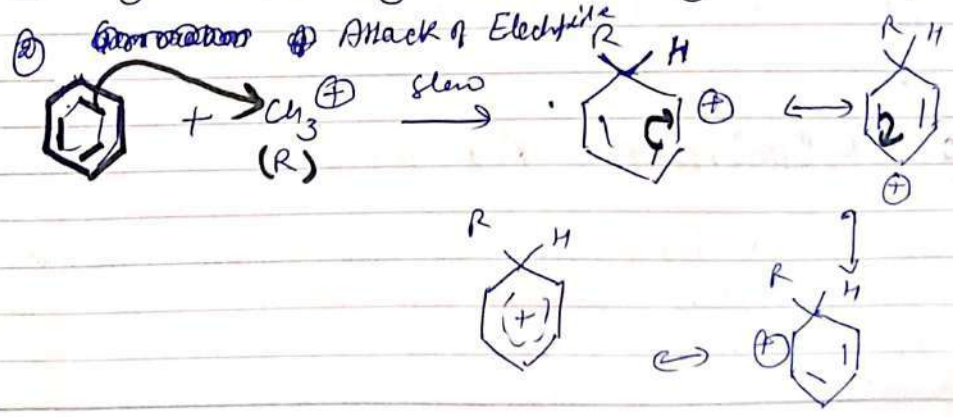
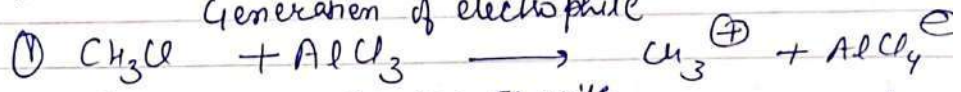
# Friedel Craft Alkylation

Benzene on treatment with alkyl halide in the presence of a Lewis acid like  $AlCl_3$  yields an alkyl benzene

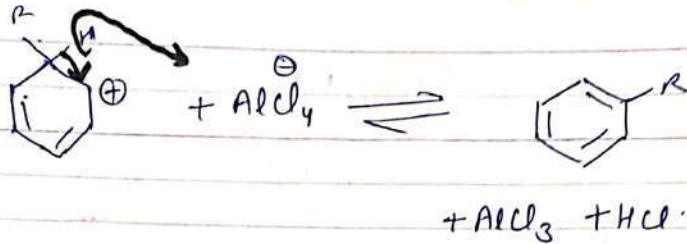


## Mechanism

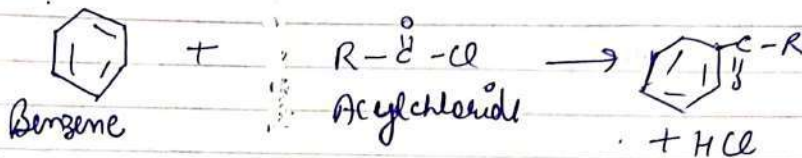
Generation of electrophile



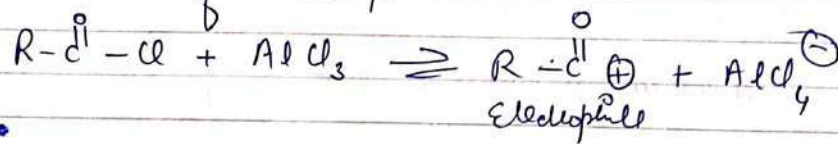
③ Abstraction of proton (Hydrogen) 16



### Friedel Craft Acylation



Generation of Electrophile



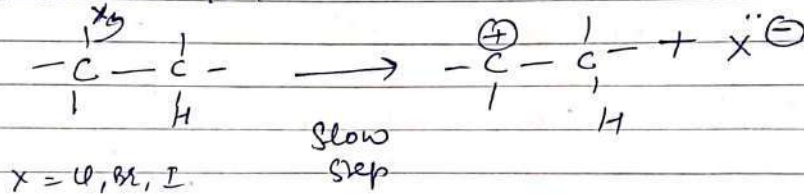
### ② Elimination Reactions

The Reactions in which hydrogen halide eliminates from the reactants to give new product.

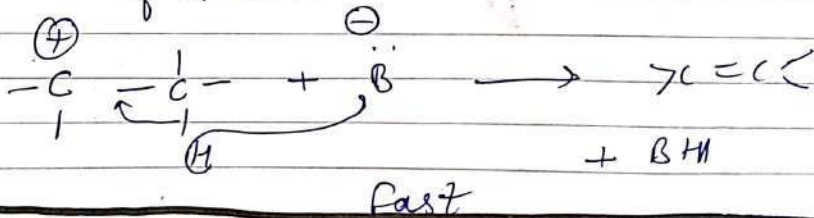


→ Rate of Reaction depends only on one reactant molecule  
 → Tertiary alkyl halides show these reactions.  
 • Mechanism is as follows

1) Step 1 Dissociation of halide to a Carbonium ion



2) Step 2 Splitting a proton in the presence of a base



~~Characteristics of E1 reaction~~  
~~1) It is a two-step reaction.~~  
~~2) The rate of reaction depends only on the concentration of the alkyl halide.~~  
~~3) The reaction is first order.~~  
~~4) The reaction is irreversible.~~  
~~5) The reaction is favored by tertiary alkyl halides.~~  
~~6) The reaction is favored by weak bases.~~  
~~7) The reaction is favored by high temperature.~~  
~~8) The reaction is favored by aprotic solvents.~~

iii)

18

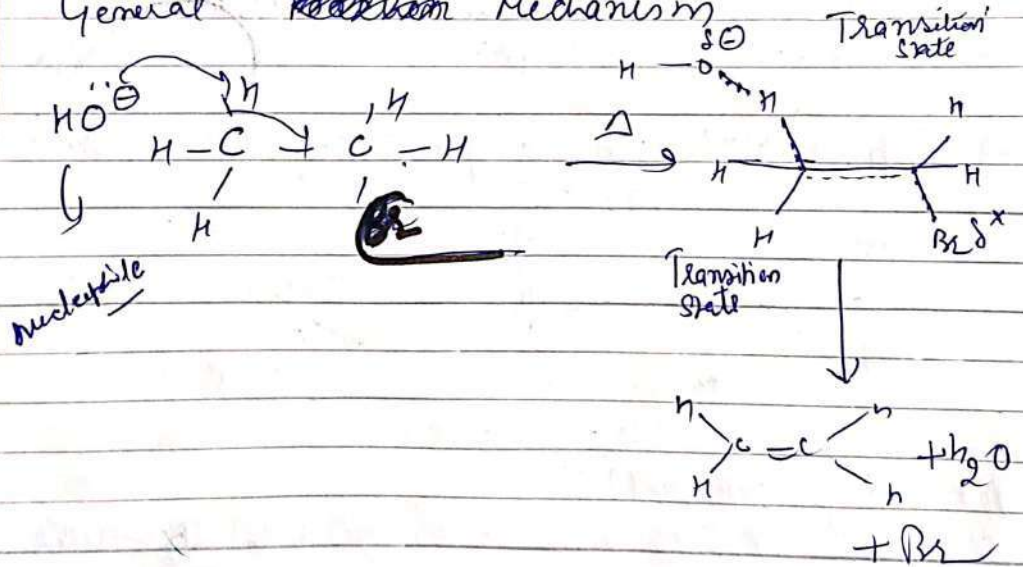
### E<sup>2</sup> (mechanism)

Majority of primary alkyl halides shows these types of reaction and took in presence of base like (KOH). Rate of Reaction depends on two reactant terms

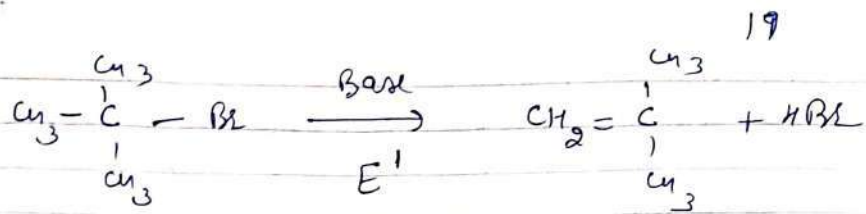
$$\text{Rate} = k [\text{Alkyl halide}] [\text{Base}]$$

It is a one step process and occurs through transition state.

### General Mechanism





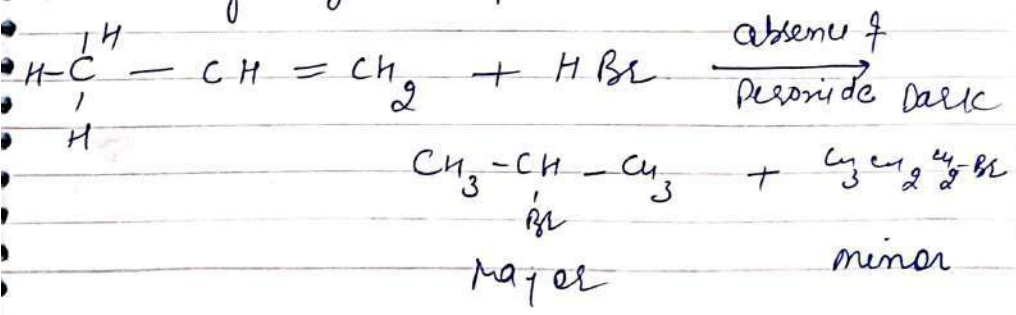


### 3 Addition Reactions

Unsaturated compounds containing double, or triple bond gives addition reaction between two carbon atoms. like alkene and alkyne.

#### Addition to Unsymmetrical Alkene

When alkene is unsymmetrical, then the addition reaction take place in two ways for exp

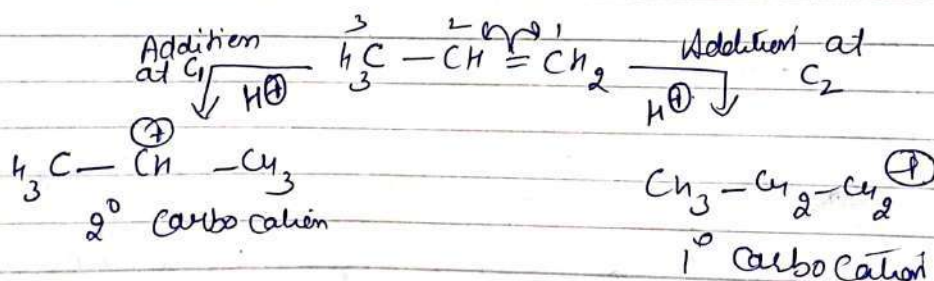


Reaction of halogen acids to unsymmetrical alkene like propene. The addition occurs on the basis of a Rule which states that

"The addition of unsymmetrical reagents like halogen acids ( $\text{HBr}$ ) to the unsymmetrical alkene occurs in such a way that negative part goes to the carbon having lesser number of hydrogen atoms. This rule is known as

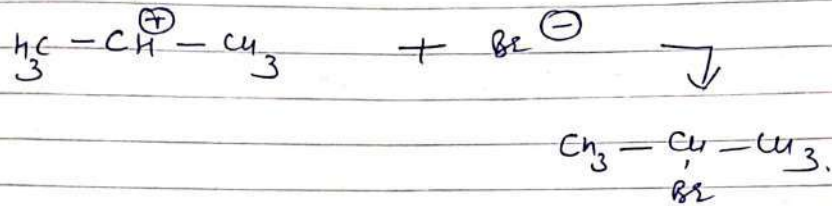
- Markovnikov's Rule in the absence of Peroxide

The mechanism which it follows is Electrophilic addition.



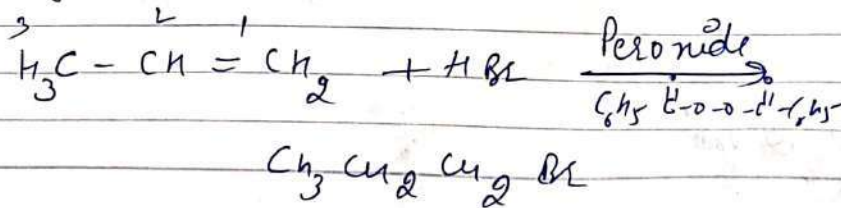


$2^\circ$  Carbocation is more stable than primary.



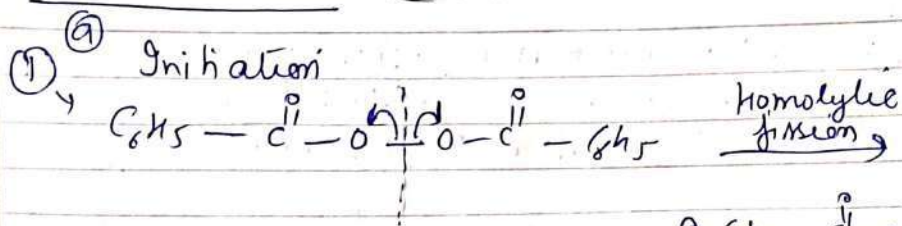
2) Anti Markovnikov's Rule → It is opposite to Markovnikov's Rule. It takes place in the presence of Peroxide also known as "Peroxide effect" or "Kharasch effect".

(Specially HBr)  
It states that when halogen acids are added to an unsymmetrical alkene than the addition takes place on the carbon having more number of hydrogen atoms.

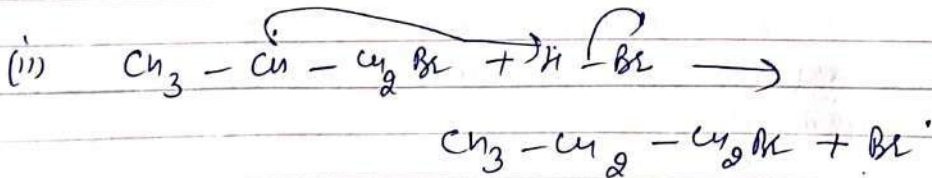
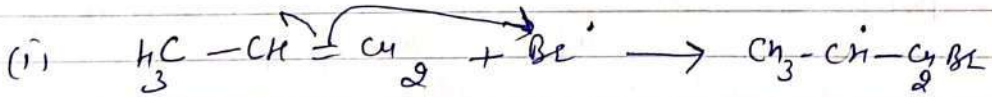
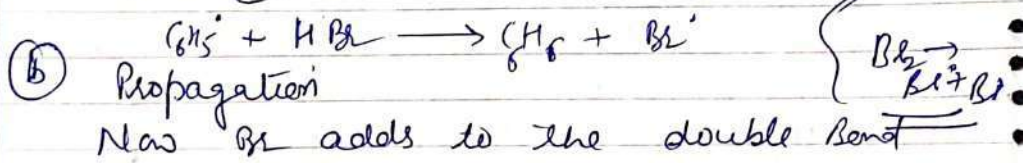


## Mechanism (Free Radical mechanism)

(A) Initiation



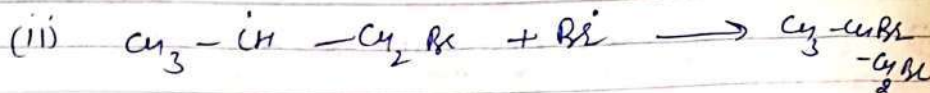
(B) Propagation  
Now Br adds to the double bond



(C) Termination

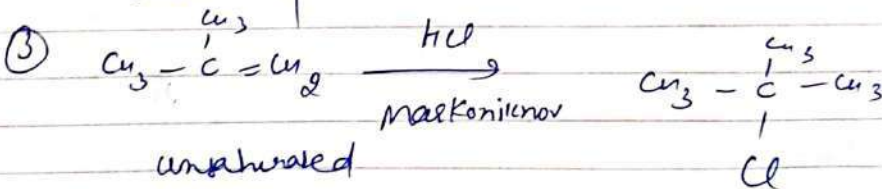
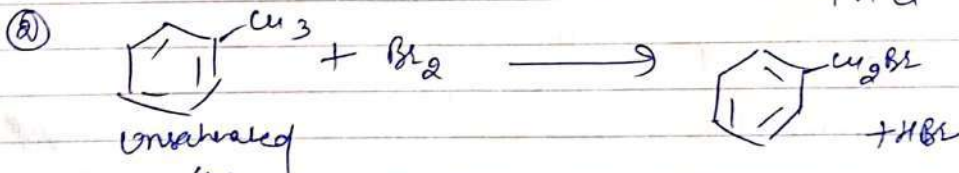
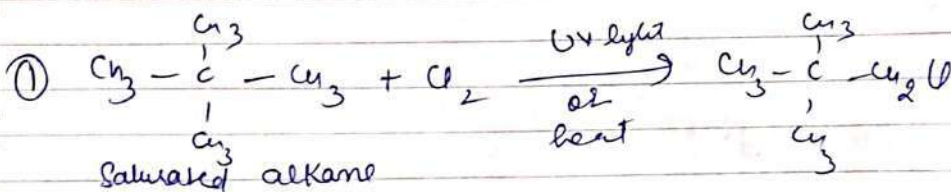






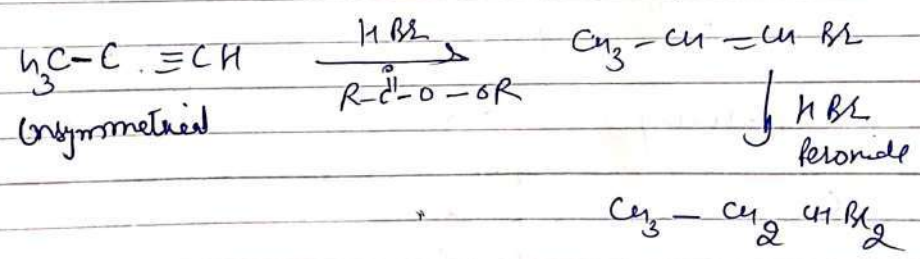
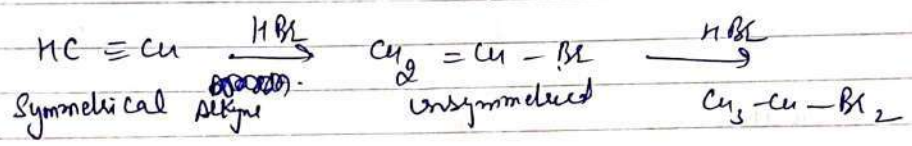
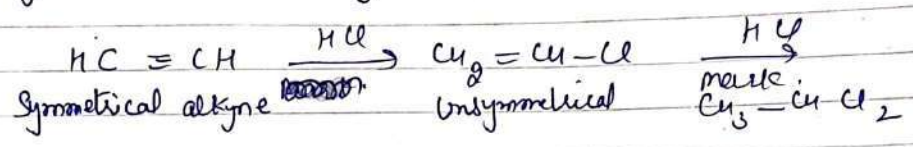
Peroxide effect is observed only with HBr not with HI, HF, HCl because in case of HBr both steps are exothermic.

### Examples of Addition Reactions



② Addition of halogen acids to alkyne

HI > HBr > HCl > HF  
Preference of halogen acids in the order of their reactivity.



Mechanism