

Synthesis : dehydration of alcohols

(removal of -OH group and H atom)

Catalyst conc. H_2SO_4 / H_3PO_4

Condition heat / 170°C / 180°C

Mechanism Elimination reaction

Equation $\text{CH}_3\text{CH}_2\text{OH} \rightarrow \text{CH}_2=\text{CH}_2 + \text{H}_2\text{O}$

(every product must be shown)

follow Zaitsev rule

major product : alkene where doubly bonded carbon have **greatest** number of alkyl groups

Addition of hydrogen halides

Reagent HCl / HBr / HI

Mechanism Electrophilic addition

Equation $\text{CH}_3-\text{CH}=\text{CH}_2 + \text{HBr} \rightarrow \text{CH}_3-\text{CHBr}-\text{CH}_3$

(every product must be shown)

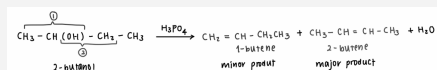
Condition room temperature

add hydrogen peroxide anti-Markovnikov rule

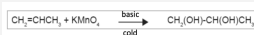
follow Markovnikov's rule

major product : halo group attach to doubly bonded carbon with **least** number of H atoms

Dehydration of alcohols



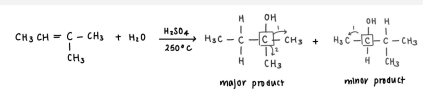
Oxidation / Baeyer test w/ KMnO_4



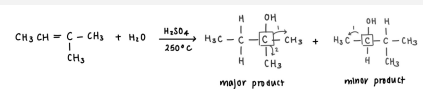
Halogenation



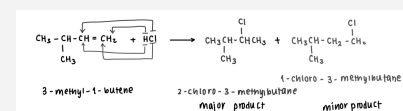
Hydration



Hydration



Addition of hydrogen halides



Polymerisation

n number of monomer join to form polymer

Catalyst Ziegler

Equation alkene $\rightarrow$ polyalkene

Hydration

Reagent H_2O

Condition 250°C

Catalyst dilute H_2SO_4

Equation $\text{CH}_3\text{CH}=\text{CCH}_3-\text{CH}_3 + \text{H}_2\text{O} \rightarrow \text{CH}_3\text{CH}_2\text{C}(\text{OH})(\text{CH}_3)-\text{CH}_3$

(every product must be shown)

produce electrophile H_3O^+

follow Markovnikov's rule

major product : OH group attach to doubly bonded carbon with least number of H atoms

Synthesis : dehydrohalogenation

(removal of H atom and one halo group)

Reagent NaOH / KOH

Condition ethanol (as solvent), reflux

Equation $\text{CH}_3\text{CHCl}-\text{CH}_2\text{CH}_3 + \text{NaOH} \rightarrow \text{CH}_2=\text{CHCH}_2\text{CH}_3 + \text{H}_2\text{O}$

(every product must be shown)

Synthesis : dehydrohalogenation (cont)

follow Zaitsev rule

major product : alkene where doubly bonded carbon have **greatest number of alkyl groups**

Halogenation

Reagent	Cl ₂ / Br ₂
Catalyst	CCl ₄ / CH ₂ Cl ₂
Mechanism	Electrophilic addition
Equation	CH ₂ =CH ₂ + Br ₂ → CH ₂ BrCH ₂ Br
Observation	brown colour of bromine disappears green colour of chlorine disappears

Hydrogenation

Reagent	H ₂
Catalyst	Ni / Pt / Pd
Condition	heat / 200°C
Equation	CH ₂ =CH ₂ + H ₂ → CH ₃ CH ₃

Oxidation / Baeyer test

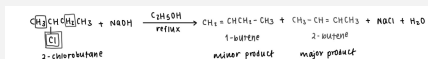
Step 1

Reagent	O ₂
Catalyst	silver
Condition	450 K
Equation	CH ₂ =CH ₂ → C ₂ H ₄ O (epoxyethane)

Step 2

Equation	$\text{C}_2\text{H}_4\text{O}$ (epoxyethane) $\rightarrow$ $\text{CH}_2(\text{OH})\text{-CH}_2(\text{OH})$
Reagent	H_2O
Catalyst	dilute H_2SO_4
Condition	60°C

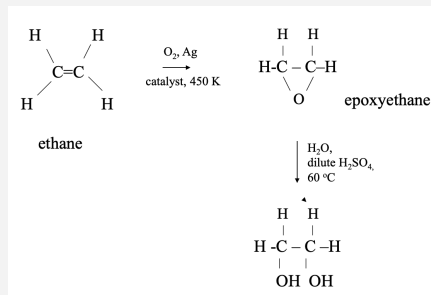
Dehydrohalogenation



Oxidation / Baeyer test

Reagent	KMnO ₄
Condition	cold condition, basic medium
Equation	$\text{CH}_2=\text{CHCH}_3 + \text{KMnO}_4 \rightarrow \text{CH}_2(\text{OH})-\text{CH}(\text{OH})\text{CH}_3$
Observation	purple colour of KMnO ₄ disappears brown colour precipitate formed

Oxidation / Baeyer test w/ silver catalyst



Polymerisation

