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	$CH_3CH_2OH \rightarrow CH_2{=}CH_2 + H_2O$
	(every product must be shown)

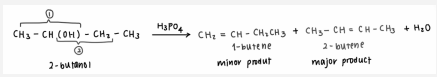
follow Zaitsev rule
major product : alkene where doubly bonded carbon have **greatest number of alkyl groups**

Addition of hydrogen halides

Reagent	HCl / HBr / HI
Mechanism	Electrophilic addition
Equation	$CH_3\text{-}CH{=}CH_2 + HBr \rightarrow CH_3\text{-}CHBr\text{-}CH_3$
	(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**

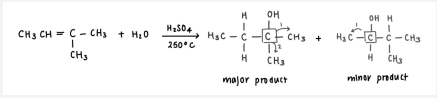
Dehydration of alcohols



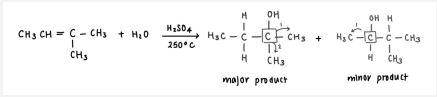
Oxidation / Baeyer test w/ $KMnO_4$

Halogenation

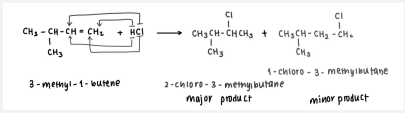
Hydration



Hydration



Addition of hydrogen halides



Polymerisation

n number of monomer join to form polymer

Catalyst	Ziegler
Equation	alkene → polyalkene

Hydration

Reagent	H_2O
Condition	250°C
Catalyst	dilute H_2SO_4
Equation	$CH_3CH{=}CCH_3\text{-}CH_3 + H_2O \rightarrow CH_3CH_2C(OH)(CH_3)\text{-}CH_3$
	(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	$CH_3CHCl\text{-}CH_2CH_3 + NaOH \rightarrow CH_2{=}CHCH_2CH_3 + H_2O$
	(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_2Cl_2
Mechanism	Electrophilic addition
Equation	$CH_2=CH_2 + Br_2 \rightarrow CH_2BrCH_2Br$
Observation	brown colour of bromine disappears
	green colour of chlorine disappears

Hydrogenation

Reagent	H_2
Catalyst	Ni / Pt / Pd
Condition	heat / 200°C
Equation	$CH_2=CH_2 + H_2 \rightarrow CH_3CH_3$

Oxidation / Baeyer test

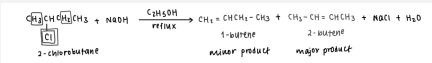
Step 1

Reagent	O_2
Catalyst	silver
Condition	450 K
Equation	$CH_2=CH_2 \rightarrow C_2H_4O$ (epoxyethane)

Step 2

Equation	C_2H_4O (epoxyethane) $\rightarrow CH_2(OH)\text{-}CH_2(OH)$
Reagent	H_2O
Catalyst	dilute H_2SO_4
Condition	60°C

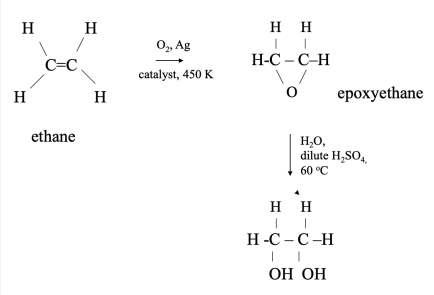
Dehydrohalogenation



Oxidation / Baeyer test

Reagent	$KMnO_4$
Condition	cold condition, basic medium
Equation	$CH_2=CHCH_3 + KMnO_4 \rightarrow CH_2(OH)\text{-}CH(OH)CH_3$
Observation	purple colour of KMnO4 disappears
	brown colour precipitate formed

Oxidation / Baeyer test w/ silver catalyst



Polymerisation