

Halogenation (substitution)

Reagent $\text{Cl}_2 / \text{Br}_2$

Catalyst $\text{AlCl}_3 / \text{FeCl}_3$

catalyst produce electrophile

Equation $\text{C}_6\text{H}_6 + \text{Cl}_2 \rightarrow \text{C}_6\text{H}_5\text{Cl} + \text{HCl}$

Mechanism free radical substitution

Formation of halonium ion

Halogenation (addition)

Reagent $\text{Cl}_2 / \text{Br}_2$

Condition UV light

Equation $\text{C}_6\text{H}_6 + 3\text{Cl}_2 \rightarrow \text{C}_6\text{H}_6\text{Cl}_6$

Mechanism free radical addition reaction

Friedel-Craft Acylation

Reagent RCOCl (acyl chloride)

Condition heat / 80°C

Catalyst $\text{AlCl}_3 / \text{FeCl}_3$

catalyst produce electrophile

Mechanism electrophilic substitution

Equation $\text{C}_6\text{H}_6 + \text{RCOCl} \rightarrow \text{RCOC}_6\text{H}_5 + \text{HCl}$

Halogenation of alkylbenzene (UV light)

Reagent $\text{Cl}_2 / \text{Br}_2$

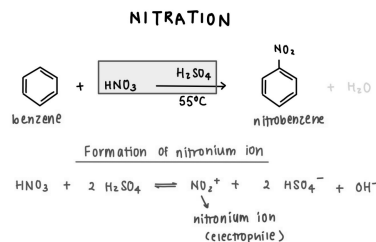
Condition UV light

Mechanism free radical substitution

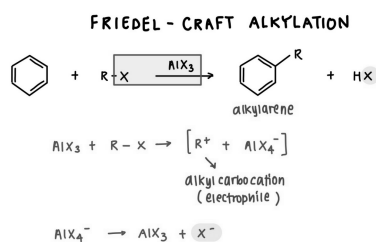
Equation $(\text{CH}_3)\text{C}_6\text{H}_5 + \text{X}_2 \rightarrow (\text{CH}_2\text{X})\text{C}_6\text{H}_5 + \text{HX}$

reaction occur in alkyl part

Nitration

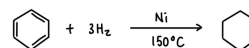


Friedel-Craft Alkylation



Hydrogenation

HYDROGENATION (addition)



Nitration

Reagent HNO_3

Condition 55°C

Catalyst concentrated H_2SO_4

catalyst produce electrophile

Mechanism electrophilic substitution

Equation $\text{C}_6\text{H}_6 + \text{HNO}_3 \rightarrow \text{C}_6\text{H}_5\text{NO}_2$

Observation yellowish oil with almond smell

Formation of nitronium ion



By bubblysoul

cheatography.com/bubblysoul/

Not published yet.

Last updated 26th April, 2022.

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Friedel-Craft Alkylation

Reagent	RX
Condition	room temperature
Catalyst	AlX ₃ / FeX ₃ <i>catalyst produce electrophile</i>
Mechanism	electrophilic substitution
Equation	C ₆ H ₆ + RX → C ₆ H ₅ R + HX
X : halogen (Cl ₂ / Br ₂)	

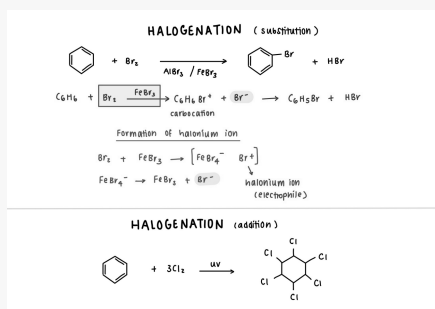
Hydrogenation

Reagent	H ₂ gas
Condition	Pt, room temperature Ni, 150°C
Equation	C ₆ H ₆ + 3H ₂ → C ₆ H ₁₂

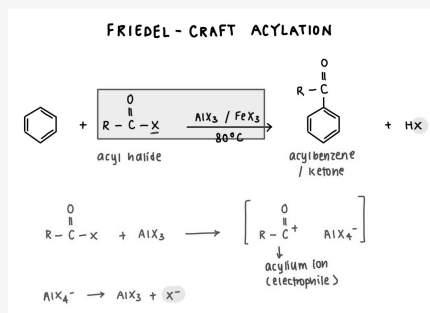
Halogenation of alkylbenzene (catalyst)

Reagent	Cl ₂ / Br ₂
Catalyst	AlX ₃ / FeX ₃
Mechanism	electrophilic substitution
Equation	(CH ₃)C ₆ H ₅ + X ₂ → (CH ₃)C ₆ H ₄ X + HX
reaction occur in benzene ring	

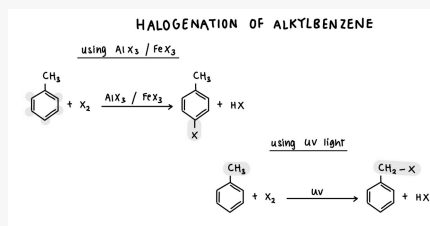
Halogenation



Friedel-Craft Acylation



Halogenation of alkylbenzene



By bubblysoul

cheatography.com/bubblysoul/

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