Benzenes Cheat Sheet

by bubblysoul via cheatography.com/146556/cs/31742/

Halogenation (substitution)

Reagent	Cl_2 / Br_2
Catalyst	$AlCl_3$ / $FeCl_3$
	catalyst produce electrophile
Equation	$C_6H_6 + Cl_2 \rightarrow C_6H_5Cl + HCl$
Mechanism	free radical substitution

Formation of halonium ion

Halogenation (addition)

Reagent	Cl_2 / Br_2
Condition	UV light
Equation	$C_6H_6 + 3Cl_2 \rightarrow C_6H_6Cl_6$
Mechanism	free radical addition reaction

Friedel-Craft Acylation

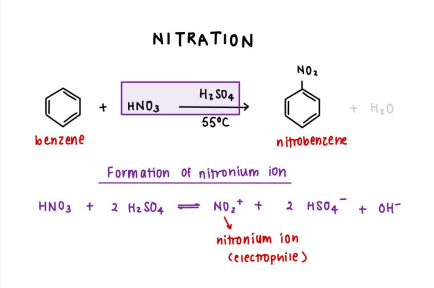
Reagent	RCOCl (acyl chloride)
Condition	heat / 80°C
Catalyst	$AlCl_3$ / $FeCl_3$
	catalyst produce electrophile
Mechanism	electrophilic substitution
Equation	$C_6H_6 + RCOCl \rightarrow RCOC_6H_5 + HCl$

Halogenation of alkylbenzene (UV light)

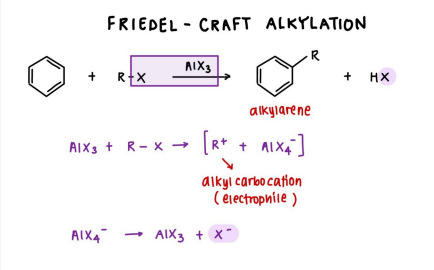
Reagent	Cl_2 / Br_2
Condition	UV light
Mechanism	free radical substitution
Equation	$(CH_3)C_6H_5 + X_2 \rightarrow (CH_2X)C_6H_5 + HX$

reaction occur in alkyl part

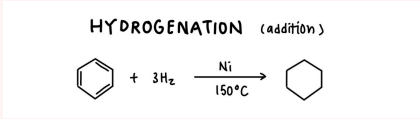
Nitration



Friedel-Craft Alkylation



Hydrogenation



Nitration

Reagent	HNO_3
Condition	55°C
Catalyst	**concentrated** H_2SO_4
	catalyst produce electrophile
Mechanism	electrophilic substitution
Equation	$C_6H_6 + HNO_3 \rightarrow C_6H_5NO_2$
Observation	yellowish oil with almond smell

Formation of nitronium ion

Friedel-Craft Alkylation

Reagent	RX
Condition	room temperature
Catalyst	AlX_3 / FeX_3
	catalyst produce electrophile
Mechanism	electrophilic substitution
Equation	$C_6H_6 + RX \rightarrow C_6H_5R + HX$

X : halogen (Cl_2 / Br_2)

Hydrogenation

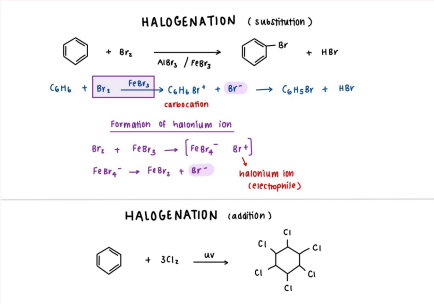
Reagent	H_2 gas
Condition	Pt, room temperature
	Ni, 150°C
Equation	$C_6H_6 + 3H_2 \rightarrow C_6H_{12}$

Halogenation of alkylbenzene (catalyst)

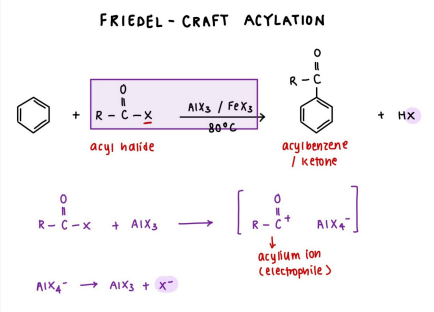
Reagent	Cl_2 / Br_2
Catalyst	AlX_3 / FeX_3
Mechanism	electrophilic substitution
Equation	$(CH_3)C_6H_5 + X_2 \rightarrow (CH_3)C_6H_4X + HX$

reaction occur in benzene ring

Halogenation



Friedel-Craft Acylation



Halogenation of alkylbenzene