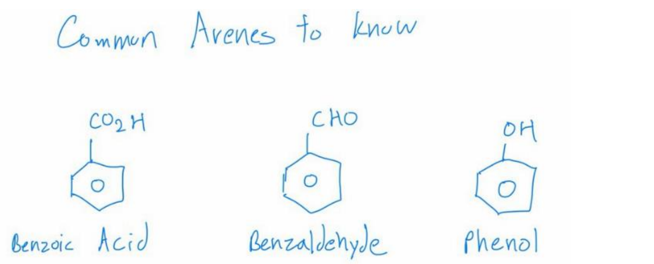
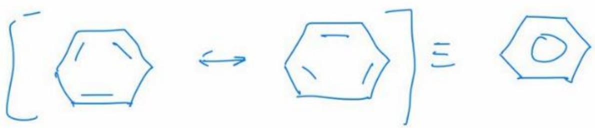
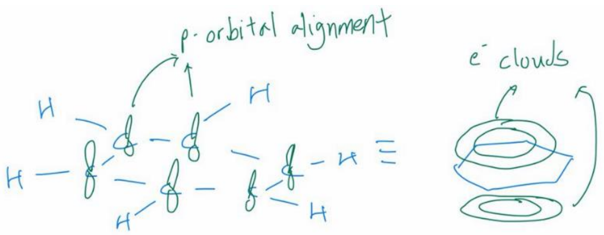
Arenes

Aromatic Hydrocrabons

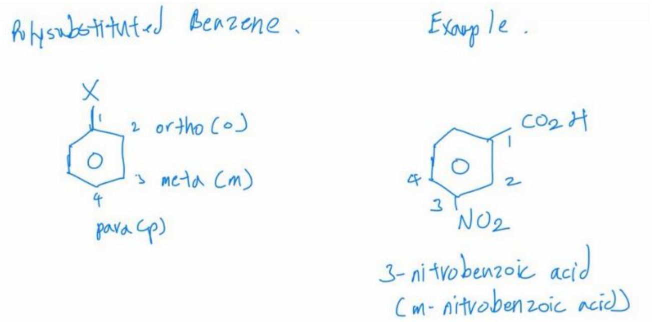


<u>Resonance of Benzene</u>



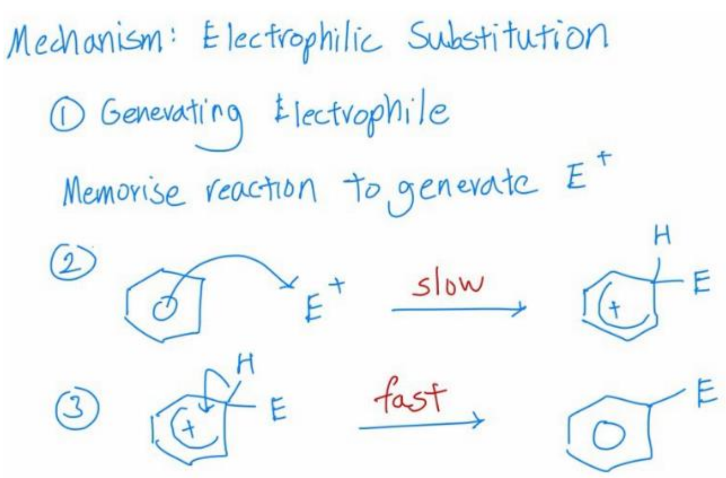


<u>Nomenclature of polysubstituted arenes</u>



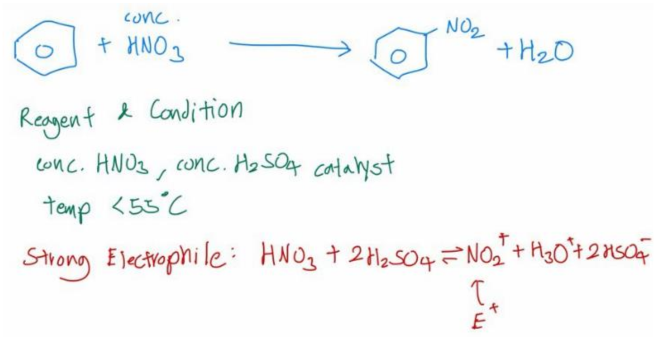
Reactions of Arenes

<u>Electrophilic Substitution Mechanism</u>

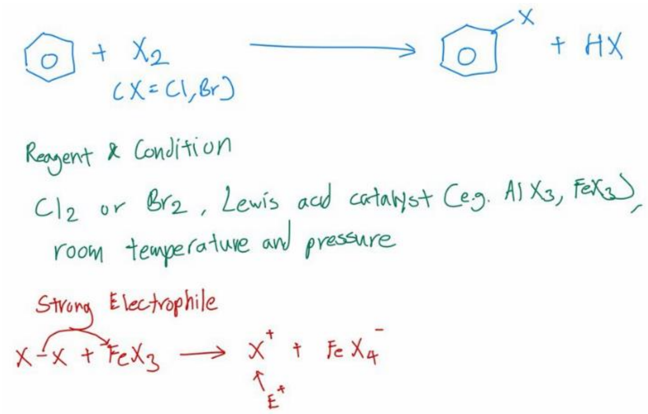


<u>Electrophilic Substitution Reactions</u>

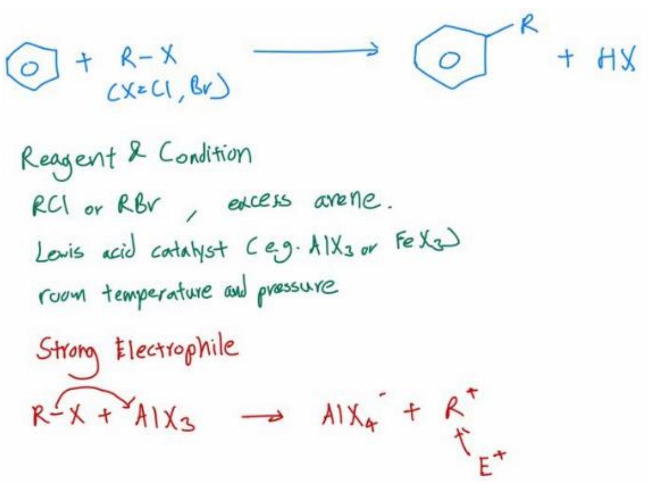
<u>Nitration</u>



<u>Halogenation</u>



<u>Friedel-Crafts Alkylation</u>

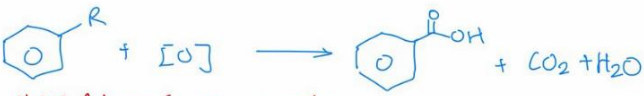


Catalytic Hydrogenation of Benzene

Reagent & Condition.

$H_2(g)$, Ni or Pd or Pt catalyst, heat

Side-Chain Oxidation



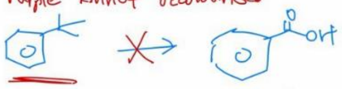
Note: Balance Equation properly

Reagent & Condition

$KMnO_4(aq)$, $H_2SO_4(aq)$, heat

↳ Obs: Purple $KMnO_4$ decolourised

Exception:



Note: $K_2Cr_2O_7$ is not a strong enough oxidising agent

Effect of Substituents on Electrophilic Substitution

Activating groups

- Donate electron density to benzene ring
  - Increase availability of pi electron cloud
  - Stabilise the intermediate by dispersing positive charge, lowering Ea of reaction

Deactivating groups

- Withdraw electron density from benzene ring
- Opposite effects of activating group

Different groups affect the orientation of the incoming electrophile for substitution!

NOTE: Refer to Data Booklet

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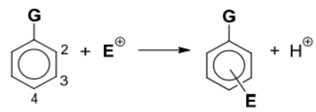
8 The orientating effect of groups in aromatic substitution reactions

The position of the incoming group, **E**, is determined by the nature of the group, **G**, already bonded to the ring, and not by the nature of the incoming group **E**.



G	–alkyl –OH or –OR –NH_2, –NHR or –NR_2 –NHCOR	–Cl, –Br, –I	–CHO, –COR –CO_2H, –CO_2R –NH_3^+ –NO_2, –CN
Reactivity of ring (compared to benzene)	Activated	Deactivated	Deactivated
Position of E (relative to position of G)	2- and/or 4-	2- and/or 4-	3-

(from data booklet)