



# Organic Chemistry Revision Sheets

## Benzene | Electrophilic Substitution, (Nitration, with $\text{HNO}_3$ )

### Reaction

**REACTANTS:** Benzene and Nitric Acid

**CONDITIONS:**  $55^\circ\text{C}$  and conc. sulfuric acid ( $\text{H}_2\text{SO}_4$ )

**PRODUCT:** Nitrobenzene

**REACTION TYPE:** Electrophilic Substitution, *Nitration*

**REACTION:**  
(example of  
benzene)



Benzene

+

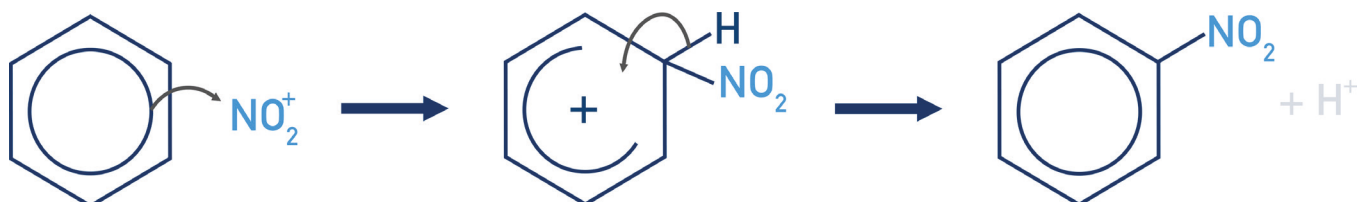
$\text{HNO}_3$



Nitrobenzene

### Mechanism

Nitronium ( $\text{NO}_2^+$ ) ion **acts as an electrophile due to its positively charged nitrogen atom accepting an electron pair** from the delocalised ring of electrons in the benzene ring. A Carbon-nitrogen bond forms. The carbon-hydrogen bond breaks to give electron pair back to delocalised ring of electrons.  $\text{NO}_2^+$  ion replaces H on benzene ring - **substitution reaction**.



### Notes:

- Nitronium ion is formed by the reaction of concentrated nitric acid with concentrated sulfuric acid



Nitronium Ion

- $\text{H}^+$  ion removed from benzene ring combines with hydrogen sulfate ( $\text{HSO}_4^-$ ) ion to reform catalyst  $\text{H}_2\text{SO}_4$ :

