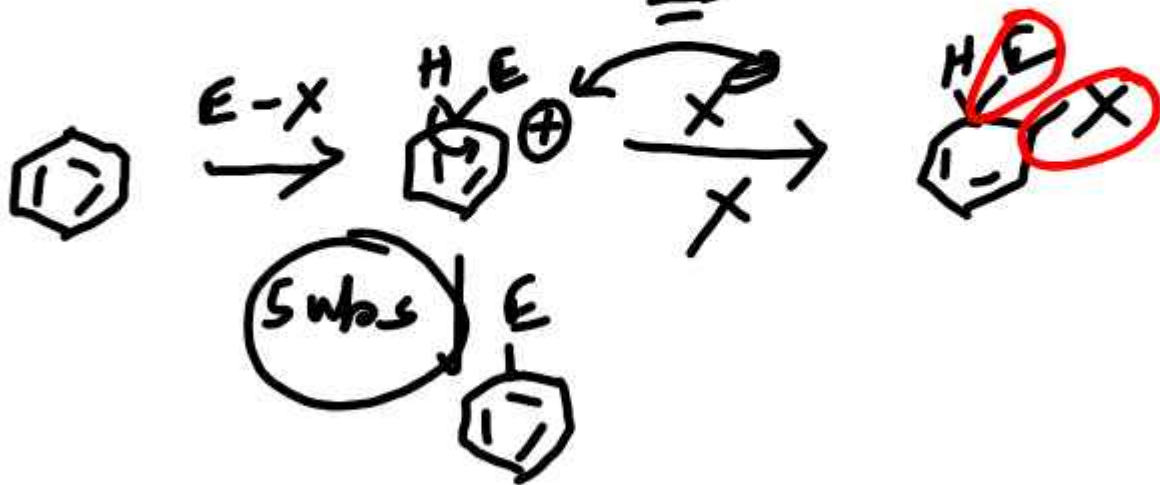


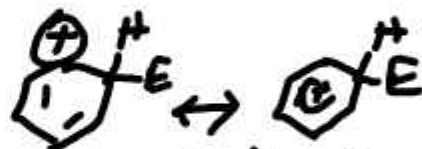
Aromatic Substitution



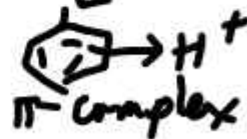
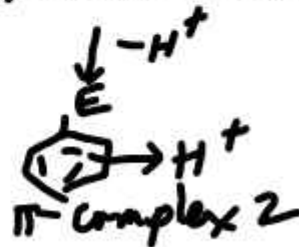
Substitution
 ↙ ↘
 Electrophilic Nucleophilic

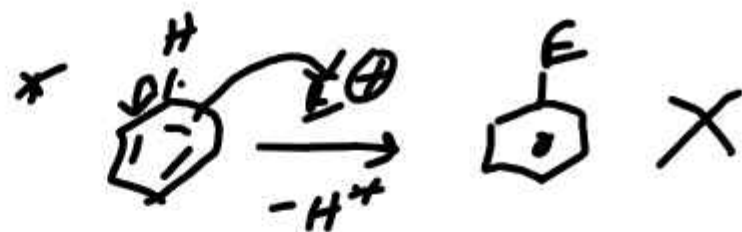
Electrophilic Aromatic Substitution

Mechanism

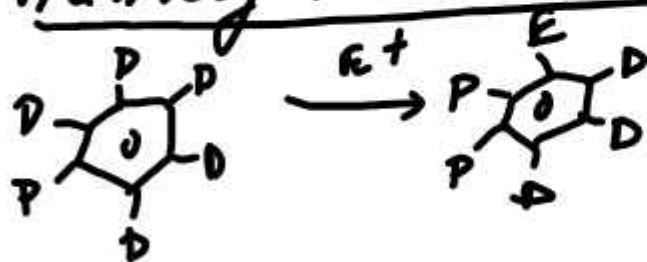


σ -complex / Wheland int.
 Arenium cation



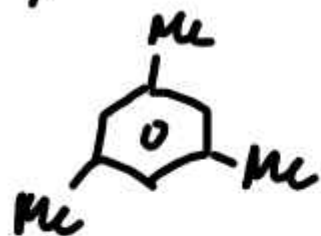


Primary Kinetic Isotope Effect

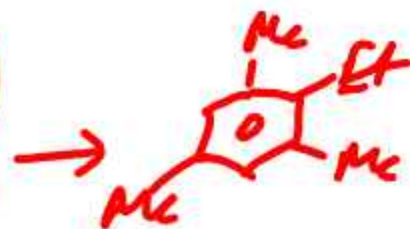


$$\frac{k_H}{k_D} = 1$$

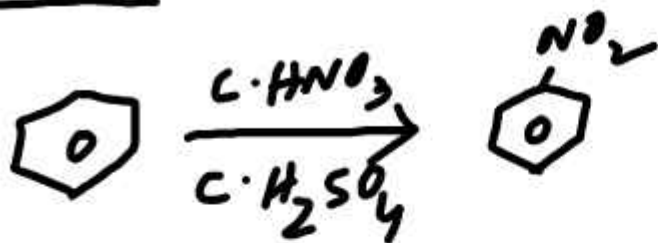
Experimental evidence of σ -complex



isolated



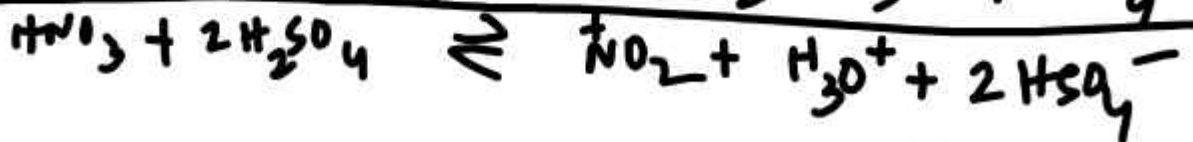
Nitration



NO_2^+ (nitronium ion)

↓
M. & / nitating mixture

Generation of NO_2^+

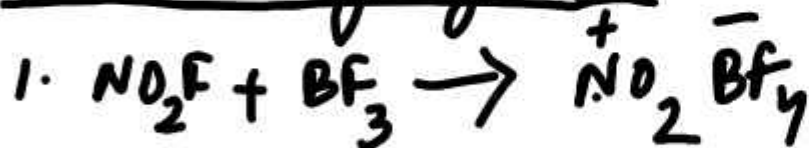




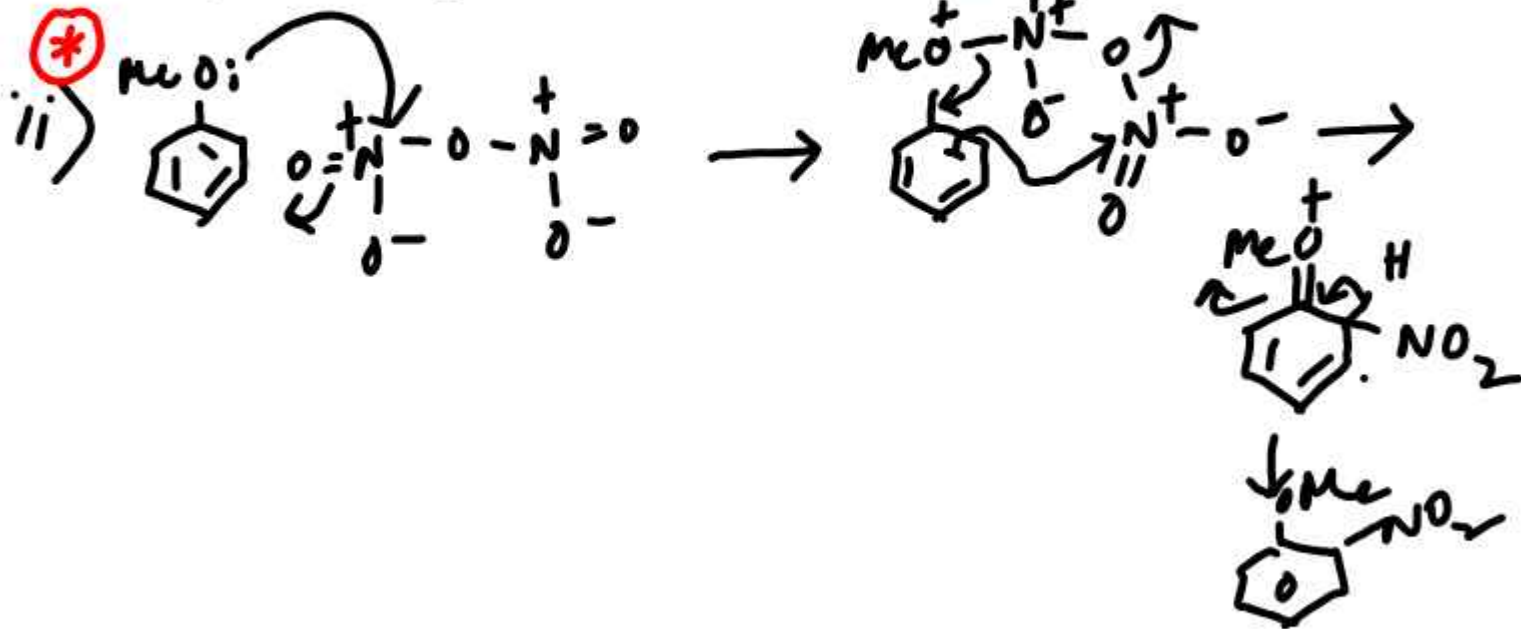
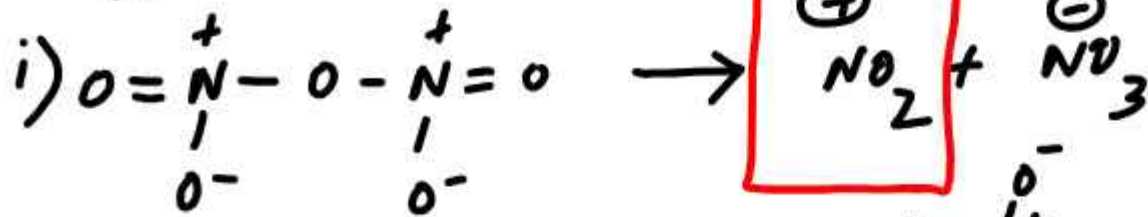
$$\text{rate} = k [\text{C}_6\text{H}_6] [\text{NO}_2]$$

Other strong acids - HClO_4 , $(\text{HF} + \text{BF}_3)$

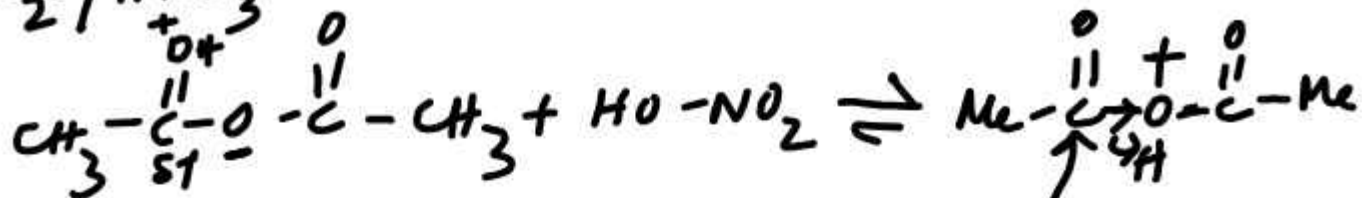
other nitrating agents



2. N_2O_5



3. ✓ $\text{Al}_2\text{O}_3 / \text{HNO}_3$



4. ✓ NH_4NO_3 or $\text{KNO}_3 / (\text{CF}_3\text{COO})_2$

