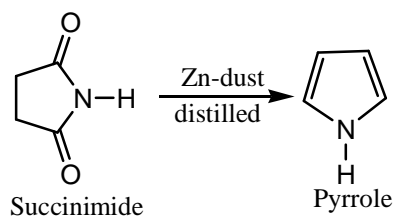
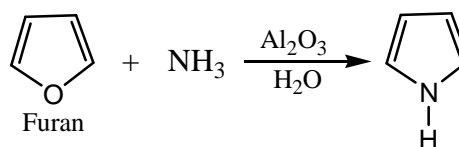
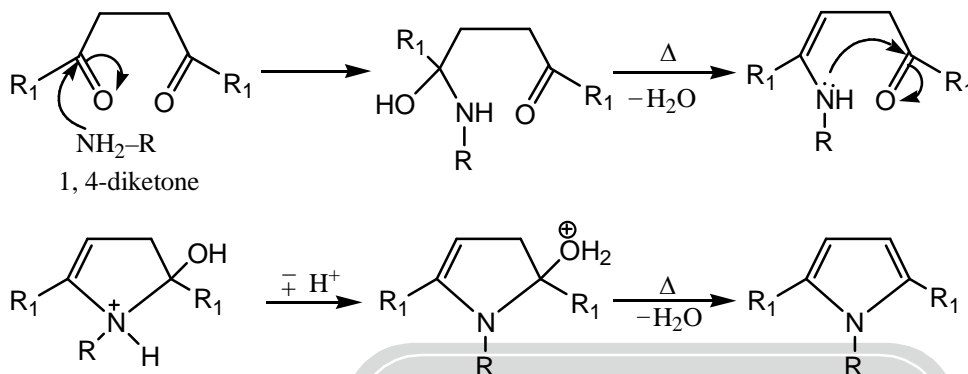


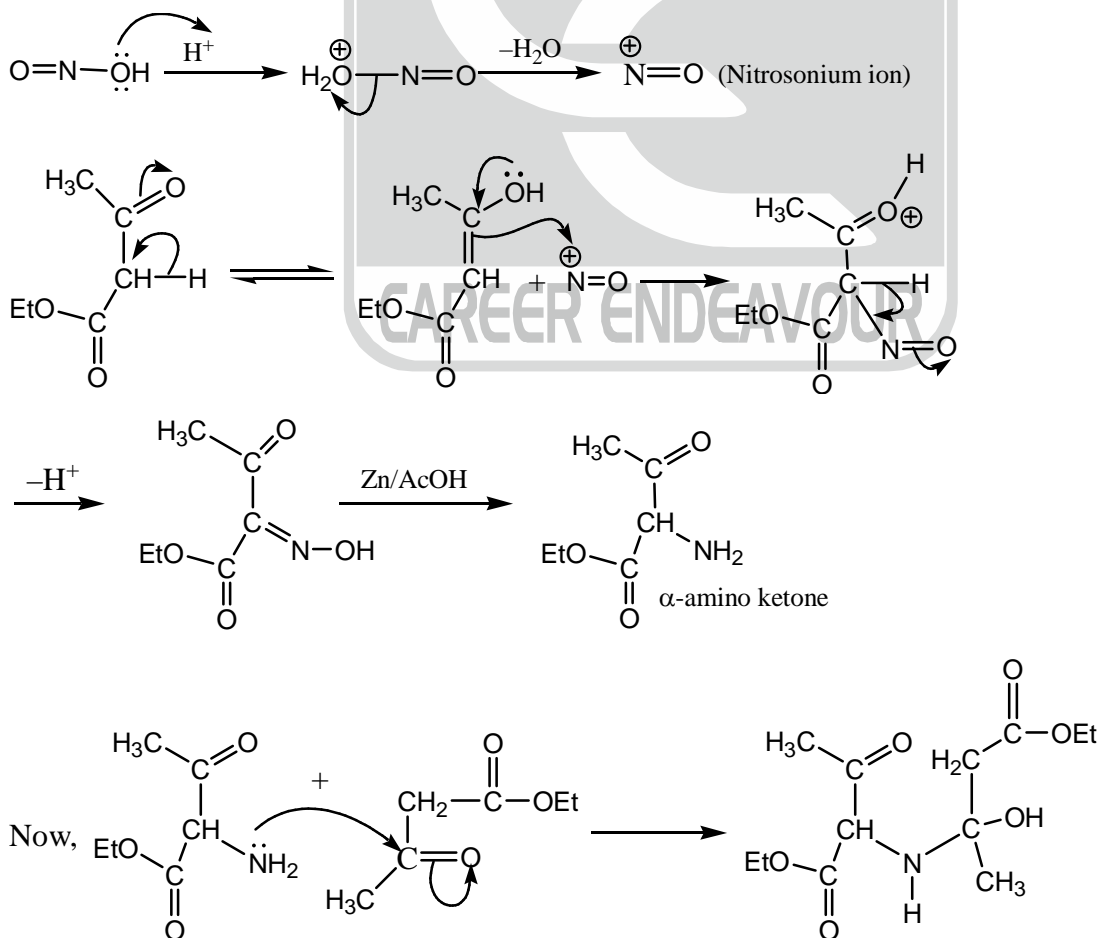
(III) From Succinamide**(IV) From Furan****(V) Paal-Knorr synthesis:**

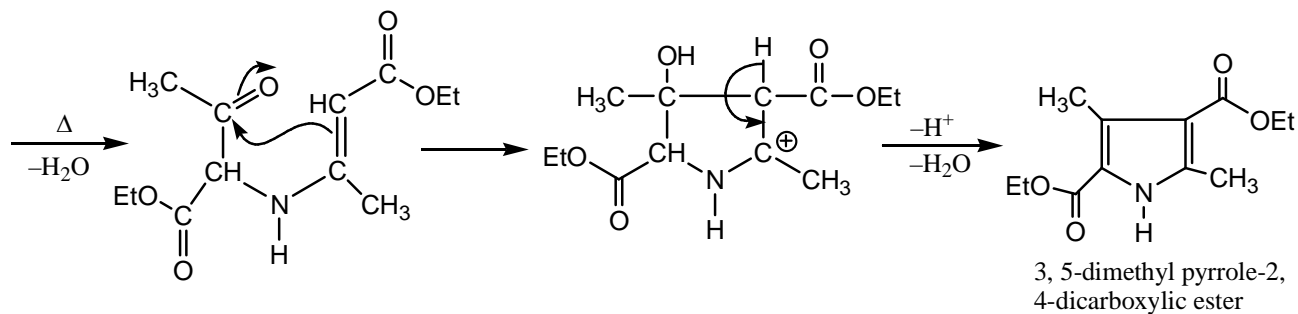
By treating 1, 4-diketone with ammonia, primary amine or hydrazine etc.

**(VI) Knorr Pyrrole synthesis:**

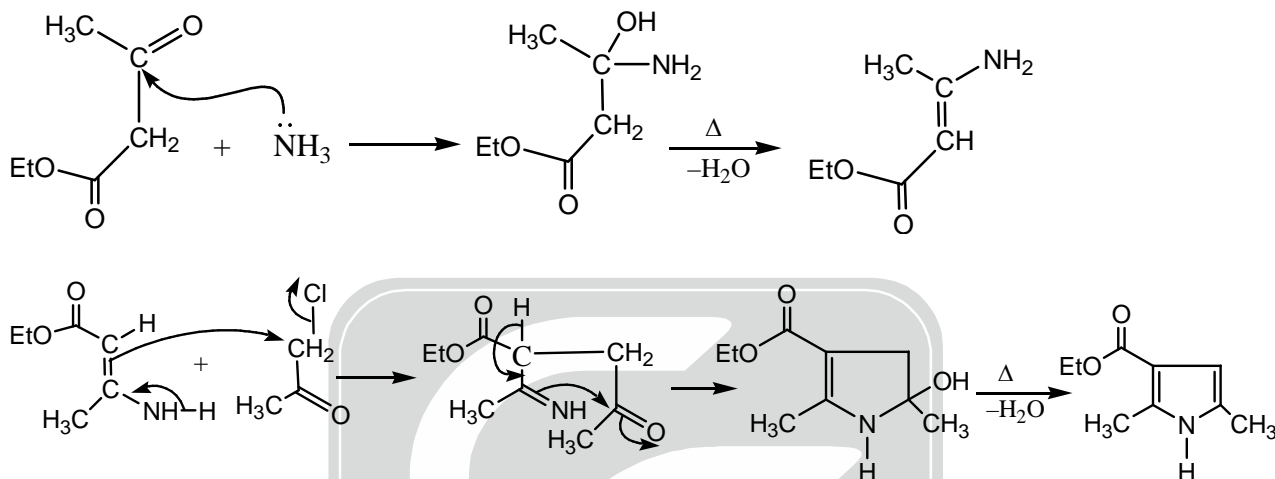
It involves the condensation between an α -amino ketone and a β -diketone or β -ketoester which produces derivative of pyrrole.

Mechanism:





(7) **Hantzsch synthesis:** Condensation between chloroacetone, a β -ketoester and primary amine or ammonia.

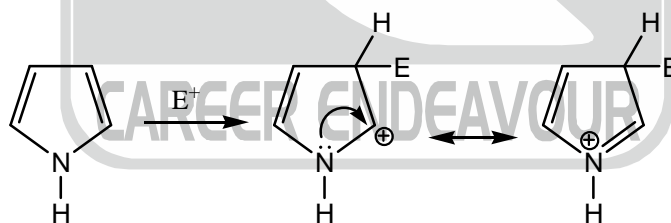


(C) Chemical Properties:

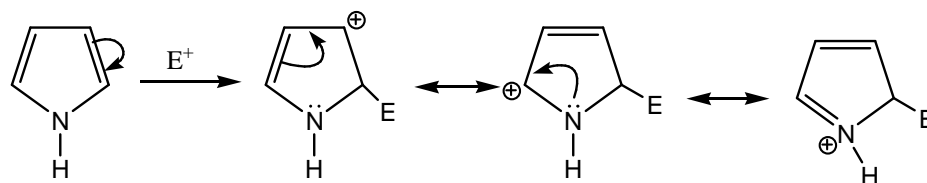
- Pyrrole is aromatic and more reactive than benzene.
- It gives electrophilic substitution reaction.

Preferential position for the attack of E^+ :

Case 1: Electrophilic attack at 3-position.



Case 2: Electrophilic attack at 2-position.



Since intermediate formed after the attack of E^+ at 2-position is more stable (due to more resonating structure) than that of intermediate formed after electrophilic attack at 3-position so, electrophilic substitution are favorably occurred at 2-position rather than three. If the 2-position is occupied then next substitution will be at 5-carbon if both position 2 and 5 are occupied then substitution can be possible at 3-position.

(1) **Reaction with Br_2 :** Reaction with bromine requires no Lewis acid and leads to substitution at all four free positions.