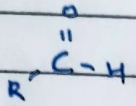
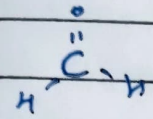
# Carbonyl Compounds

→ Aldehydes  general formula - $C_nH_{2n}O$

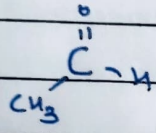
 → Methanal

→ Formation of aldehydes

→ oxidation of primary alcohols

condition - Heat and distil off

$CH_3CH_2OH + [O] \rightarrow CH_3CHO + H_2O$

 → Ethanal

$CH_3CH_2CH_2CH_2\underset{\text{aldehyde.}}{\underline{CHO}}$ → Pentenal

→ Reduction of aldehydes

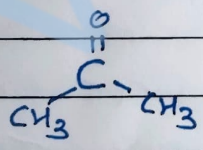
using $LiAlH_4$, $LiAlH_4$ should be in dry ether

$CH_3CHO + 2[H] \rightarrow CH_3CH_2OH$

using $NaBH_4$, $NaBH_4$ should be a aqueous, heat

$CH_3CHO + 2[H] \rightarrow CH_3CH_2OH$

⇒ Ketones

 → Propanone (simplest ketone)

$CH_3\underset{\text{ketone}}{\underline{CO}}CH_3$ → Propanone

Reduction of ketones give secondary alcohols.

use $LiAlH_4$ or $NaBH_4$

→ Formation of ketone

→ oxidation of secondary alcohol

condition - Heat under reflux

$CH_3CH(OH)CH_3 + [O] \rightarrow CH_3COCH_3 + H_2O$

ammonia - $NH_3$
ammonium - $NH_4^+$

* ketone and alcohol react with alkaline iodine solution to form yellow ppt.

* OH and COOH react w Na to give effervesce

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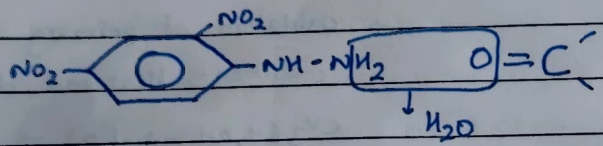
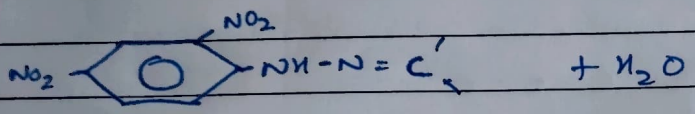
⇒ Testing for carbonyl compounds

Reaction Type - Condensation
Reagent - 2,4 - DNPH
Observation - Orange precipitate





⇒ Test for aldehydes

→ Tollens' reagent - ammoniacal silver nitrate

→ Observation - silver mirror seen with aldehyde

$$2CH_3CHO + 2OH^- + Ag^+ \rightarrow 2CH_3COO^- + Ag + 2H_2O$$

⇒ Test for aldehydes

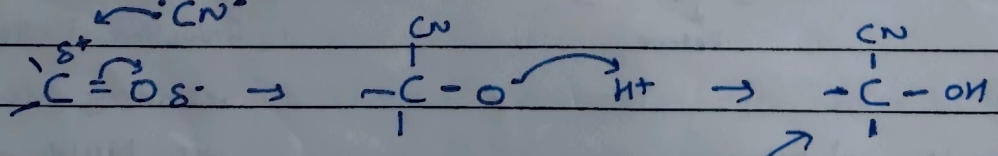
→ Fehling's solution - Alkaline solution with $Cu^{2+}$ ions

→ Observations - Pale blue solution changes to brick red precipitate

$$CH_3CHO + 5OH^- + 2Cu^{2+} \rightarrow CH_3COO^- + Cu_2O + H_2O$$

It is a KETONE if no change.

⇒ Nucleophilic addition mechanism → reduction of carbonyl uses this



Aldehyde/ketone + HCN → (in the presence of NaCN)

VK Notes