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General Methods of Preparation:

(A) For both Aldehydes and ketones:

(1) By Oxidation of Alcohols:

(a) By $K_2Cr_2O_7$ / H_2SO_4 :

Oxidation of primary alchohols gives aldehyde and oxidation of secondary alcohols gives ketones.
Here, ($K_2Cr_2O_7$ / H_2SO_4) is a strong oxidising agent.

$$RCH_2OH \xrightarrow[K_2Cr_2O_7/H_2SO_4(dil.)]{[O]} RCHO \quad \text{(Aldehyde)}$$

$$R-\underset{\underset{OH}{|}}{CH}-R \xrightarrow[K_2Cr_2O_7/H_2SO_4]{[O]} R-\underset{\underset{O}{||}}{C}-R \quad \text{(ketone)}$$

Aldehydes are quite susceptible to further oxidations to acids -

$$RCH_2OH \xrightarrow{[O]} R-CHO \xrightarrow{[O]} R-COOH$$

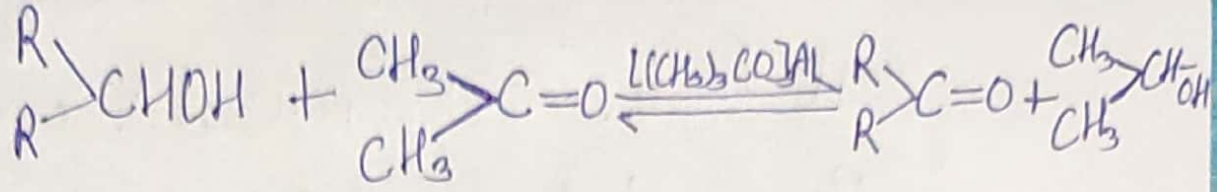
Thus oxidation of primary alcohols is made at the temperature much above the boiling point of aldehyde and thus aldehydes are vapourised out and prevented from being oxidised.

◆ Note: Aldehydes can be prepared from 1 alcohol, secondary alcohols can be oxidized to ketones by oxidation with Pyridinium Chlorchromate (PCC) in CH_2Cl_2 solvent, Pyridiniumdichromate (PDC) and with Jones reagent ($CCr_2O_3 + H_2SO_4$) in acetone.

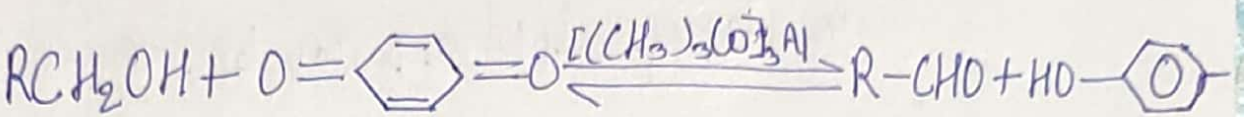
(b) Oppenauer oxidation:

The oxidation of secondary alcohols to ketones by heating them with specific reagent: $[(CH_3)_3CO]_3Al$ (Aluminium-t-butoxide) in presence of acetone. Primary alcohols may be oxidized to aldehydes if ketones is replaced by a better hydrogen acceptor, eg. P-benzoquinone. The equilibrium can be controlled by the amount of

acetone, an excess of which favours the oxidation of the alcohol.



2° Alcohol Acetone Ketone Isopropyl alcohol



1° Alcohol Quinone Aldehyde Quinol

◆ Note: The reaction is the reverse of Meerwein-Ponndorf-Verley reduction.

(C) Mild oxidising Agent:

1° alchols will get oxidised with CrO_3/Pyridine, Collin's reagent Ag/O_2 at 250°C

$$RCH_2OH + [O] \longrightarrow RCHO + H_2O$$

By this reaction, good yield of aldehyde is possible.