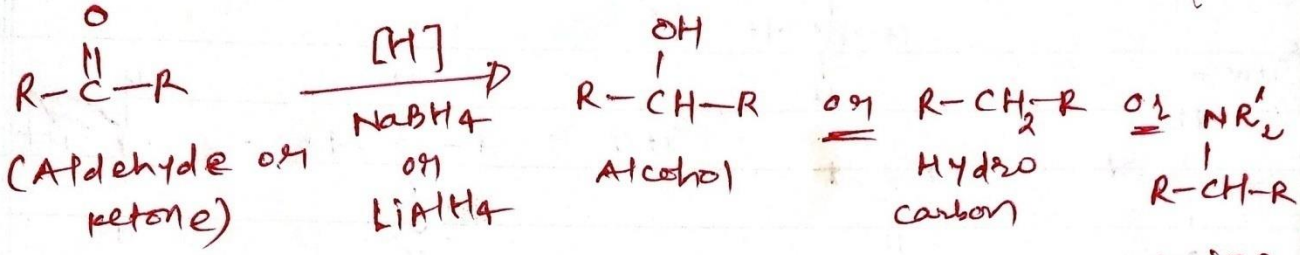
Name of Subject	:	Pharmaceutical Organic Chemistry III
Subject Code	:	BP401TT
Name of Chapter	:	Name reactions
Name of Topic	:	Metal hydride reduction
Prepared By	:	Dr. Sandip N. Badeliya
Name of faculty	:	Dr. Sandip N. Badeliya
Designation	:	Associate Professor
Education	:	M.Pharm, Ph.D

Metal hydride reduction

— Aldehyde or ketone whenever treated with Lithium aluminium hydride ($LiAlH_4$) or sodium borohydride ($NaBH_4$), reduction reaction will be taken place and they will be converted into Alcohol, hydrocarbon or an amine. This reaction is known as metal hydride reduction

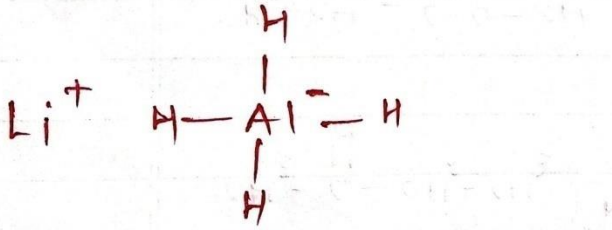


(Aldehyde or ketone) — Alcohol — Hydro carbon

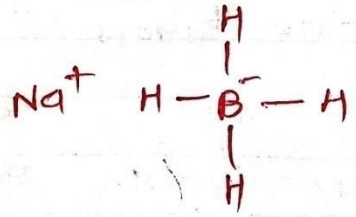
— As carbonyl gp. can not be catalytically hydrogenated so to reduce this carbonyl gp. metal hydride reduction is preferable.

— Two metal hydrides are used to reduce aldehydes and ketones

1) $LiAlH_4$ (Lithium Aluminium hydride) &
2) $NaBH_4$ (sodium borohydride)



Lithium aluminium hydride

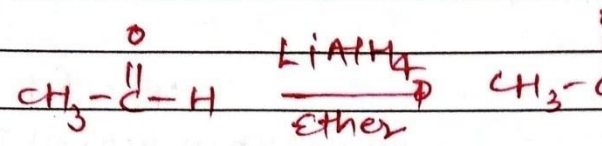


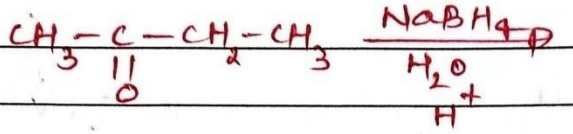
sodium borohydride

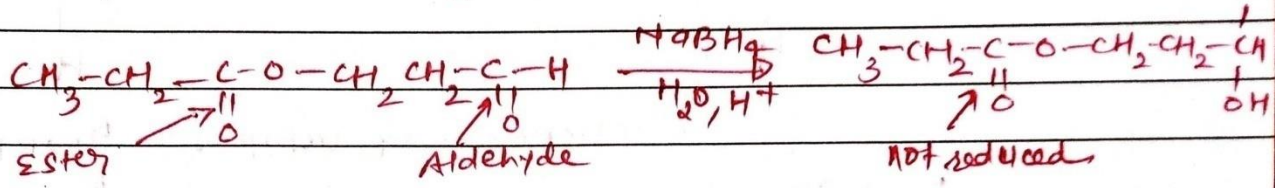
— $LiAlH_4$ is powerful reducing agent. It reduces Aldehydes and ketones. Beside this, It also reduces carboxylic acids, esters, amides and nitriles.

— $LiAlH_4$ is violent with water so reduction using $LiAlH_4$ usually carried out in anhydrous solvent like anhydrous ether

- $NaBH_4$ is mild reducing agent. It reduces only aldehydes and ketones.
- It has lower reactivity towards water so reduction using $NaBH_4$ can be done with water as a solvent
- It can not reduce carboxylic acid, ester, amide, nitriles.



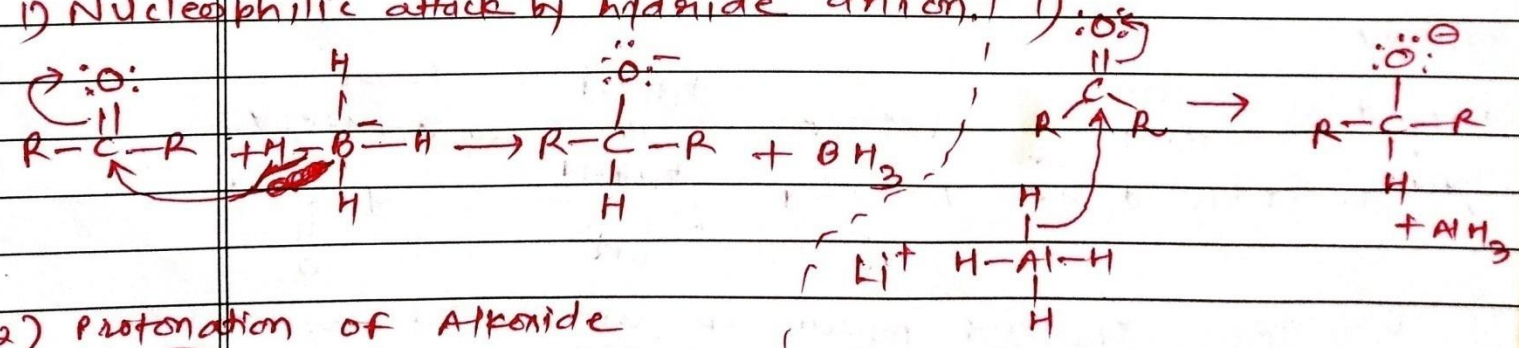




DIBAL-H (Diisobutylaluminium hydride) is newer reducing agent that similar to LAH. This also reduces carboxylic acids, & esters to aldehydes or ketones

mechanism of Using $LiAlH_4$

1) Nucleophilic attack by hydride anion.



2) Protonation of Alkoxide