

# SYNTHETIC REAGENTS

1.

28-07-2020

Lecture-1

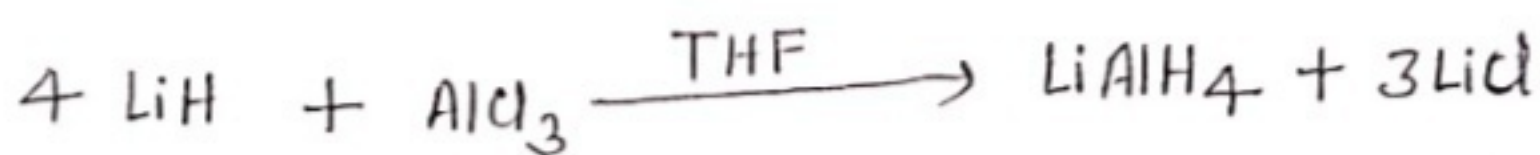
By-Dr.Rinky

Degree-III, Paper-VII, Chapter-2

## Lithium Aluminium Hydride

(LiAlH<sub>4</sub>)

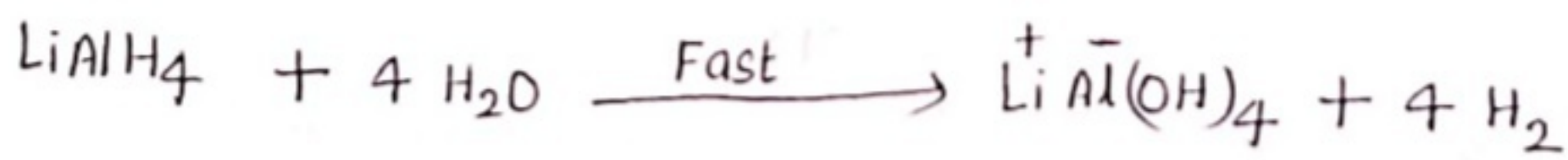
Lithium aluminium hydride (LAH) is prepared by reaction of lithium hydride (LiH) with aluminium trichloride (AlCl<sub>3</sub>) in THF.



- \* Lithium Aluminium hydride reacts violently with water or protic solvents, resulting in the liberation of hydrogen.
- \* Reduction with LiAlH<sub>4</sub> are usually carried out by adding the compound to a flask, containing LiAlH<sub>4</sub> dissolved either in dry ether, THF or dioxane.
- \* LiAlH<sub>4</sub> is more reactive than NaBH<sub>4</sub> and normally reduces various polar functional groups except alkenes and alkynes.
- \* It reduces aldehydes, ketones, esters, carboxylic acids,

acid anhydrides, acid chlorides and epoxides to the corresponding alcohols.

\* Amides, nitriles, aliphatic nitro compounds are converted to the corresponding amines.

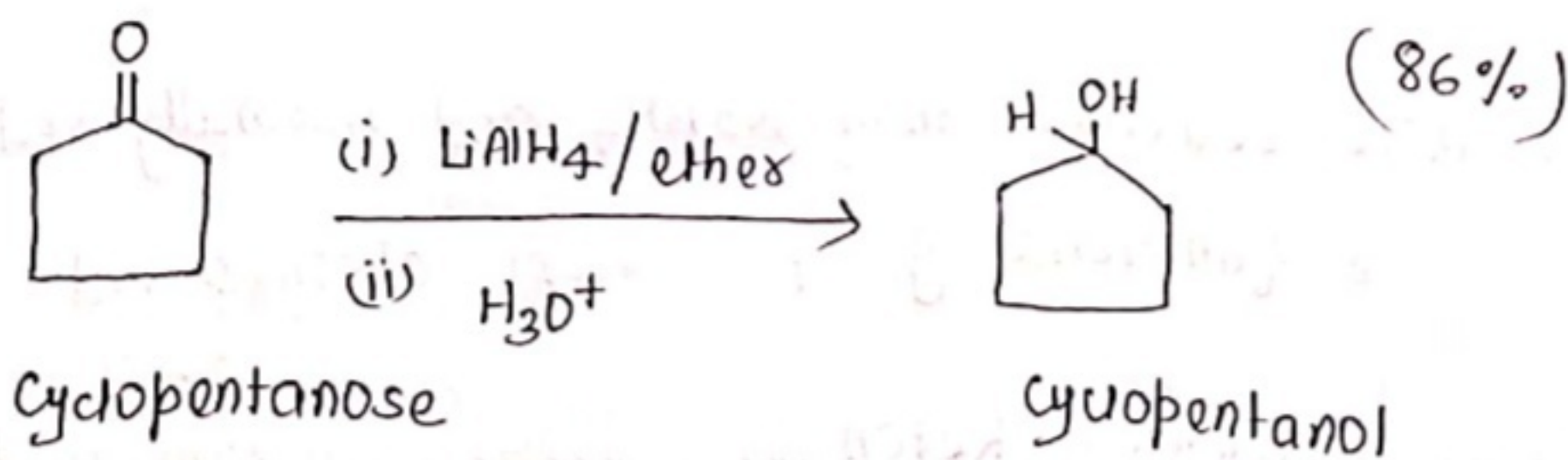
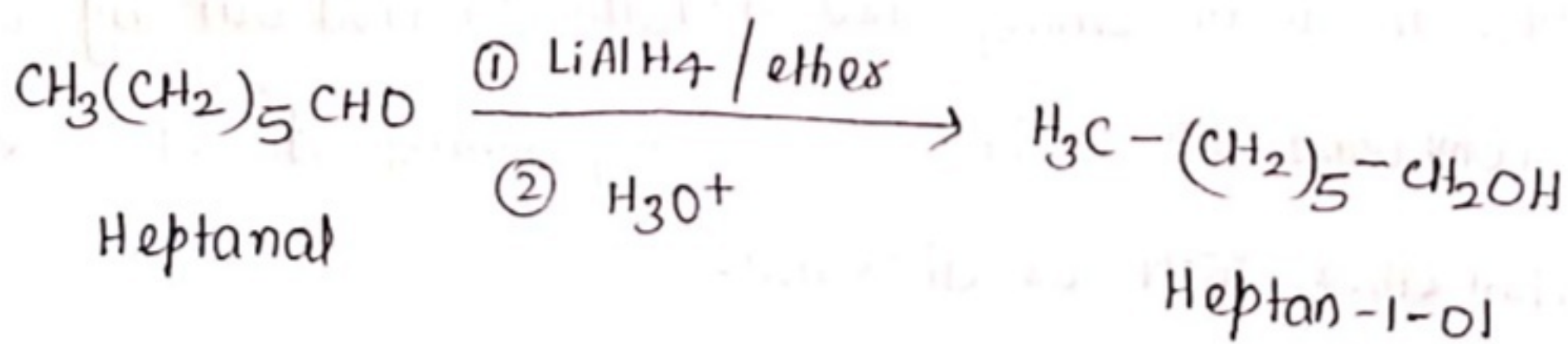


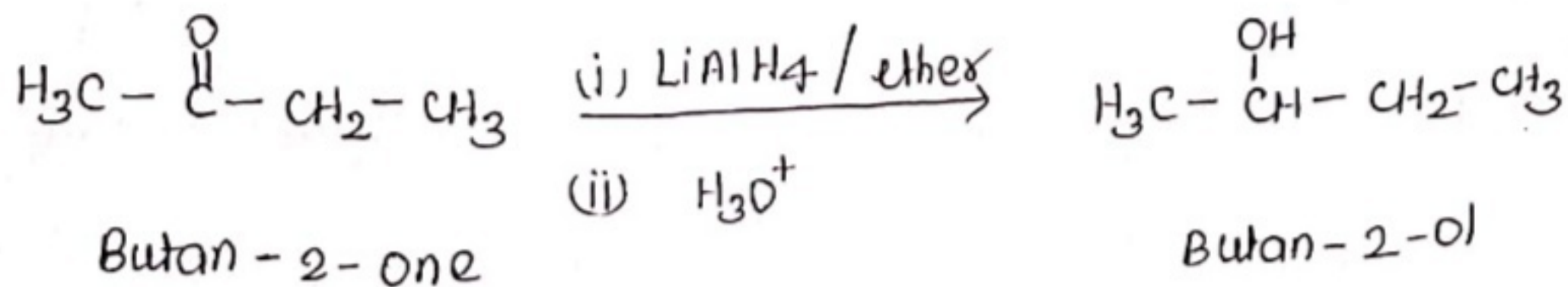
## Reduction of Carbonyl Compounds

LAH reduces aldehydes to primary alcohols and ketones to secondary alcohols.

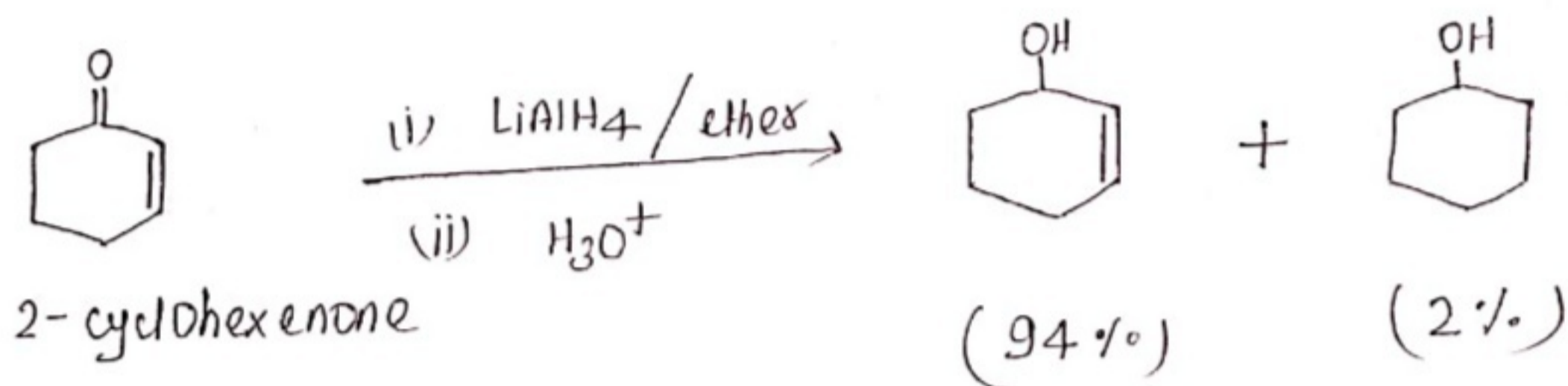
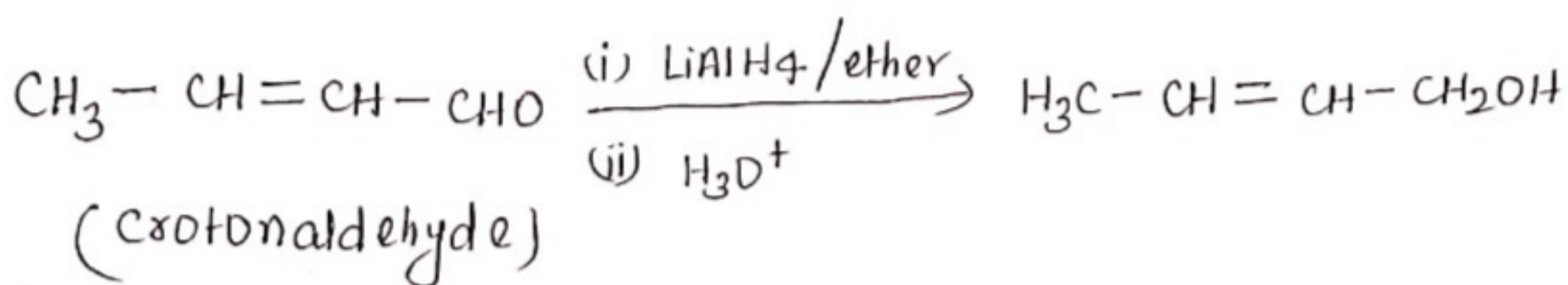
Reduction of aldehydes is faster than ketones because there is less steric hindrance.

\* Following are given some typical reductions of aldehydes and ketones by LAH.

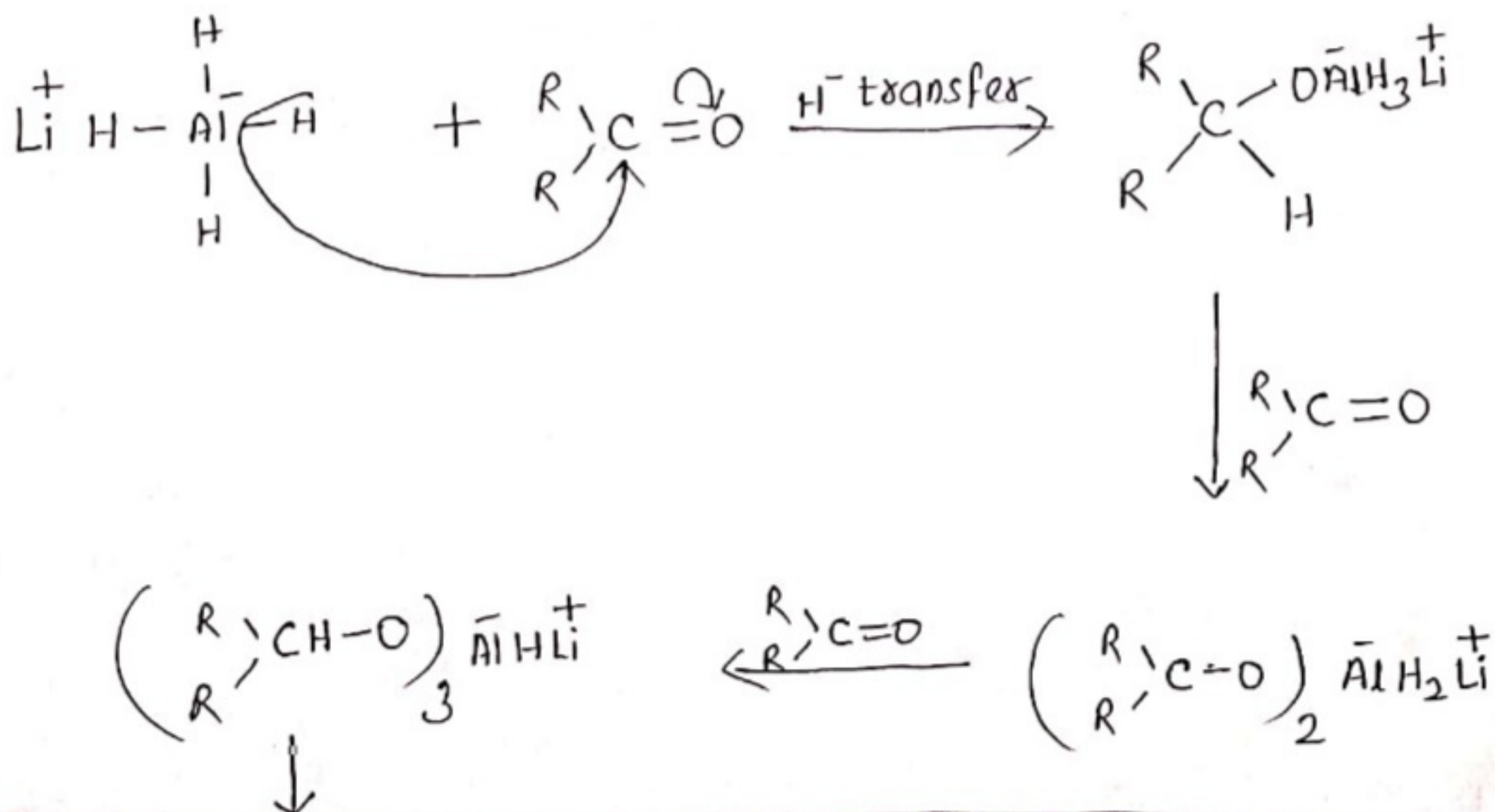


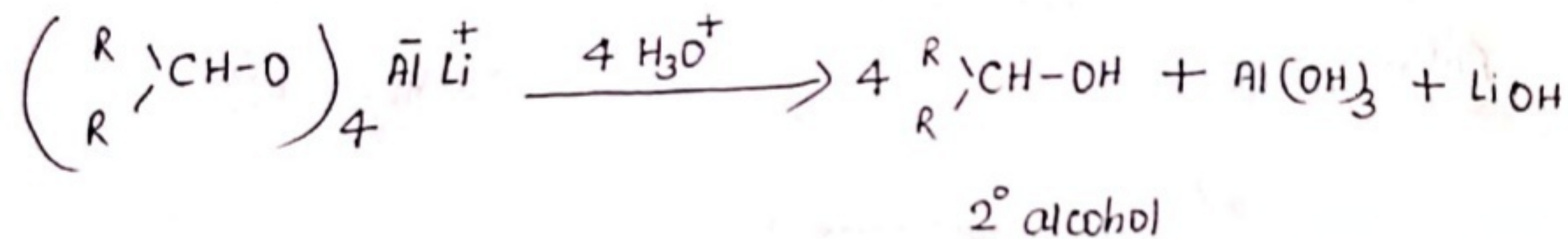
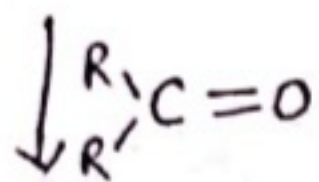


\* Reduction of  $\alpha, \beta$ -unsaturated carbonyl compounds generally give 1,2-reduction product (ie; double bond or triple bond is not reduced).



## Mechanism





## Reduction of Carboxylic acid and its derivatives :-

Reduction of carboxylic acid and its derivatives, viz; esters, acid anhydrides and acid chlorides results in the formation of corresponding alcohols.

Aromatic anhydrides may undergo partial reduction with one equivalent of LAH, but diols are the more useful product.

\* The order of reactivity of carboxylic acid and its derivatives towards LAH reduction is :-



**To be Continued in next lecture...**