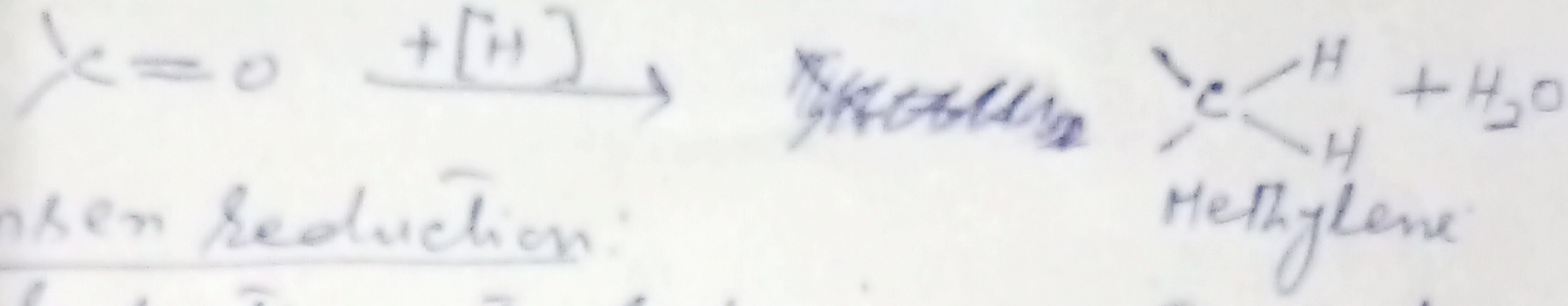
Unit – II

Reduction of aldehydes and Ketones:

1. Reduction to hydrocarbons:

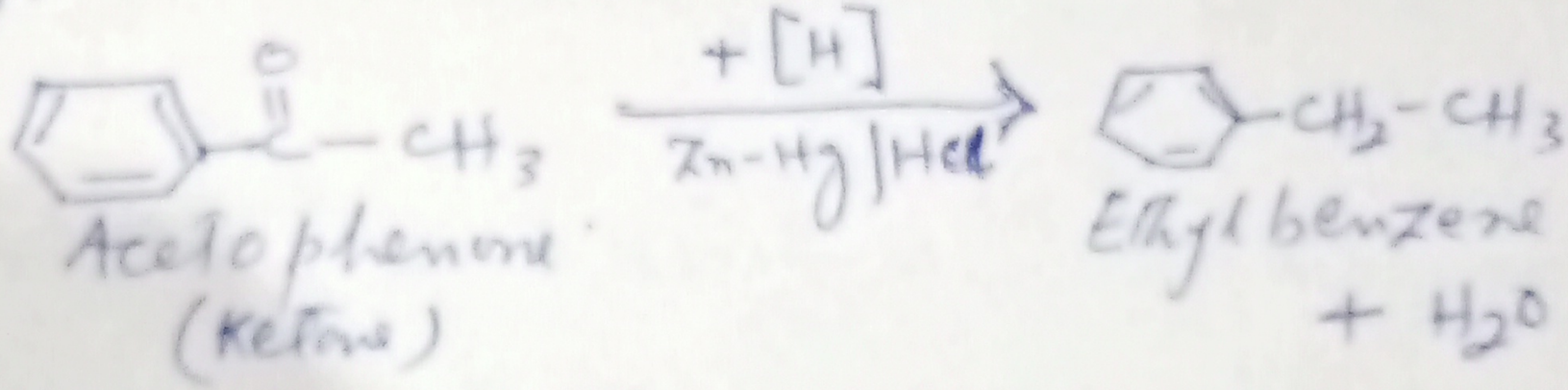
Carbonyl group (>C=O) of aldehydes and Ketones is reduced to methylene (=CH₂) group to form hydrocarbons



i) Clemmensen Reduction:

In this Reduction, the Reducing agent used is Zn-Hg | con HCl.

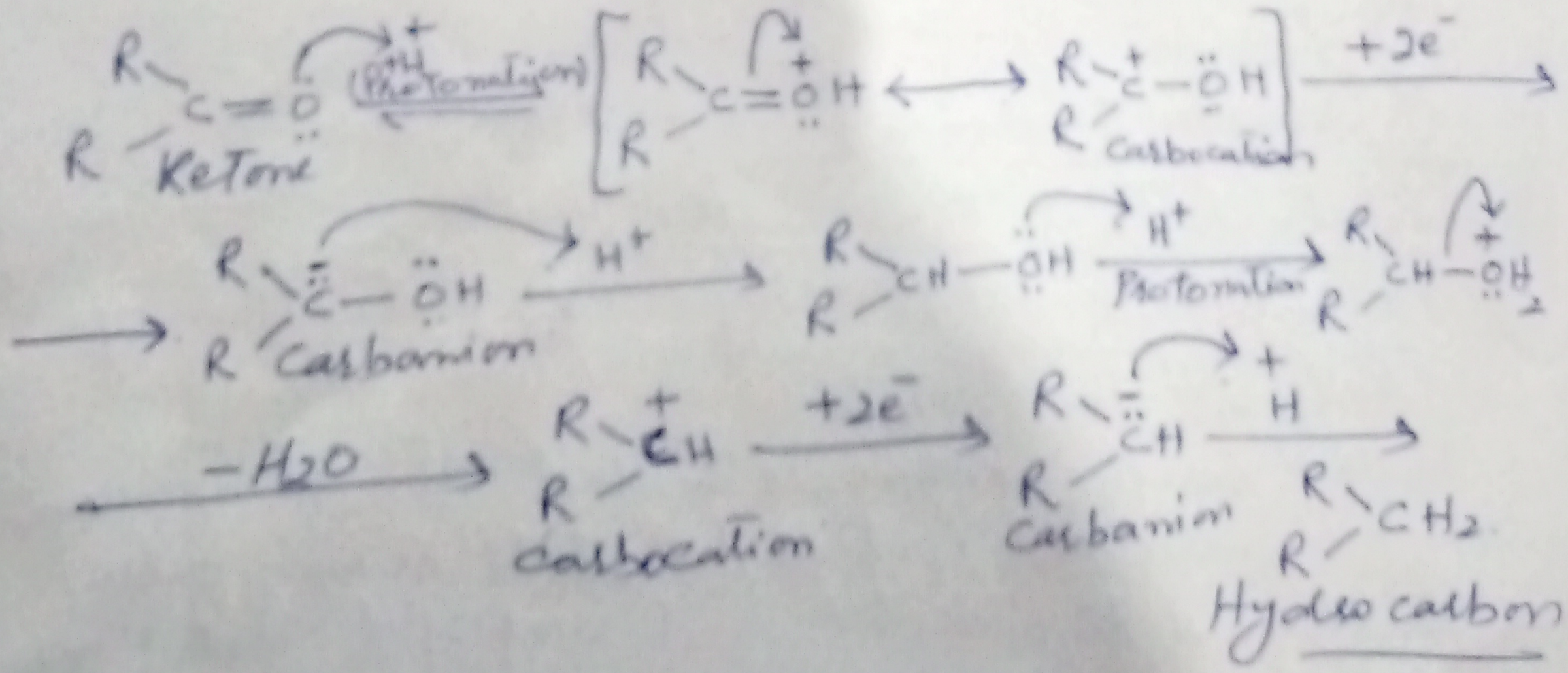
For example:



This Reduction is mostly used for Ketones

Mechanism:

$Zn \longrightarrow Zn^{++} + 2e^-$, $HCl \rightleftharpoons H^+ + Cl^-$



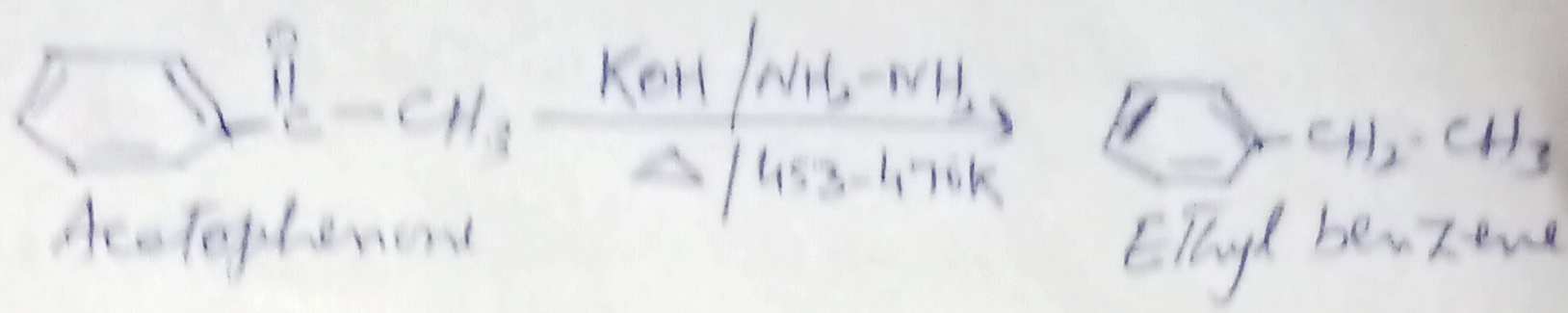
PTO

(1) Wolff-Kishner Reduction:

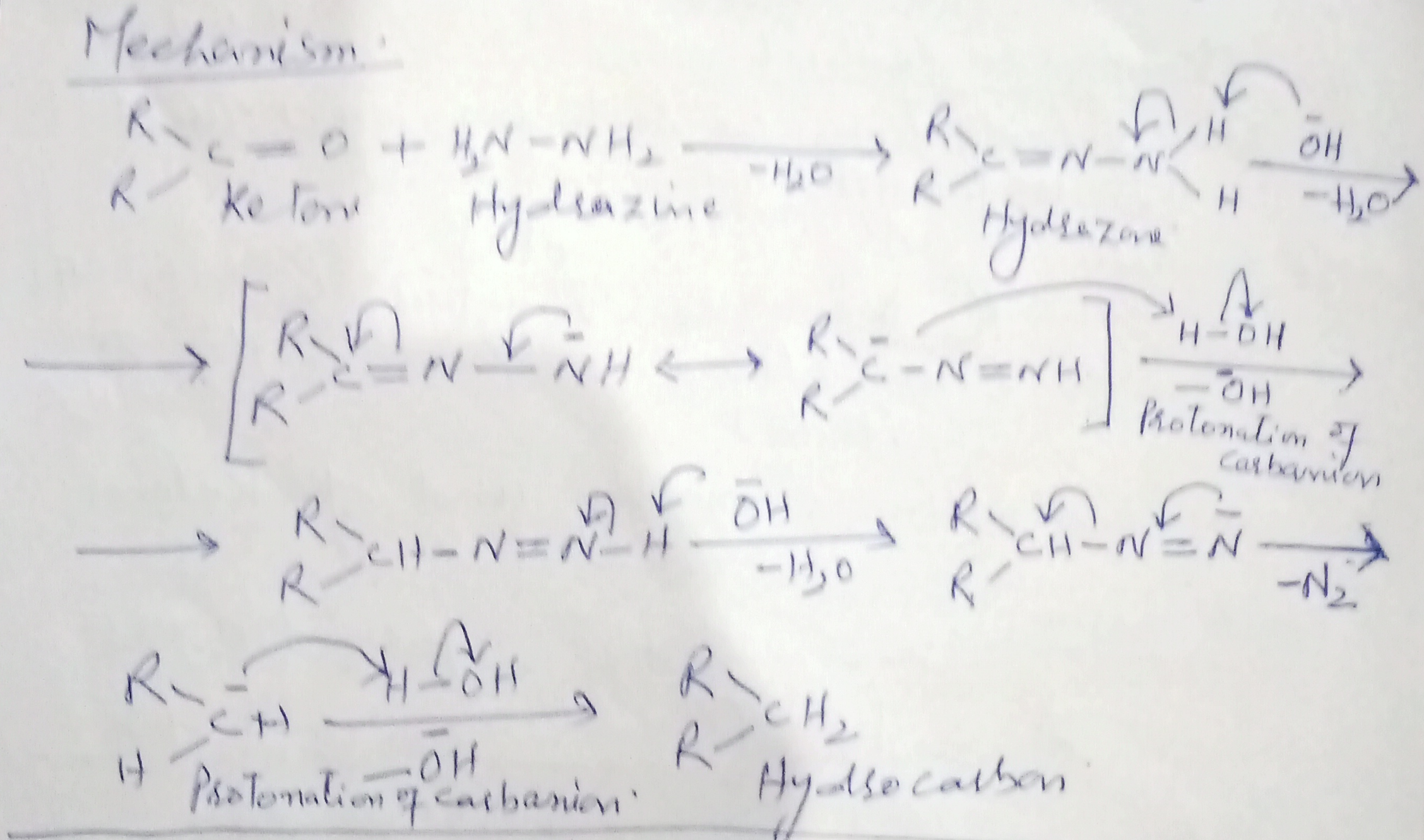
In this reaction the reducing agent used are:

KOH/NH_2-NH_2 (Hydrazine) OR $(CH_2)_2OK$ / ethylene glycol

For example:



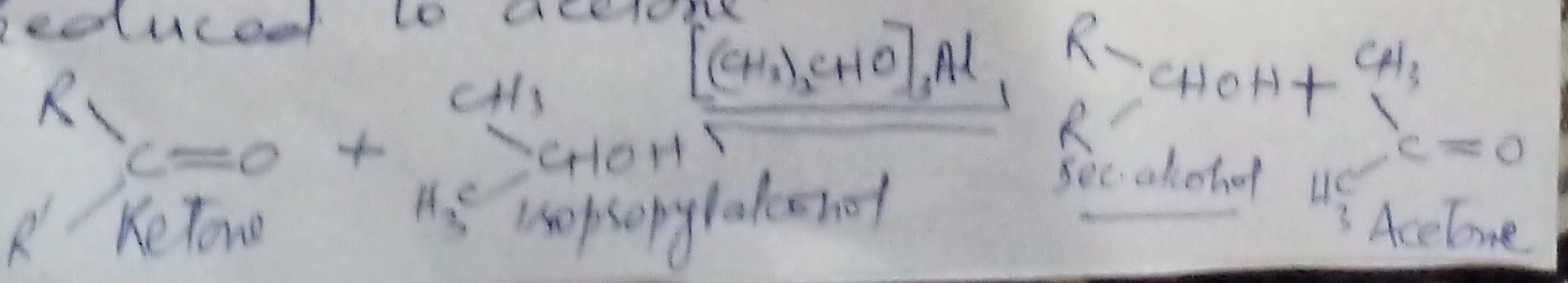
Mechanism:



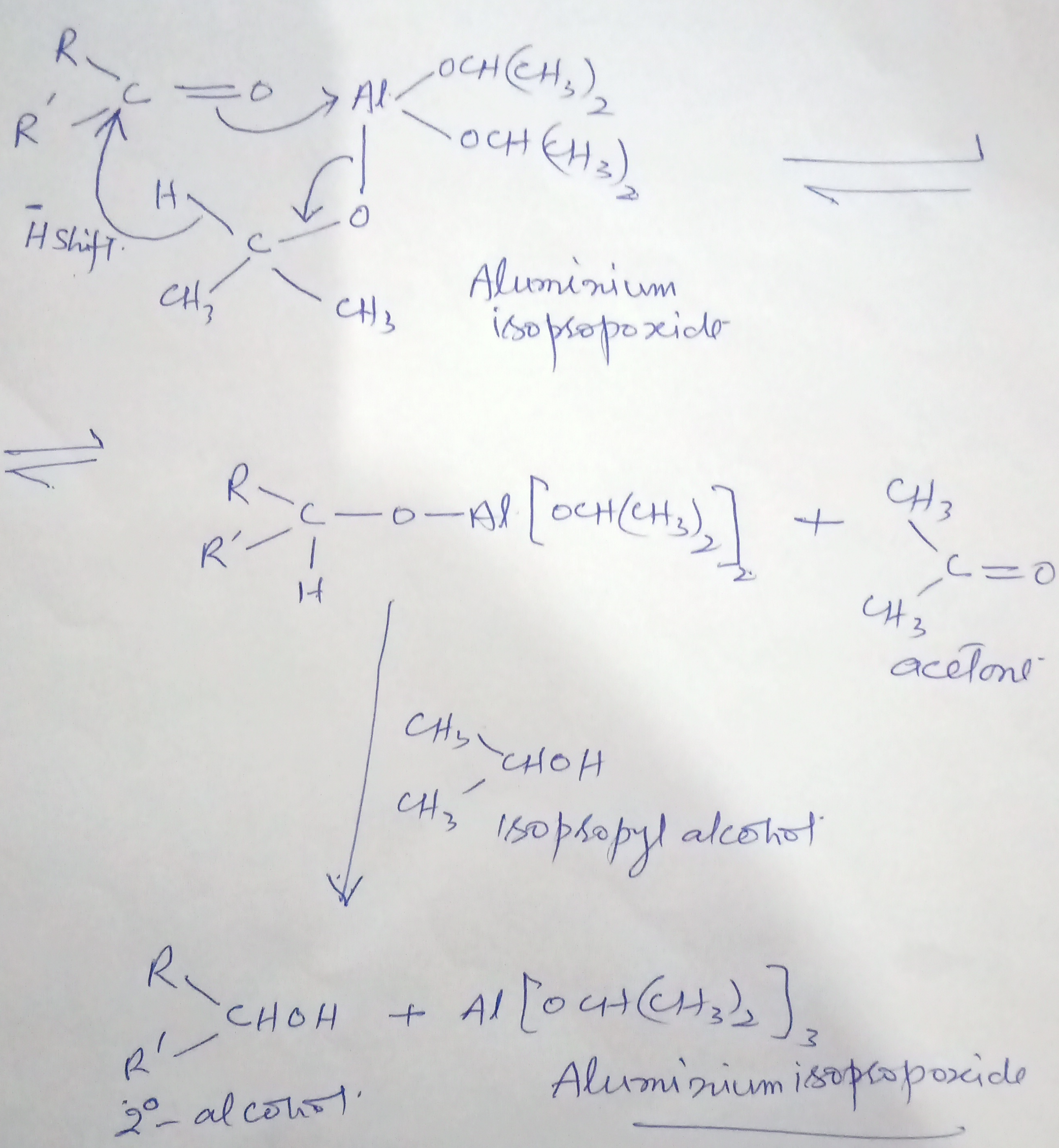
(2) Reduction to alcohols:

Meerwein-Pondorf-Verley (MPV) Reduction of Ketones to alcohols.

In this reaction Ketone is heated with aluminium isopropoxide and isopropyl alcohol. Ketone gets reduced to alcohol and isopropyl alcohol gets reduced to acetone.



Mechanism:


R
R'
C
O
Al
OCH(CH3)2
OCH(CH3)2
H
O
C
CH3
CH3
H shift
Aluminium isopropoxide
R
R'
C
H
O
Al[OCH(CH3)2]2
CH3
C=O
CH3
acetone
CH3
CHOH
CH3
isopropyl alcohol
R
CHOH
R'
2°- alcohol
Al[OCH(CH3)2]3
Aluminium isopropoxide