

Reactions in organic chemistry

① Ascending a homologous series
(to increase the no. of carbon atoms)

(a) Wurtz reaction:-

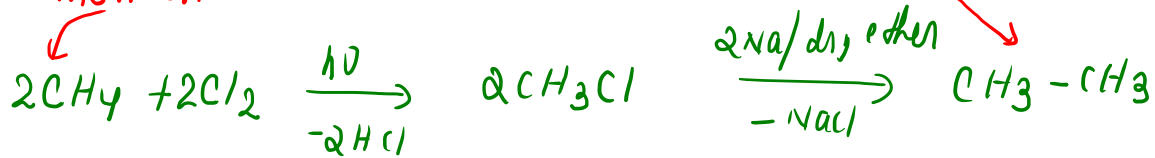


General reaction:-

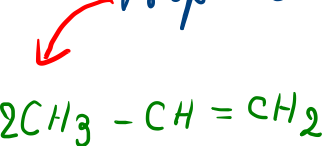
will be helpful to get alkanes having even no. of carbon atoms.

employed only in the preparation of symmetrical alkanes

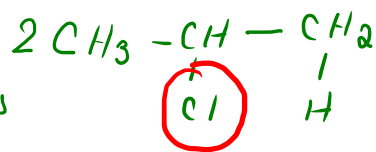
methane to ethane



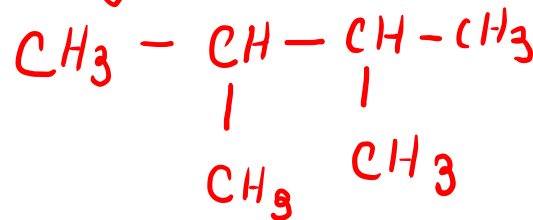
Propene to 2,3-dimethylbutane



$\xrightarrow[\text{Markovnikov's}]{2\text{HCl}}$
addn



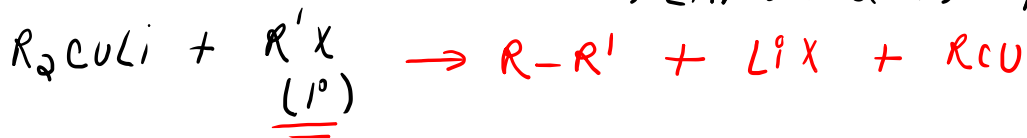
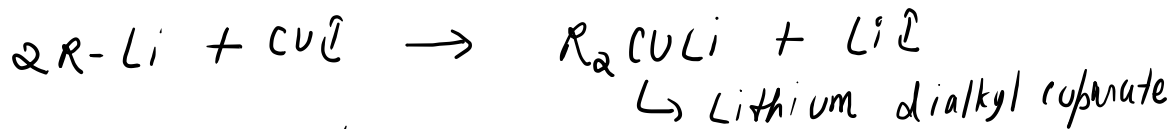
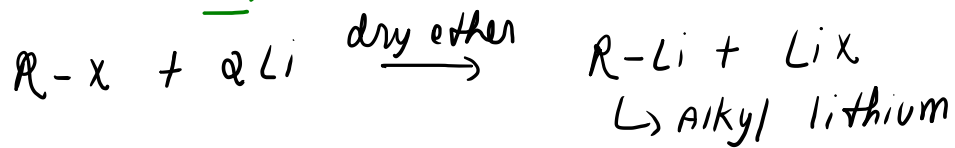
$\xrightarrow[\text{-2NaCl}]{2\text{Na/dry ether}}$



Note: - to use wurtz reaction we'll have to get alkyl halide from whatever we have.

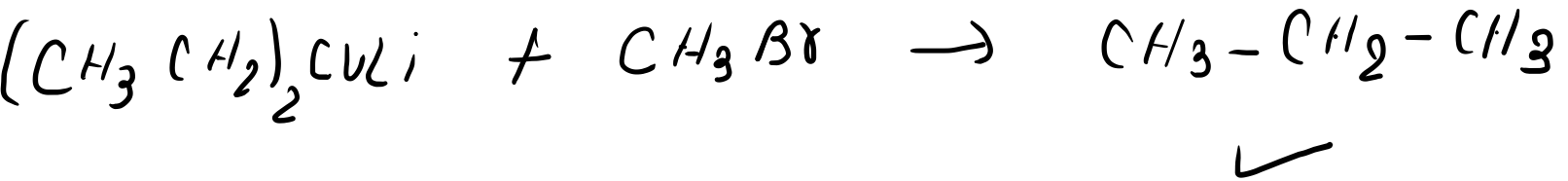
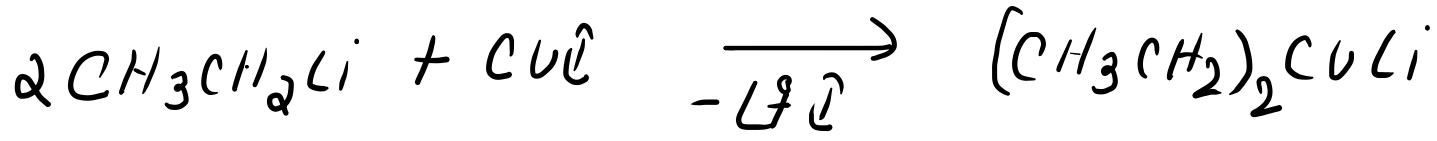
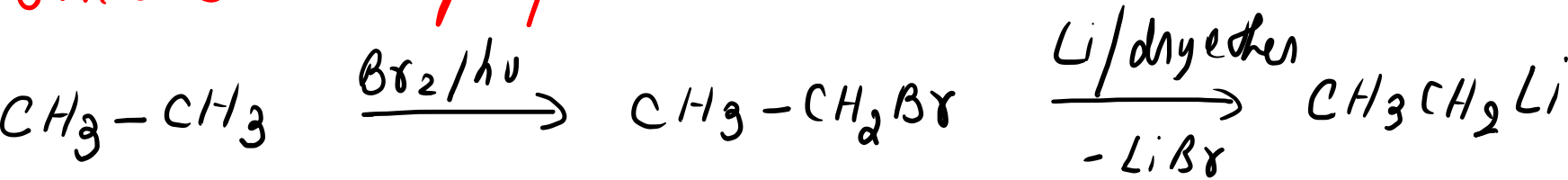
(b) Corey-house synthesis

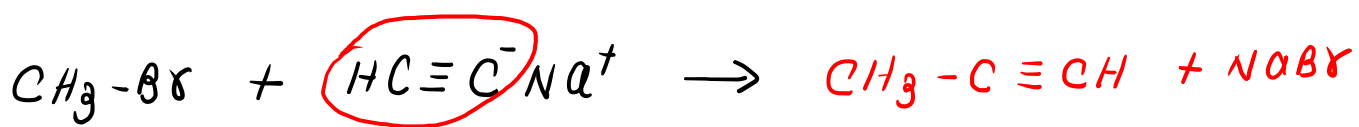
(can be used to ^{also} get unsymmetrical alkanes).



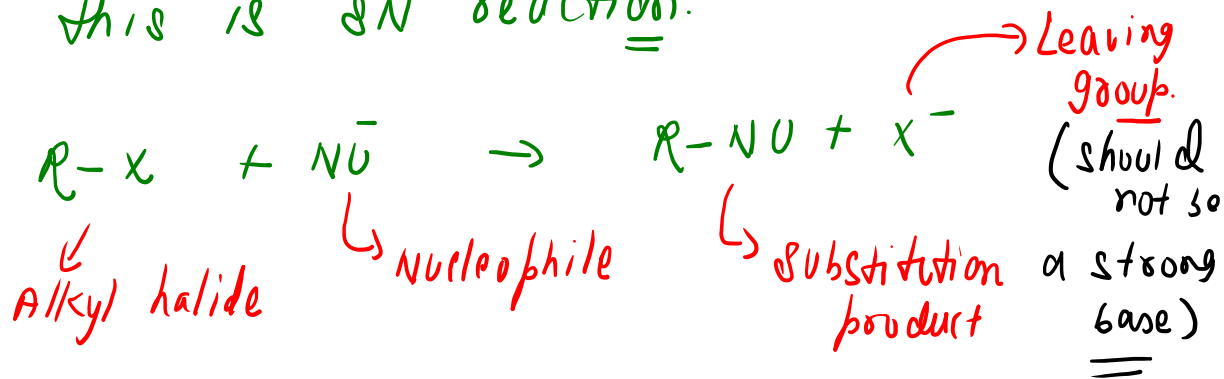
Alkyl group of R_2CuLi can be 1° , 2° , 3° but $R'X$ must be methyl halide or a primary alkyl halide.

Ethane to propane.

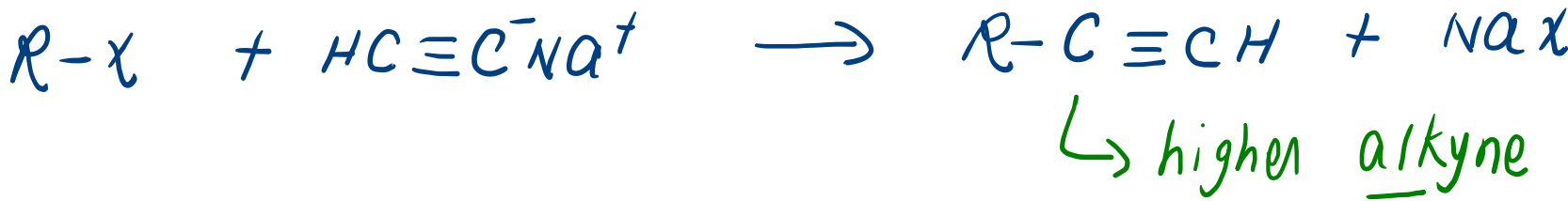




this is SN reaction.

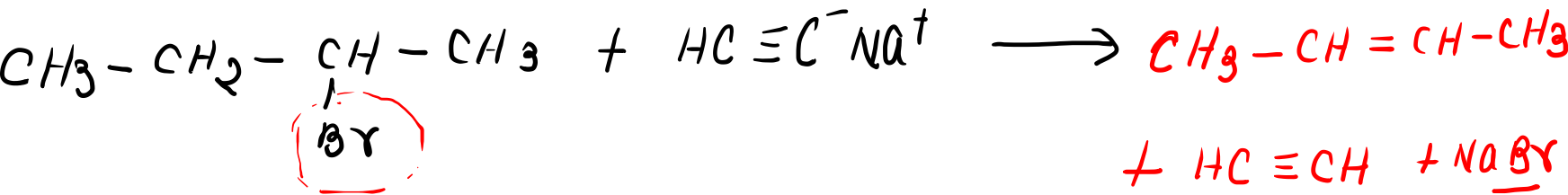


General reaction:-

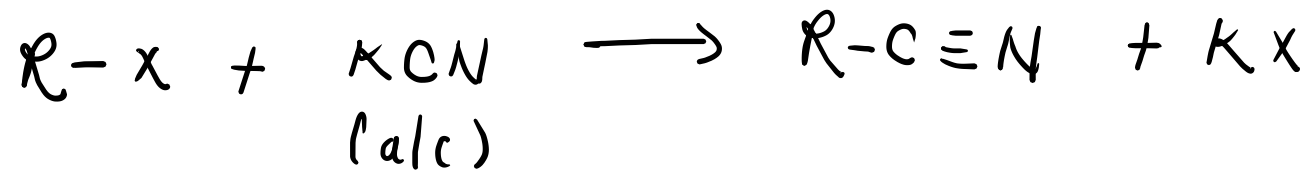


Note:- It fails with 2° & 3° alkyl halides, because there alkynide ion acts as base rather than as a nucleophile. So in this case alkynide ion will lead to elimination.

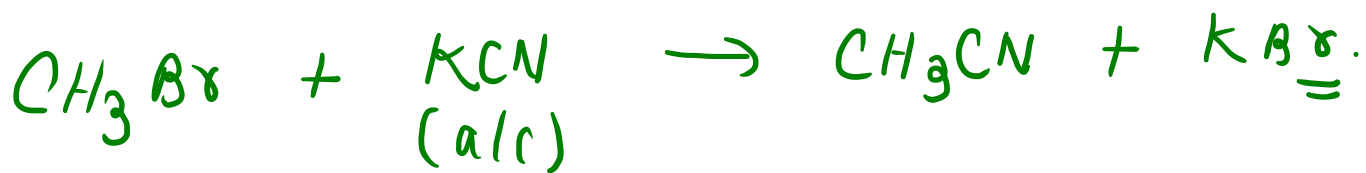
Dehydrohalogenation.

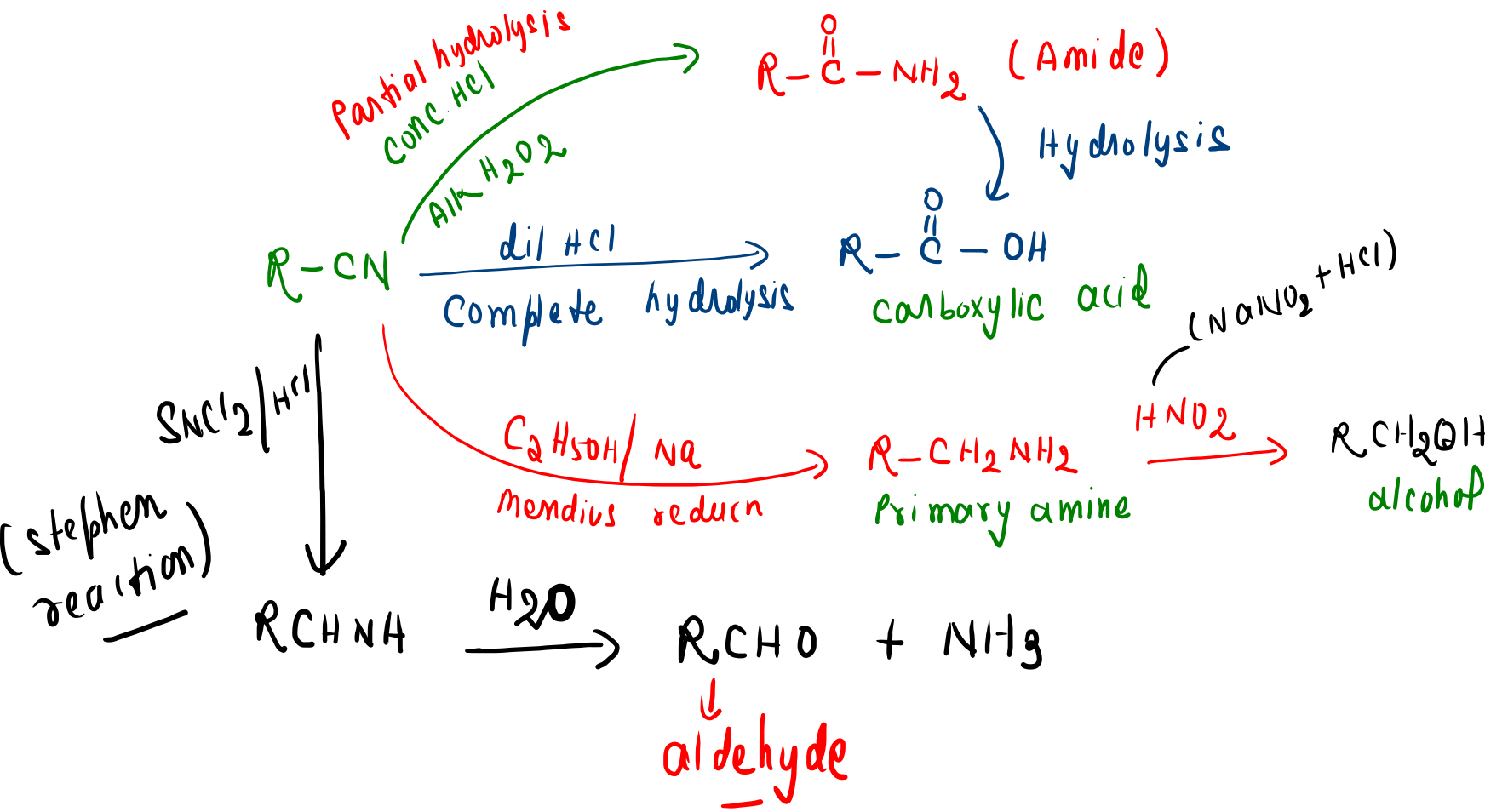


(d) cyanide method:-

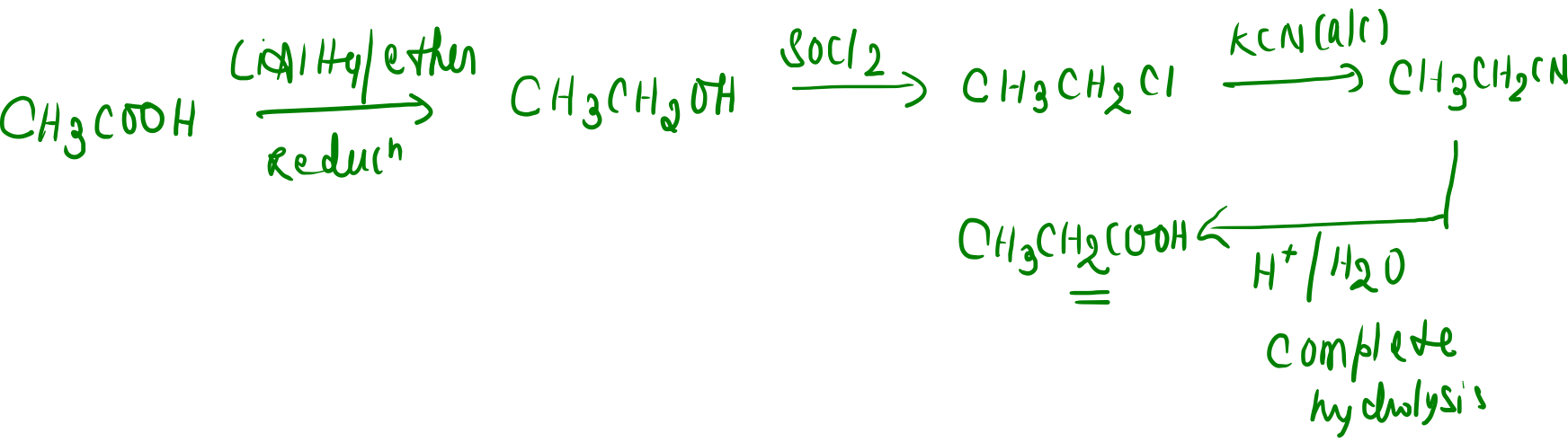


this method can be used to increase the carbon chain length by one unit.

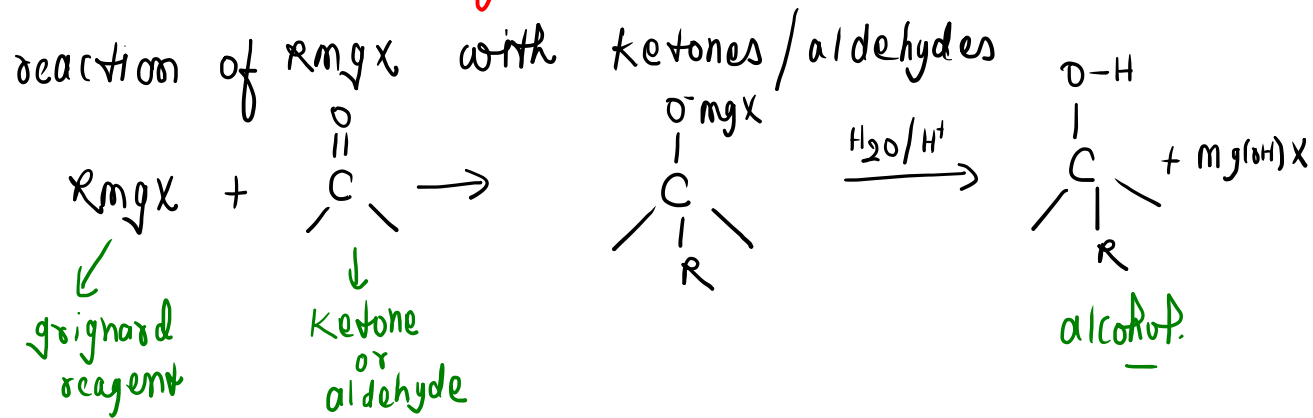




8 Convert Acetic acid to propanoic acid.



② by the use of Grignard reagent (RMgX or ArMgX)

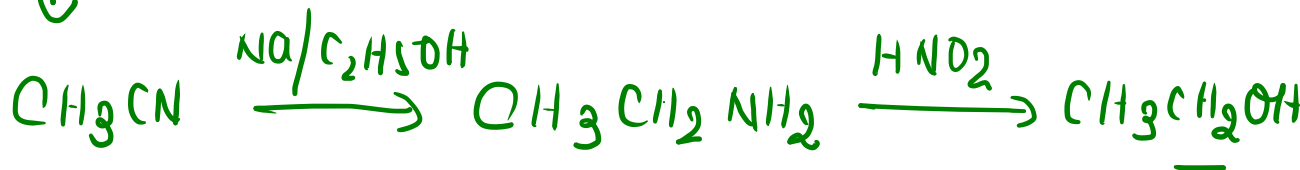
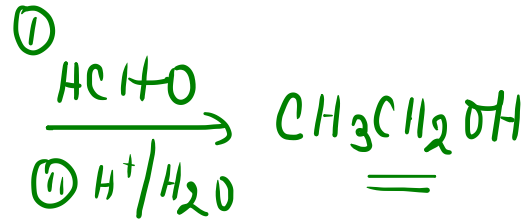
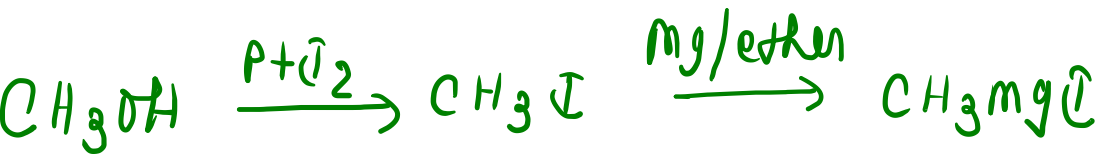


Note:

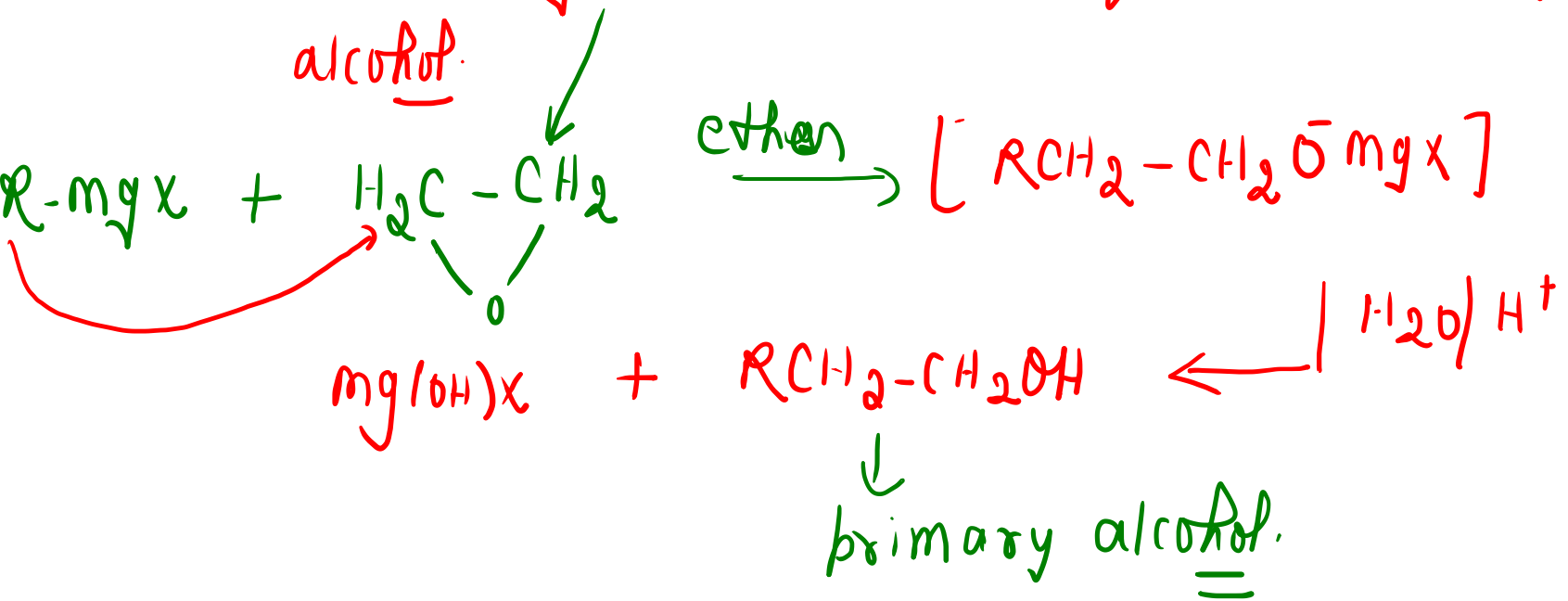
Formaldehyde \rightarrow 1° alcohol
Any other aldehyde \rightarrow 2° alcohol
ketone \rightarrow 3° alcohol

} this reaction increase the no. of atom & changes degree also.

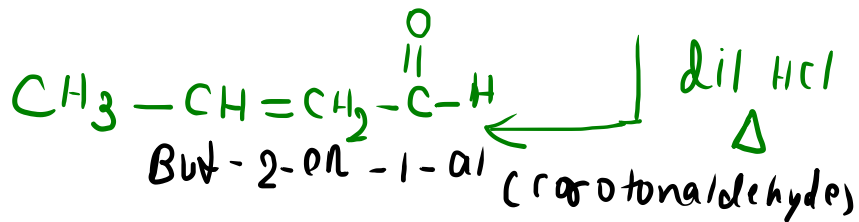
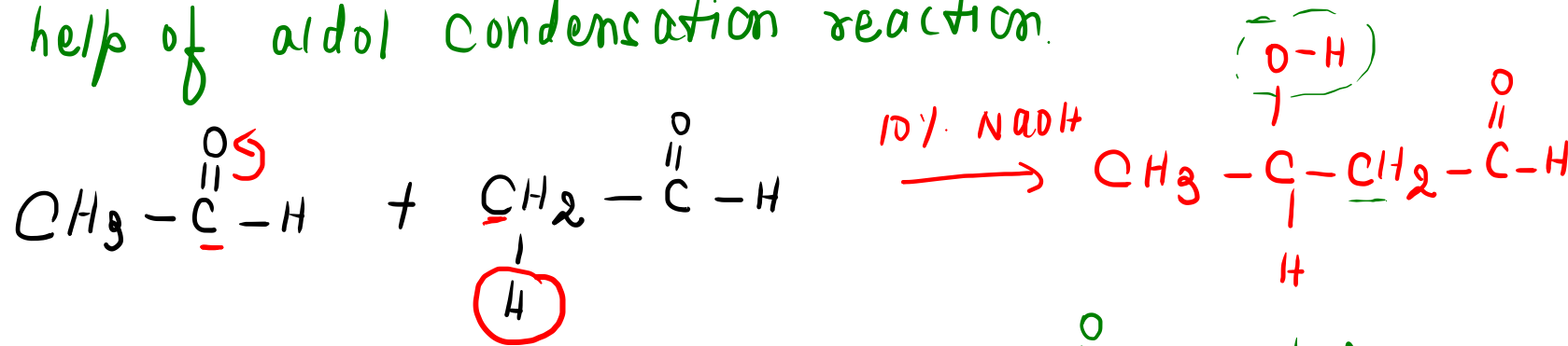
Convert methanol to ethanol.



Grignard reagent also reacts with epoxide
(such as ethylene oxide) to form primary
alcohol.

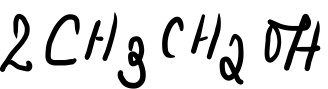


(f) by the use of aldol condensation reaction.
 Lower aldehydes & ketones containing α H can be converted to higher alcohols with the help of aldol condensation reaction.

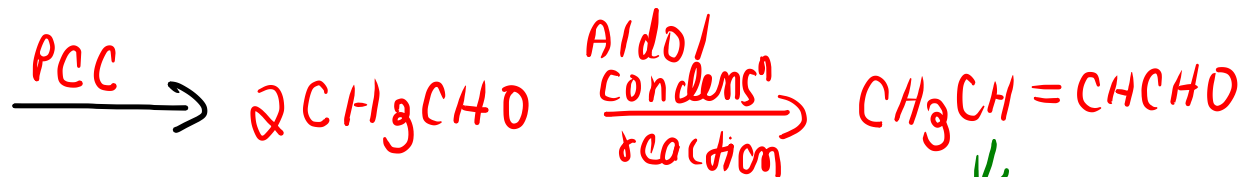


Convert

ethanol to butanol

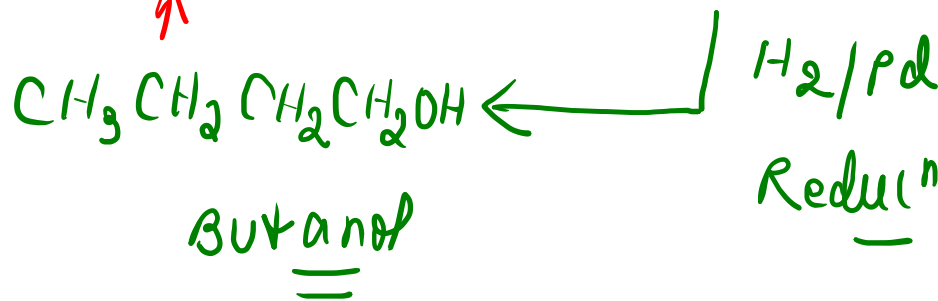


↓
Primary
alcohol

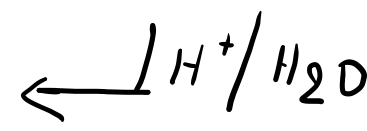
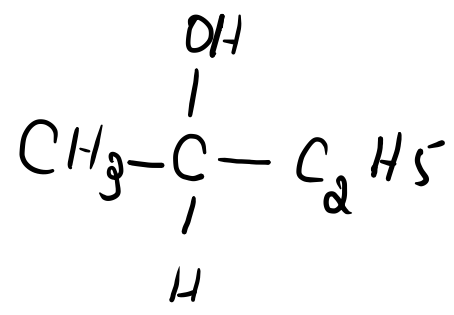
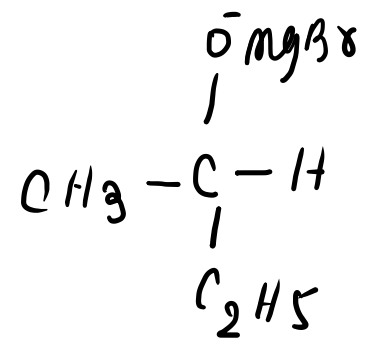
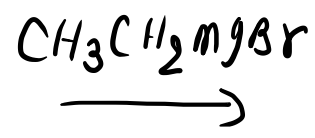
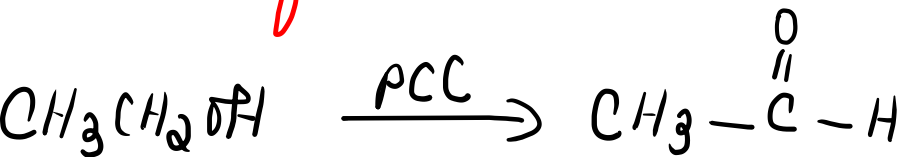


Primary ~~alcohol~~

↓
But-2-en-1-al
or
Crotonaldehyde



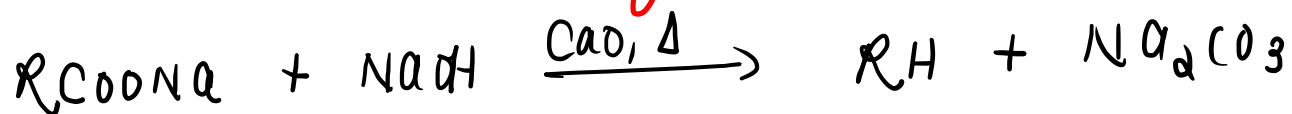
what if we RMgX.



Butan-2-ol

Descending a homologous series
(to decrease the number of carbon atoms).

① Decarboxylation of monocarboxylic acid:-

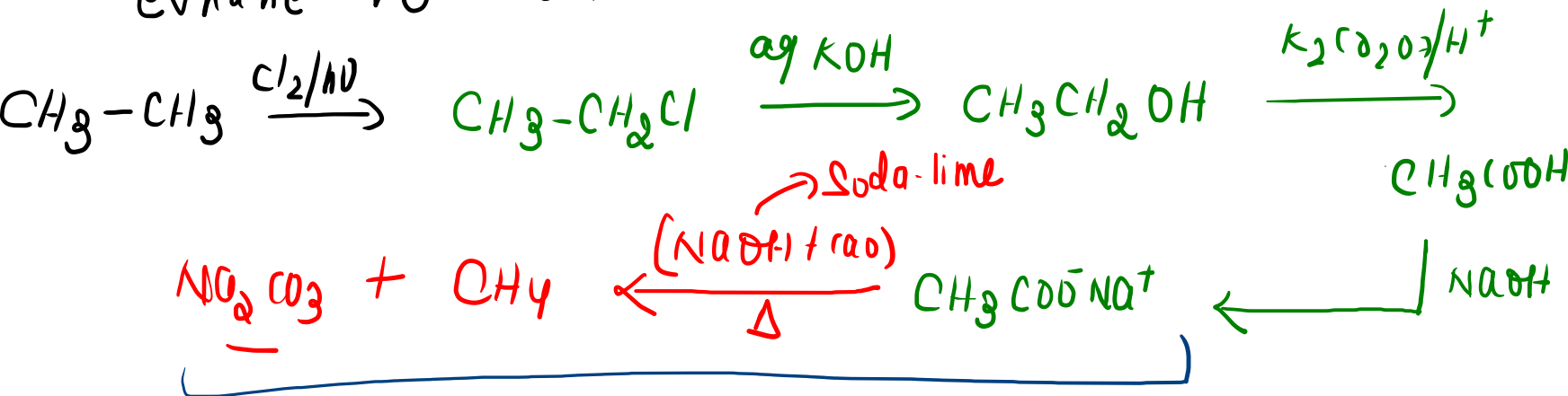


Sodium or potassium salt of acid when
reacted with soda lime gives alkane.

Note: This method can be used to decrease
the carbon chain length by one unit.

Convert:-

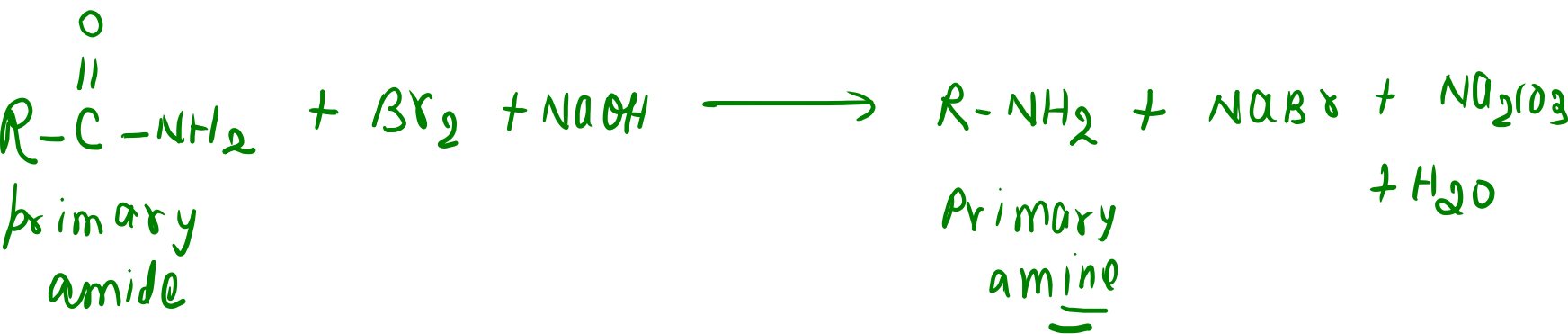
Ethane to methane



Decarboxylation reaction

⑤ Hoffmann rearrangement of amides.
(Hoffmann bromoamide degradation)

Amides with no substituent on the nitrogen atom react with solutions of bromine or chlorine in sodium hydroxide to yield primary amines with the loss of carbonyl carbon atom.

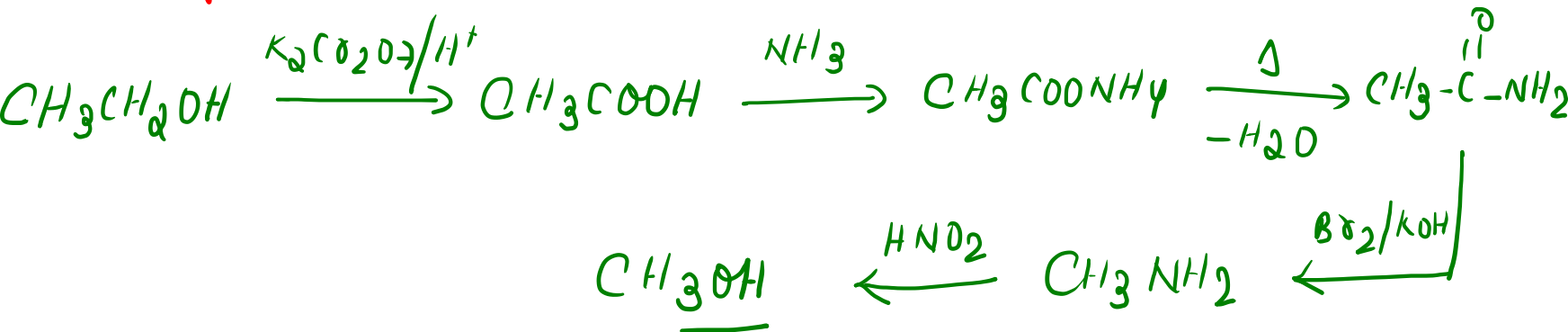


Note:-

this reaction can be used to get
primary amines with 1° , 2° & 3° alkyl groups
or aryl amines.

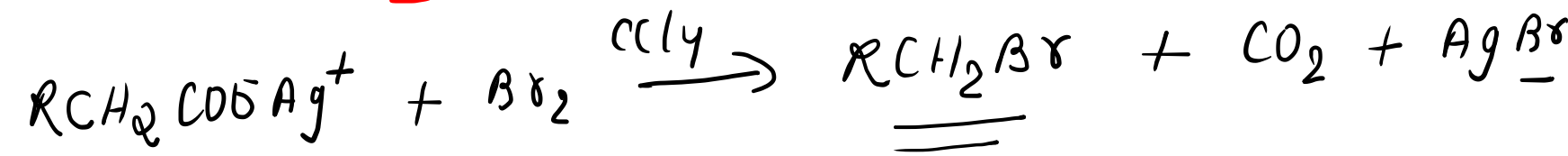
convert:-

ethyl alcohol to methyl alcohol.



© Hunsdiecker reaction

Alkyl bromides can be prepared by brominative decarboxylation of the silver salt of carboxylic acid

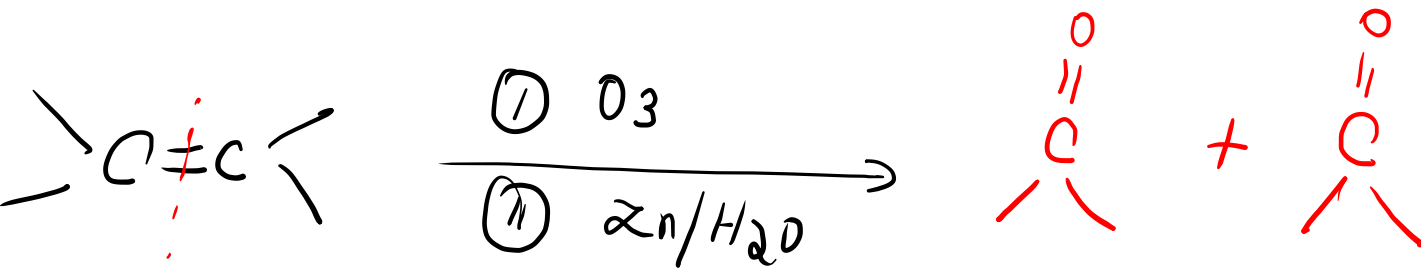


Ozonolysis of alkene

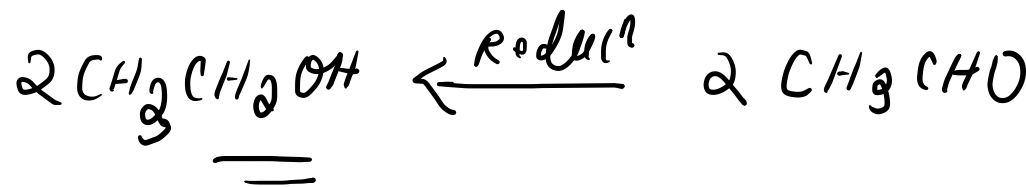
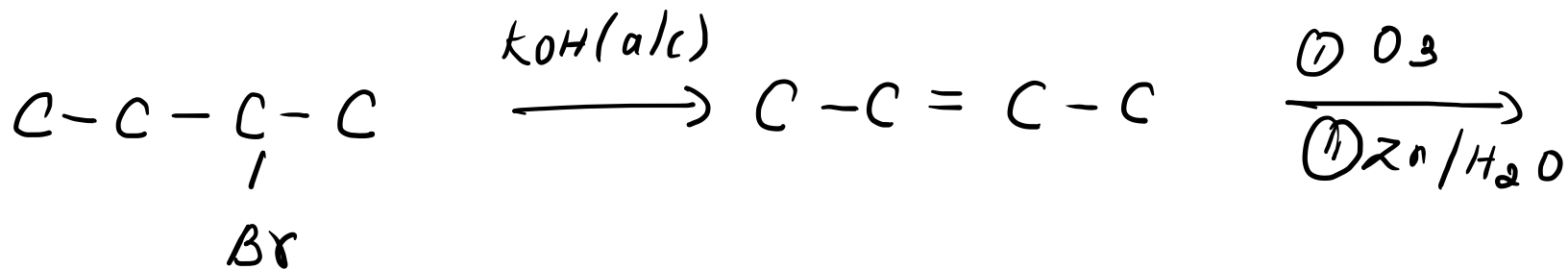
↳ gives ketones & aldehyde as product

and also they break carbon chain into

two halves.

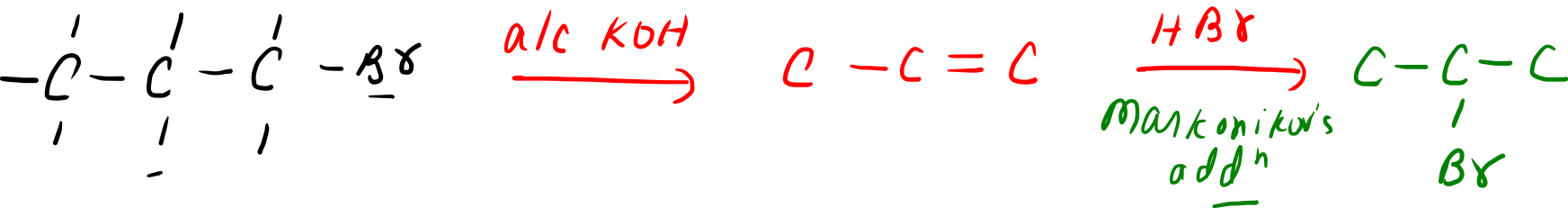


Q Convert 2-bromobutane to ethanol.



Changing the place of functional group:-

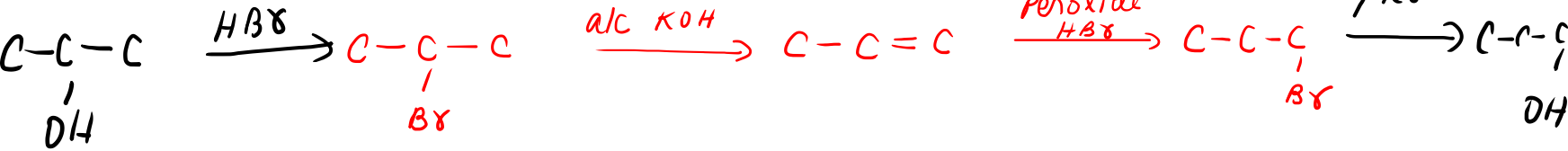
① 1-Bromopropane to α -bromopropane



2-Propanol

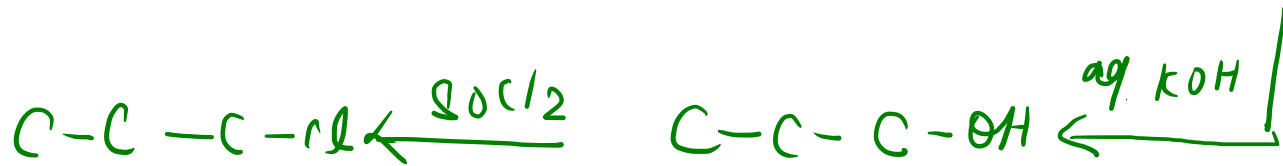
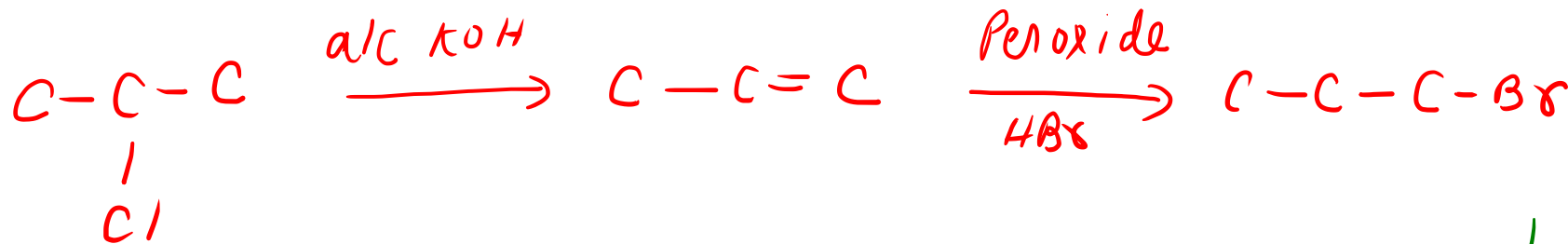
1-Propanol

(ii) 2-Bromopropane to 1-Bromopropane



Q Convert

2-chloropropane to 1-chloropropane



Note: Peroxide will only work with HBr