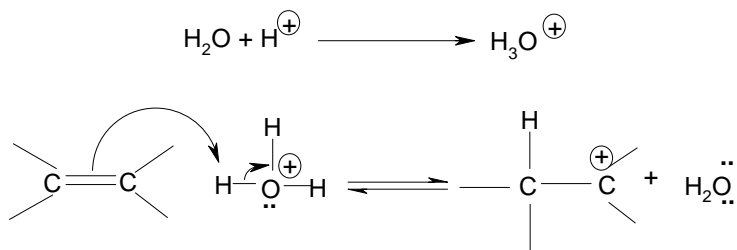


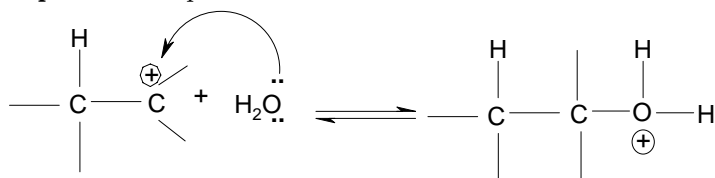
IMPORTANT MECHANISM REACTIONS

1. Preparation of alcohols from alkene (By acid catalysed hydration)

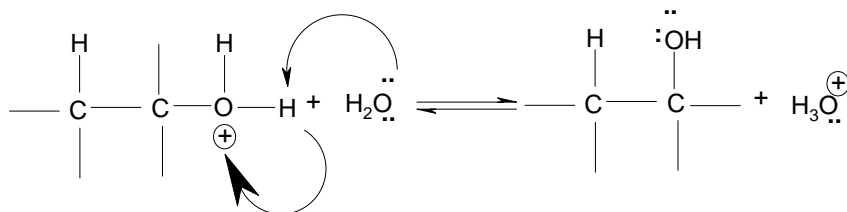
Step-1 :- Protonation of alkene to form carbocation by electrophilic attack of H_3O^+ .



Step-2 :- Nucleophilic attack of water on carbocation

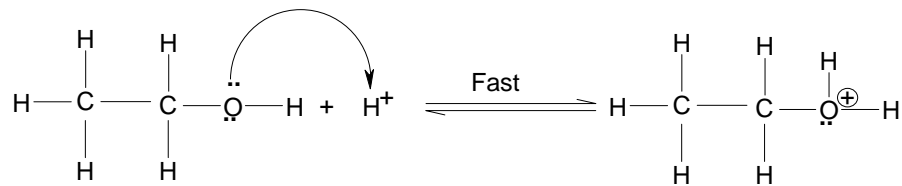


Step-3 :- Deprotonation to form an alcohol.

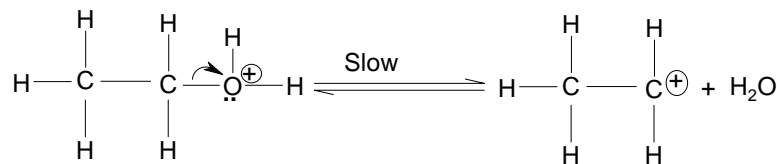


2. Dehydration of alcohol to form alkene :-(At 443 K in the presence of Conc. H_2SO_4)

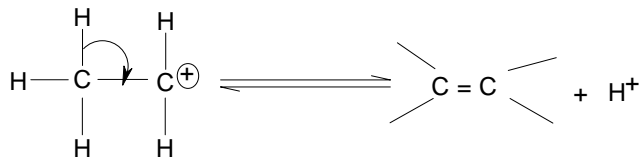
Step-1 :- Formation of protonated alcohol



Step-2 :- Formation of carbocation :- It is the slowest step and hence, the rate determining step of the reaction.

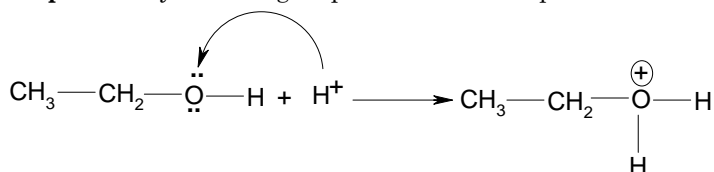


Step-3 :- Formation of ethene by elimination of a proton.

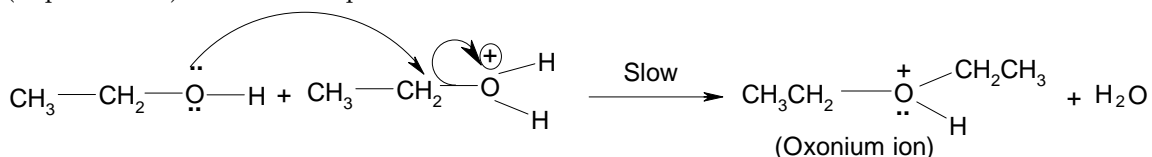


3. Formation of diethyl ether from ethanol at 413 K in the presence of conc. H_2SO_4

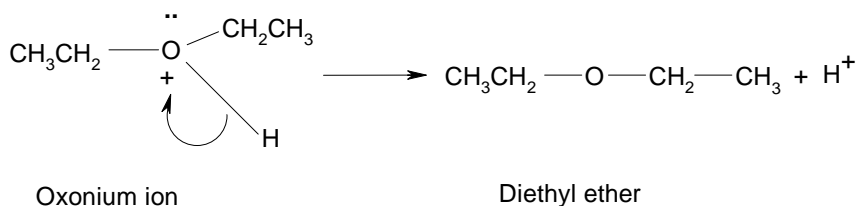
Step-1 :- Ethyl alcohol gets protonated in the presence of H^+ .



Step-2 :- Due to the presence of a positive charge on the oxygen atom, the carbon of CH_2 part of CH_3CH_2 becomes electron deficient. As a result Nucleophilic attack by another alcohol molecule (unprotonated) occurs on the protonated alcohol with the elimination of a molecule of water.

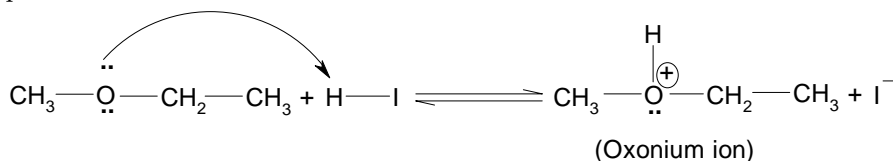


Step-3 :- Oxonium ion loses a proton to form an ether.

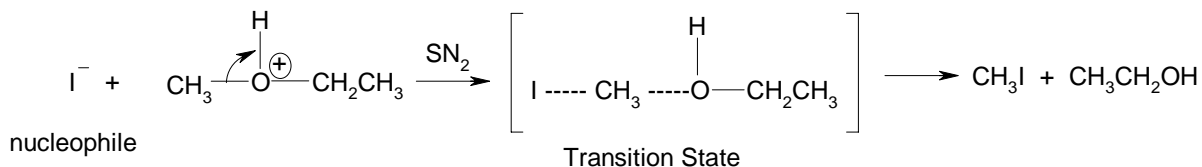


4. The reaction of an ether with concentrated HI:-

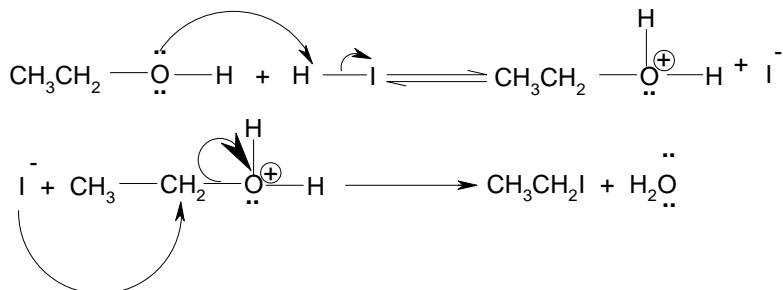
Step-1:- The ether molecule being Lewis base gets protonated by the hydrogen of the acid to form protonated ether or oxonium salt.



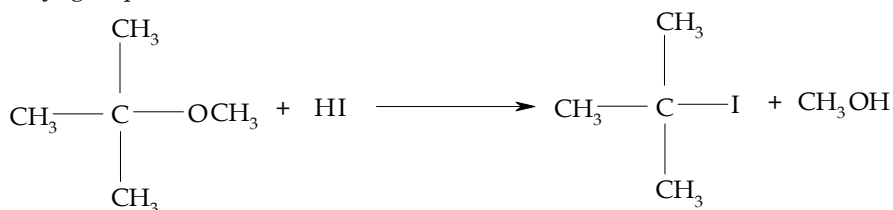
Step-2:- Iodine ion, I^- is a good nucleophile. The protonated ether undergoes nucleophilic attack by iodide ion (I^-) and displaces an alcohol molecule by $\text{S}_\text{N}2$ mechanism and therefore, forms alkyl alcohol and alkyl halide.



Step-3 :- When HI is in excess and the reaction is carried out at high temperature, ethanol formed reacts with another molecule of HI and is converted into ethyl iodide.

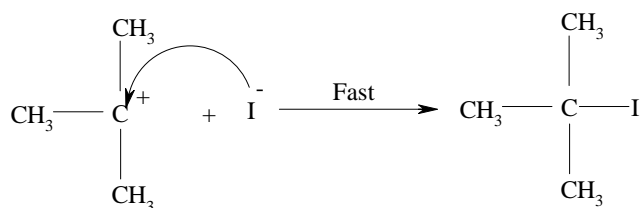
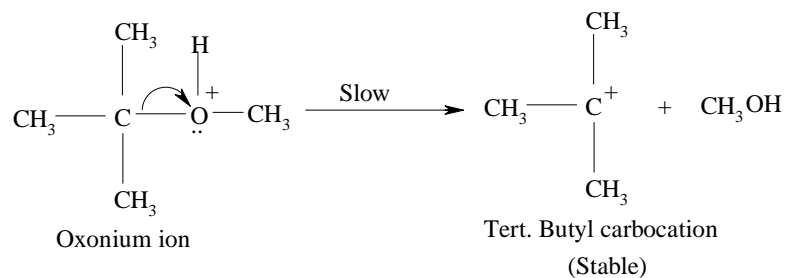
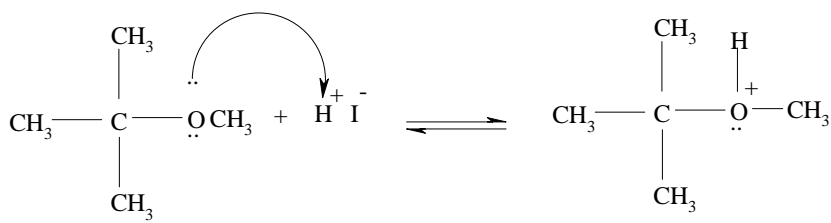


If however, one of the alkyl groups is tertiary group, the alkyl halide is formed from the tertiary alkyl group.

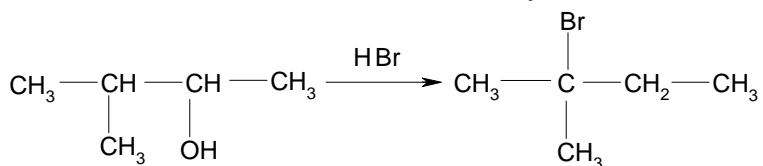


Tert. Butyl methyl ether

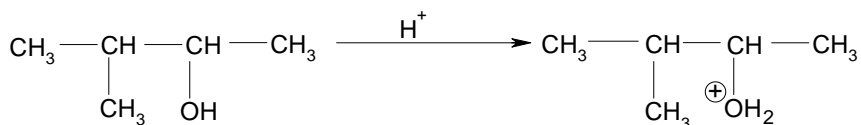
This is because the reaction now occurs by SN₁ mechanism. The formation of products is governed by the stability of the carbocation formed from the cleavage of C – O bond in the protonated ether (oxonium ion). Since tert. Butyl carbocation [(CH₃)₃C⁺] is more stable than the methyl carbocation (CH₃)⁺, therefore cleavage of C – O bond gives a more stable carbocation [(CH₃)₃C⁺] and methanol. Then, iodide ion, I⁻ attacks this tert. Butyl carbocation to form tert. Butyl iodide.



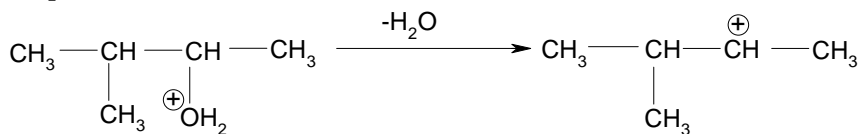
5. Mechanism of the reaction when 3-methylbutan-2-ol is treated with HBr



Step-1:- Alcohol gets protonated

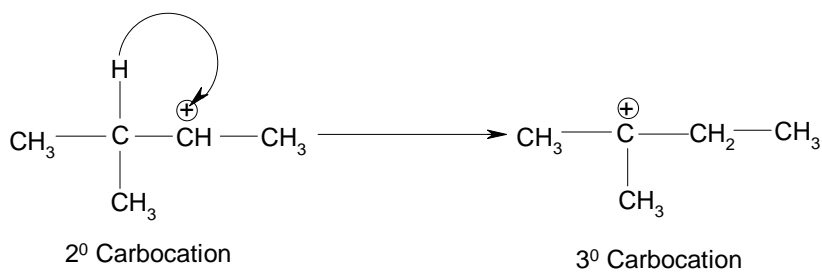


Step-2:- Protonated alcohol loses H₂O molecule to form 2° carbocation.

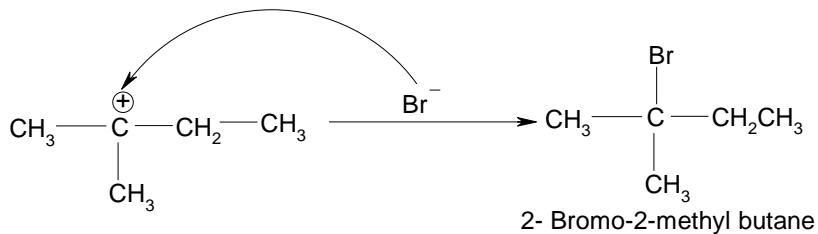


2° carbocation

Step-3:- 1,2-Hydride shift of 2-carbocation gives more stable 3° carbocation.

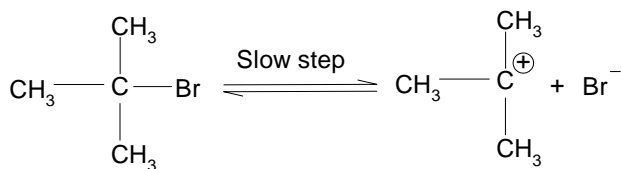


Step-4:- Nucleophilic attack by Br^- ion gives alkyl halide

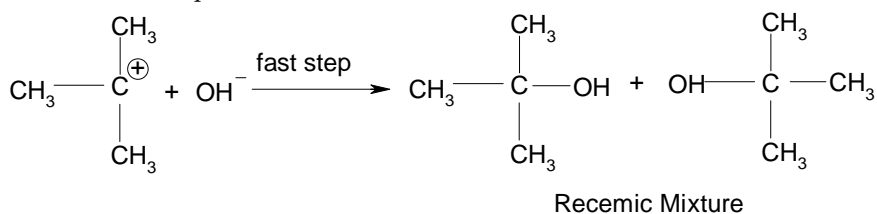


6. SN_1 Mechanism:- (For 3° alkyl halide)

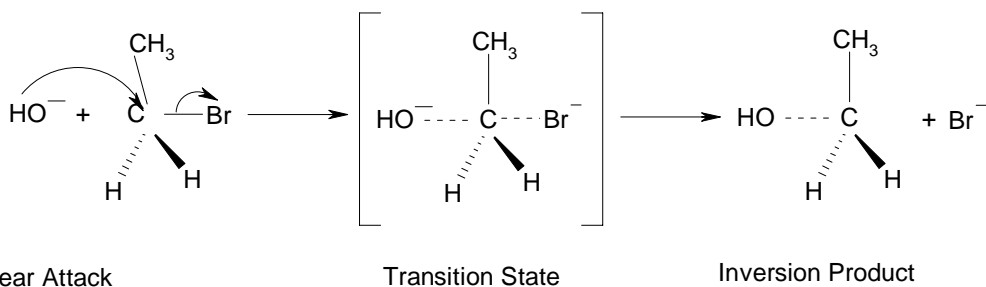
Step-1:- The polarized C-halogen bond (C-Br) undergoes slow cleavage to form a carbocation and bromide ion.



Step-2:- The carbocation is very reactive species. Therefore, it readily reacts with a nucleophile, OH^- to form the product.

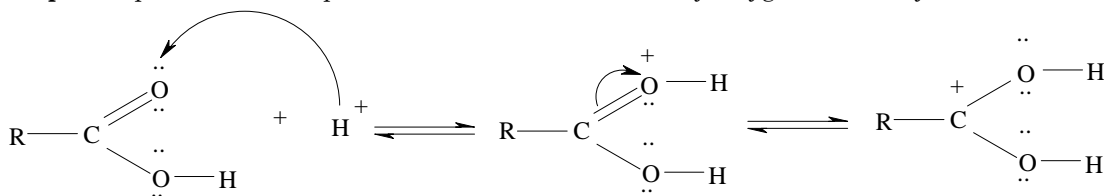


7. SN_2 mechanism:- Single step reaction

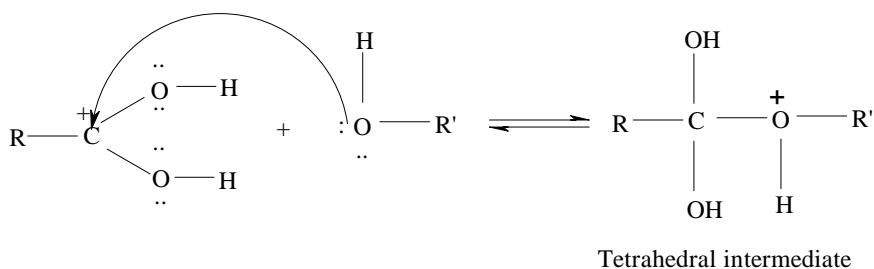


8. Mechanism of esterification of carboxylic acids:-

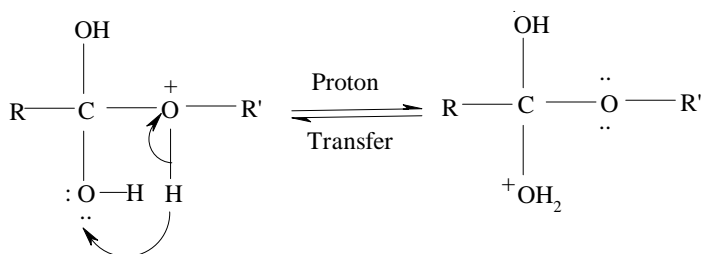
Step-1:- A proton from the protonic acid attacks the carbonyl oxygen of carboxylic acid.



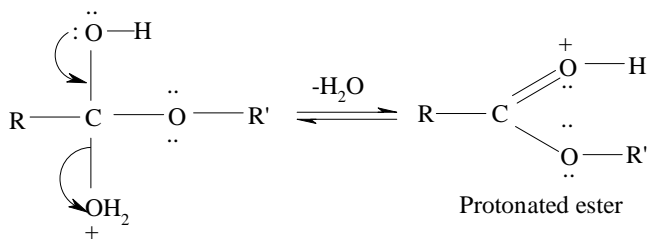
Step-2:- As a result of protonation, the carbonyl carbon gets activated and hence readily undergoes attack by the lone pairs of electrons on the oxygen of an alcohol to form a tetrahedral intermediate.



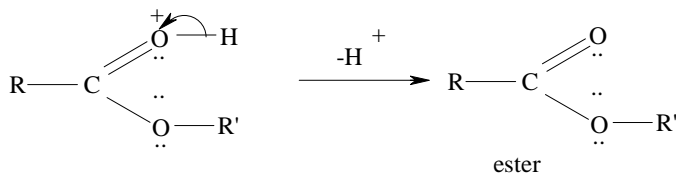
Step-3:- From the resulting intermediate, a proton shifts to OH group to form another tetrahedral intermediate. During this proton transfer, the -OH group gets converted into -OH₂⁺ group.



Step-4 :- The intermediate obtained in step – 3 loses a water molecule to form a protonated ester.

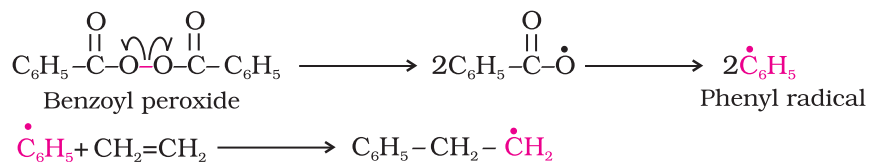


Step-5 :- The protonated ester loses a proton to form an ester.

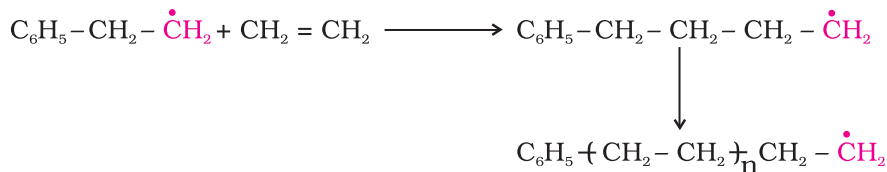


9. Free radical mechanism of polyethene

Chain initiation steps



Chain propagating step



Chain terminating step

For termination of the long chain, these free radicals can combine in different ways to form polythene. One mode of termination of chain is shown as under:

