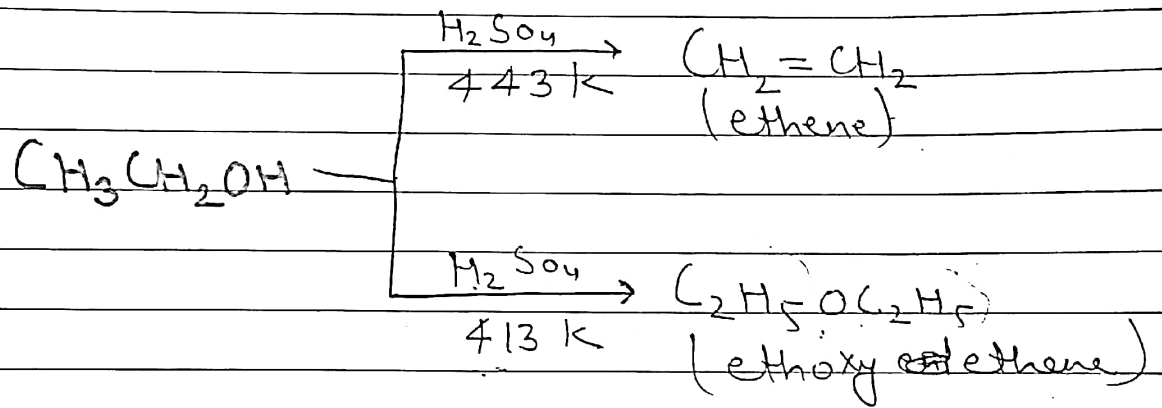


ETHERS

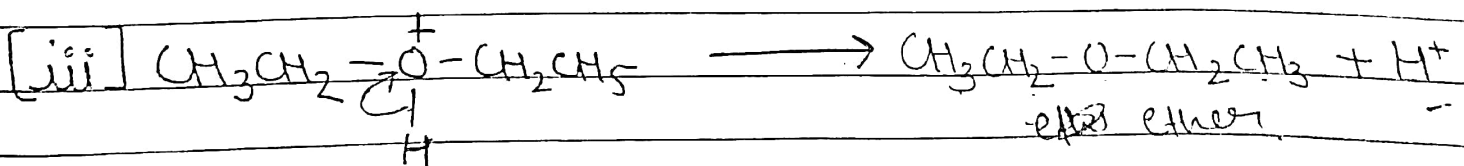
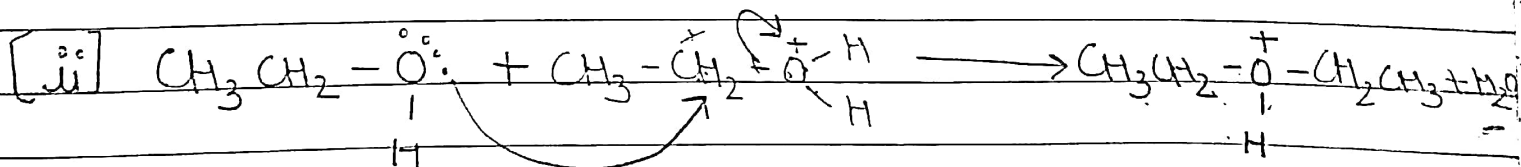
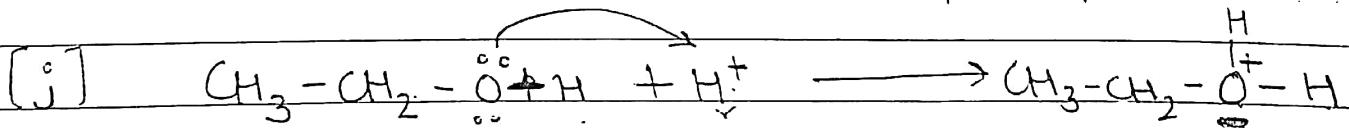
Preparation of ether.

1. by dehydration of alcohol.

→ Alcohol undergoes dehydration in presence of protic acid (H_2SO_4 , H_3PO_4). Reaction product depend on reaction condition.



(i) Formation of ether is (S_N2) reaction involving the attack of alcohol on a protonated alcohol.



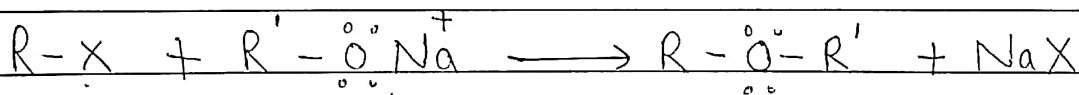
① The method is suitable for preparation of ethers having primary alkyl groups only.

② The reaction follows S_N1 pathway when the alcohol is 2° or 3° .

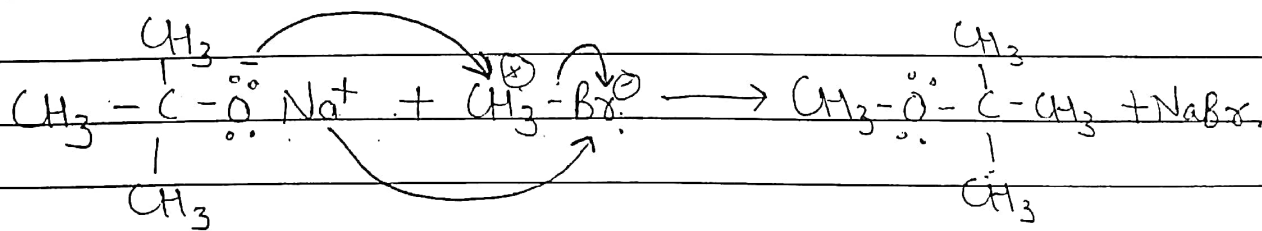
③ Dehydration of secondary and tertiary alcohols to give ethers is unsuccessful and alkenes are easily formed.

2. Williamson Synthesis

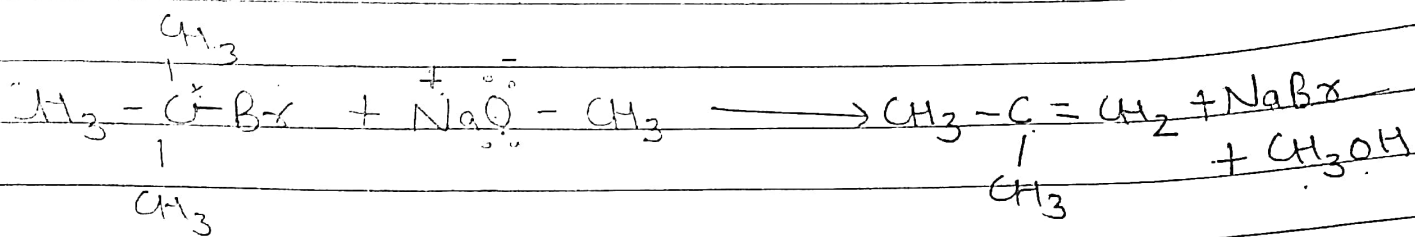
① In this method an alkyl halide is allowed to react with sodium alkoxide.



② Ethers containing substituted alkyl group (3° or 2°) also prepared by this method.

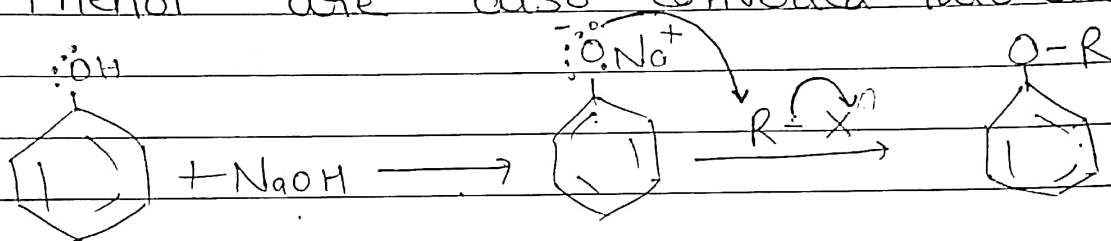


③ Better results are obtained if alkyl halide is primary. In case of 2° or 3° alkyl halide elimination competes over substitution.



→ It is because alkoxide are also strong base as well. They react with alkyl halide leading to elimination R^n .

① Phenol are also converted into ether.



Physical properties

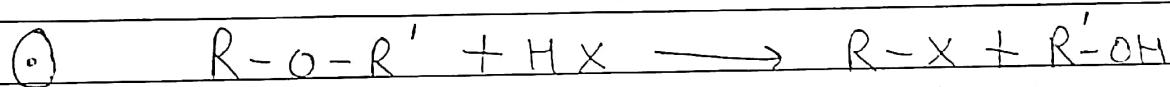
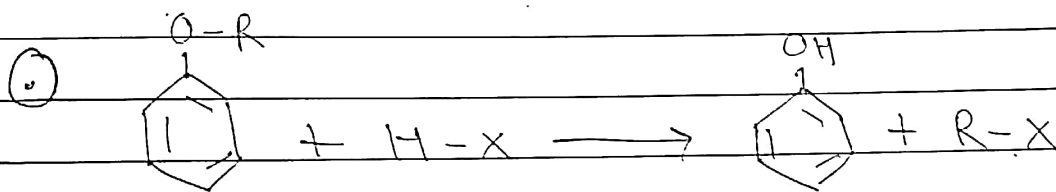
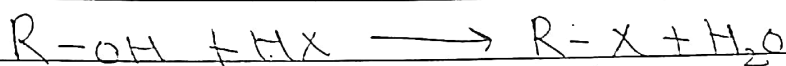
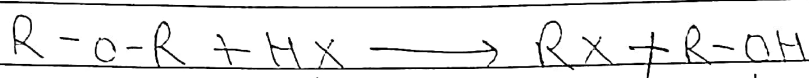
① B.P of ethers are comparable of alkene having comparable molecular mass. but less than that of alcohol.

② The miscibility of ether with water resembles those of alcohol of same molecular mass. due to the presence of oxygen in ether which can also form hydrogen bonding with water.

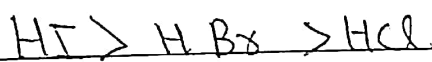
CHEMICAL REACTION.

1. Cleavage of C-O bond in ethers.

Reaction of dialkyl ether give two molecules alkyl halide when react with excess of hydrogen halide.

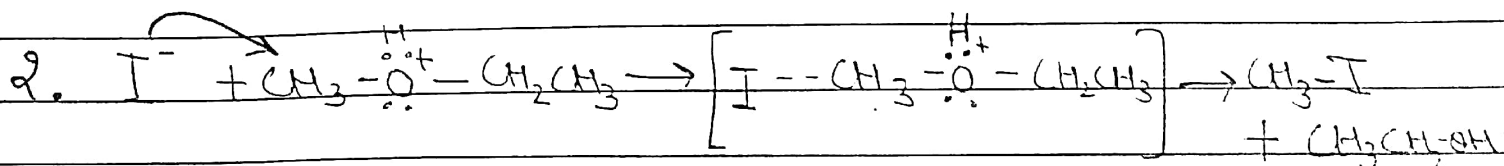
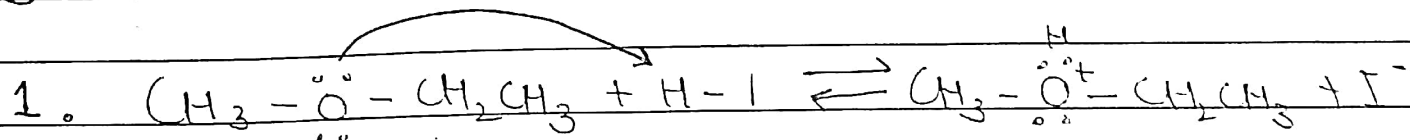


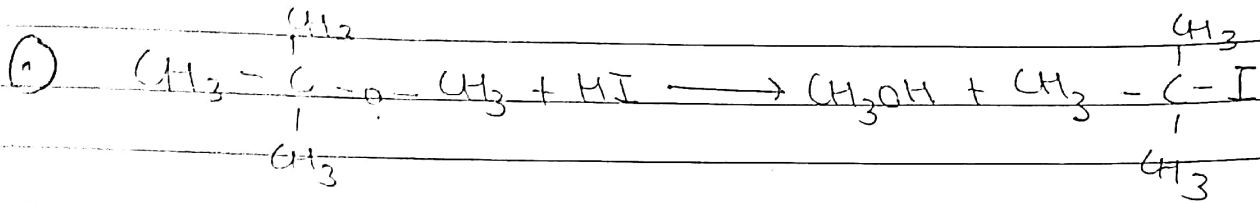
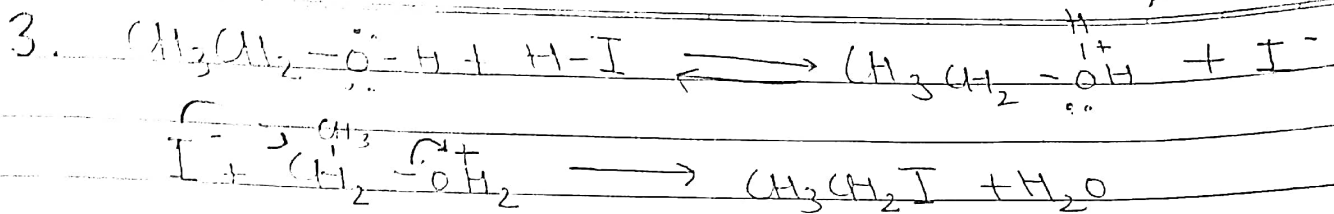
③ order of reactivity of hydrogen halide.



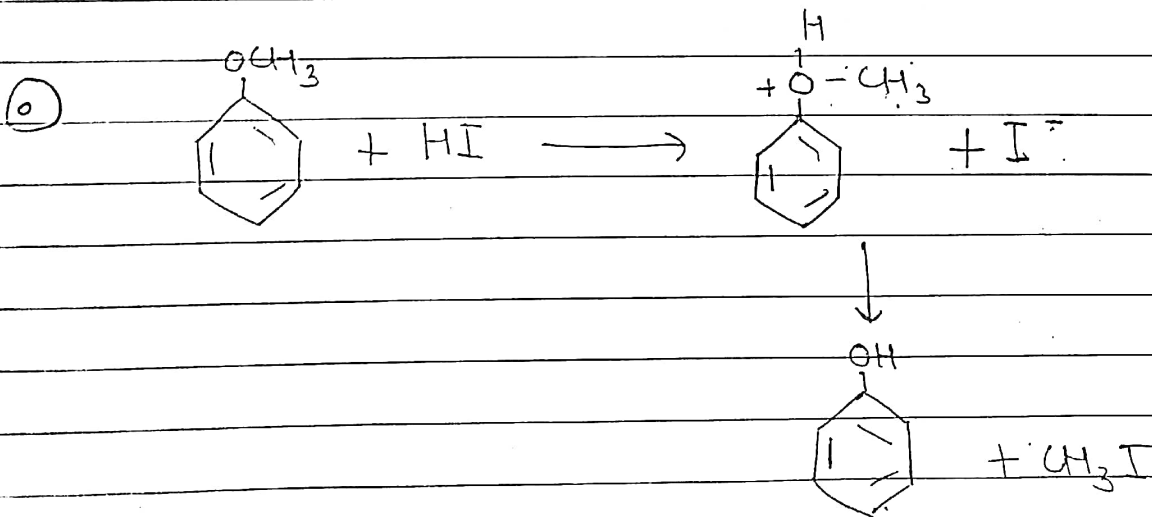
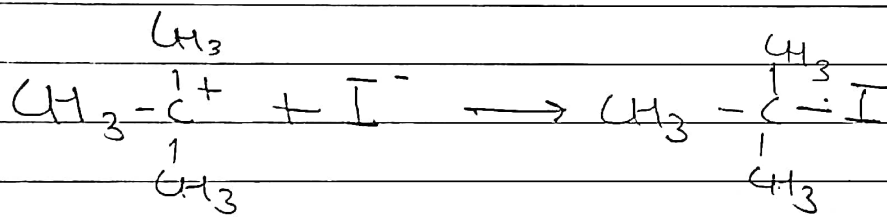
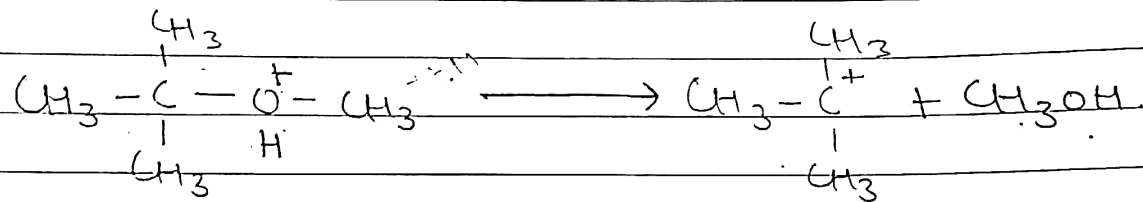
→ Cleavage of ether take place with Conc. H₂O or HBr at high temperature.

④ Mechanism





Mechanism.



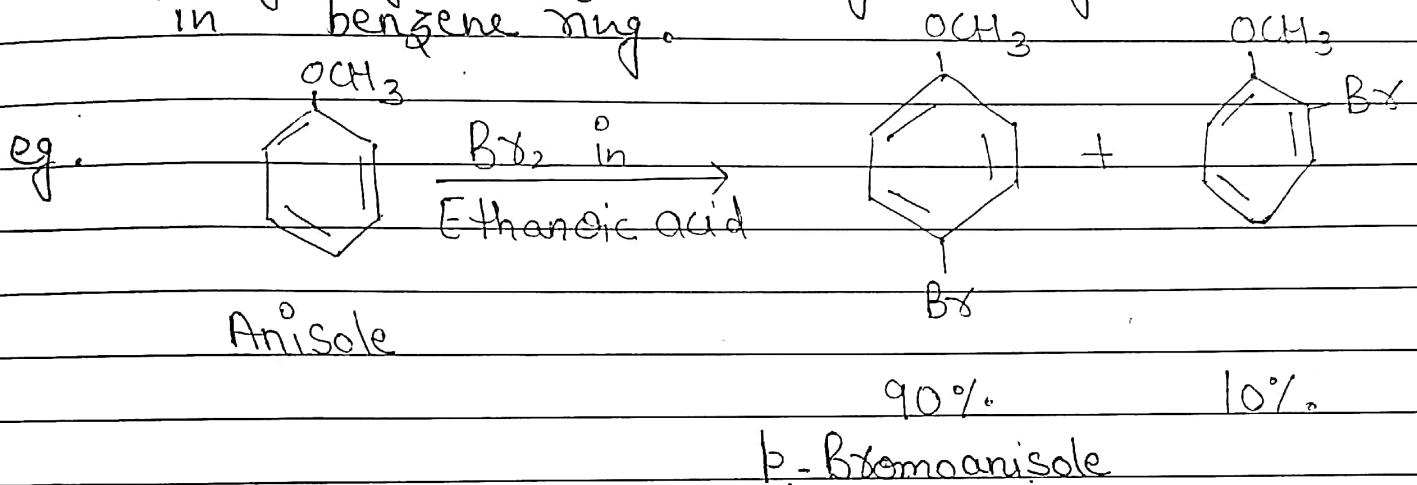
→ The bond b/w O-CH₃ is weaker than the bond b/w O-C₆H₅ because carbon of phenyl group is sp² hybridised and there is a partial double bond character.

2. Electrophilic Substitution.

(i) The alkoxy group (-OR) is Ortho and para directing.

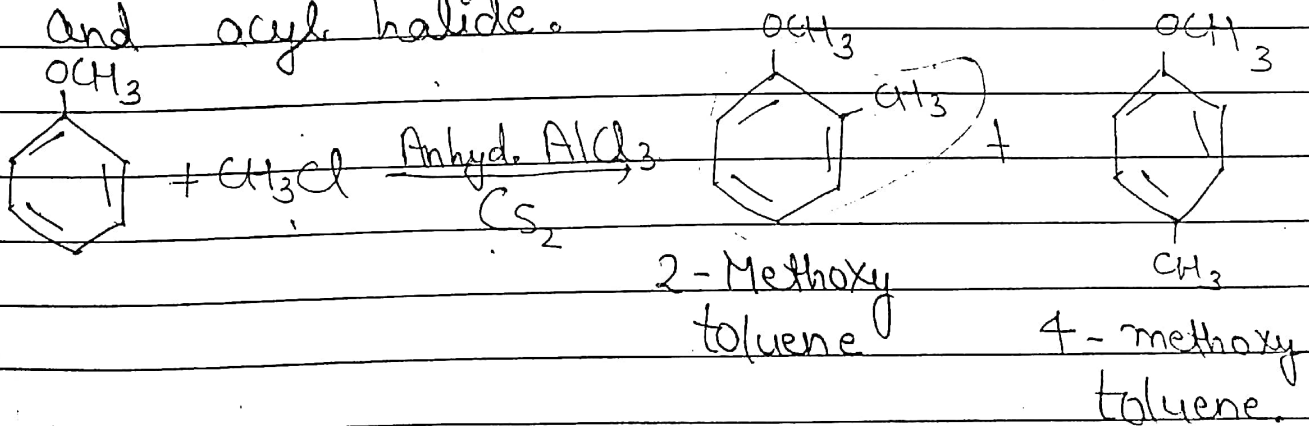
(ii) Halogenation:

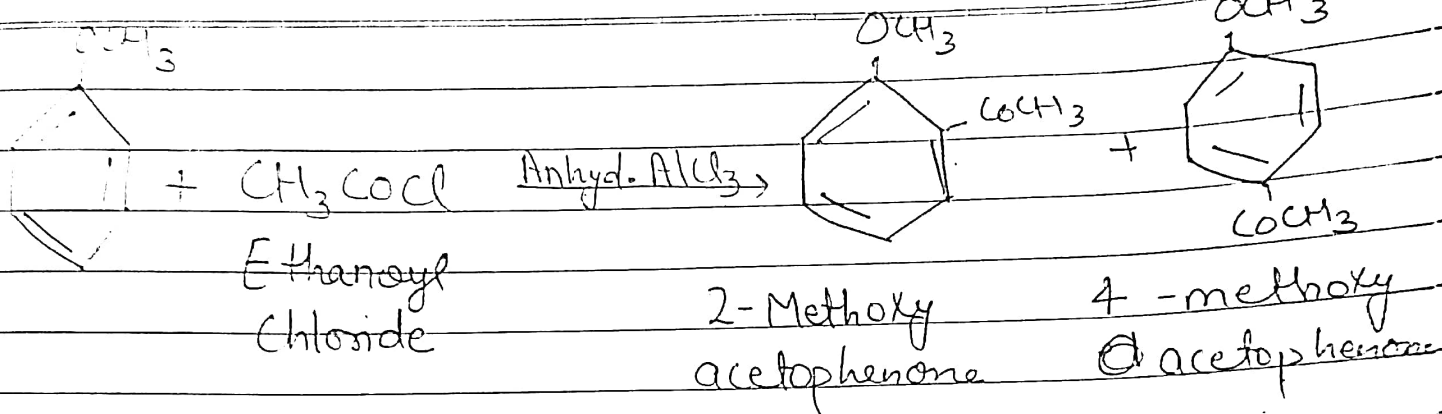
(i) Phenylalkyl ethers undergo halogenation in benzene ring.



(iii) Friedel-Crafts reaction:

(i) Anisole undergoes Friedel-Crafts reaction i.e. alkyl and acyl group are introduced at Ortho and para position with alkyl halide and acyl halide.





iii Nitration:

