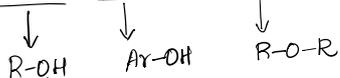
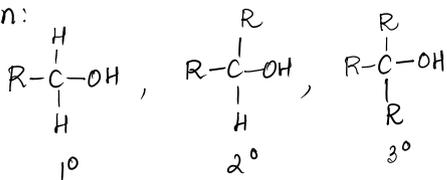


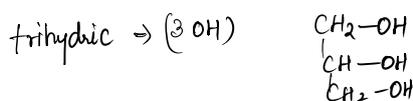
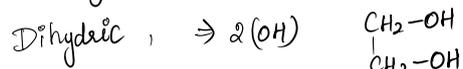
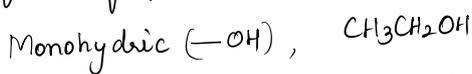
Alcohol, Phenol and Ether



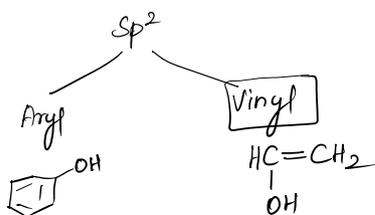
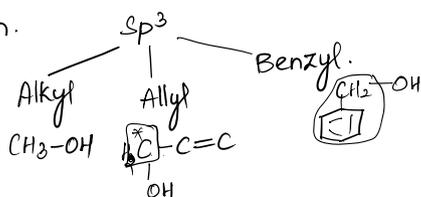
Classification:



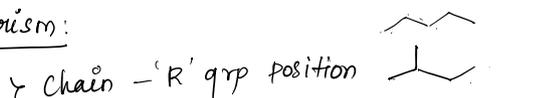
No. of -OH groups:



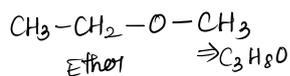
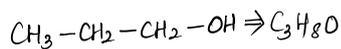
Hybridisation.



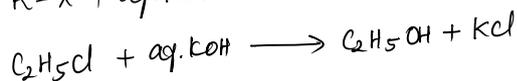
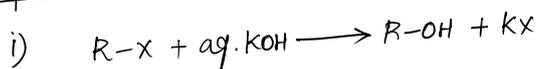
Isomerism:



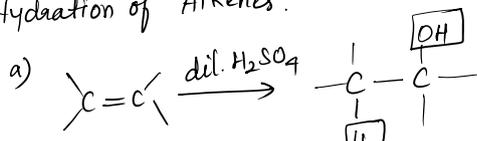
> Functional - functional grp



Preparation:



ii) Hydration of Alkenes:



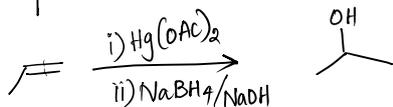


> Anti addn

> Markovnikoff addn

> Shifts are allowed

b) Oxymercuration - demercuration: $\text{OAc}-\text{CH}_2\text{COO}^-$

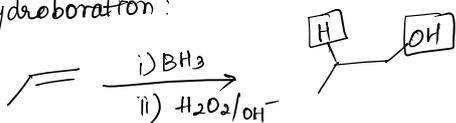


> Anti pdt

> No rearrangement

> Markovnikoff

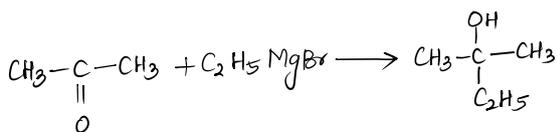
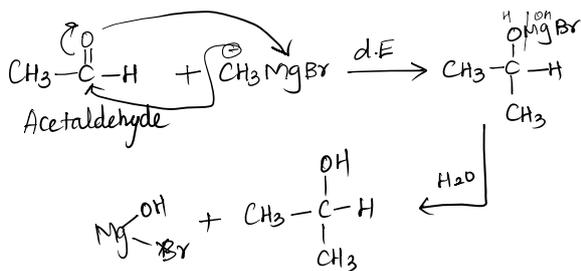
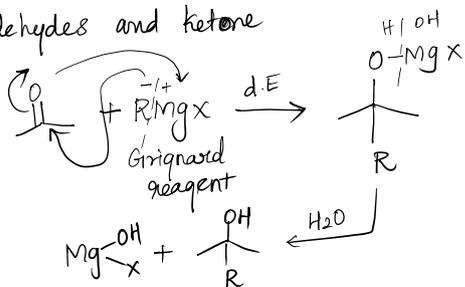
c) Hydroboration:



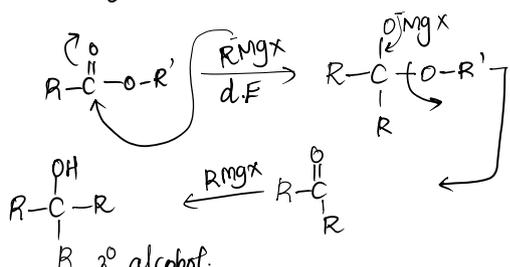
> Anti-Markovnikoff

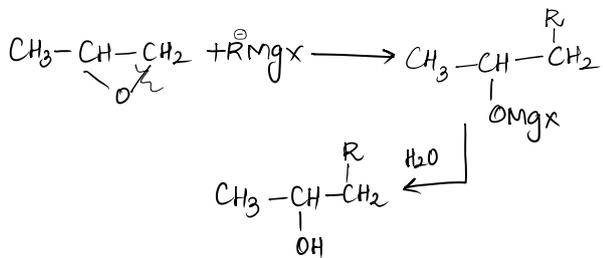
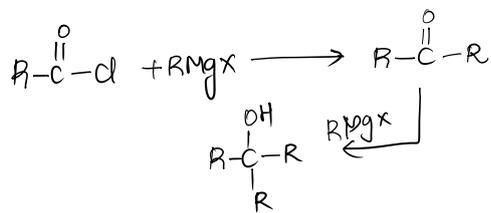
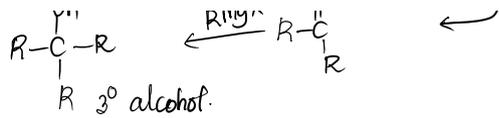
> Syn addn.

③ Aldehydes and ketone

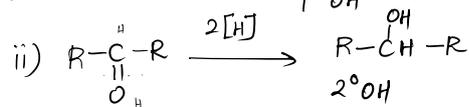
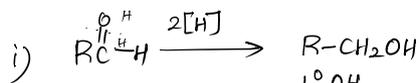


Ester: $\text{R}-\overset{\text{O}}{\parallel}{\text{C}}-\text{OR}'$

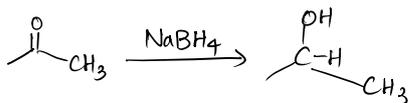
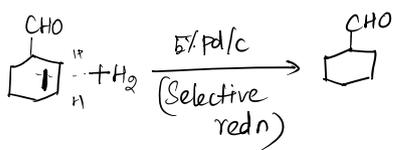
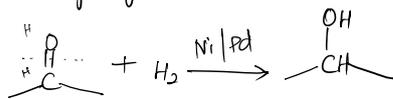




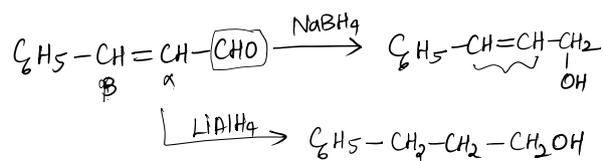
Reduction of $-\text{CHO} / -\text{C}=\text{O}$



Catalytic hydrogenation:

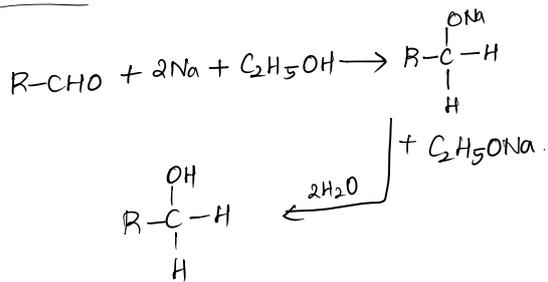


$\text{LiAlH}_4 > \text{NaBH}_4$

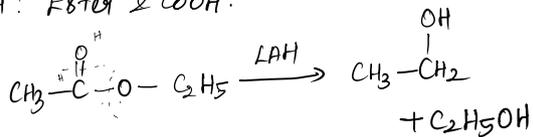


NaBH_4 can't reduce ester and $-\text{COOH}$

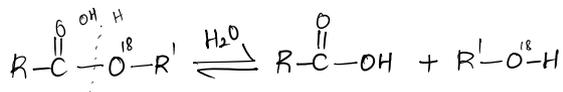
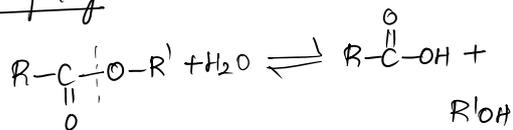
d) Bouveault-Blanc Reduction:



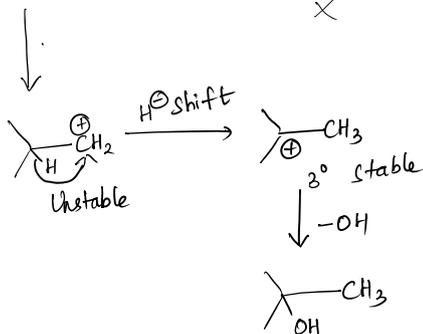
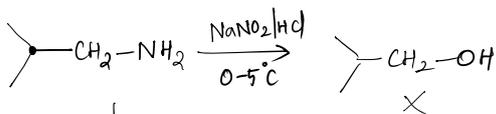
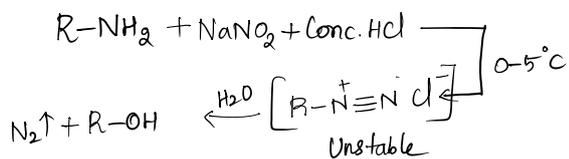
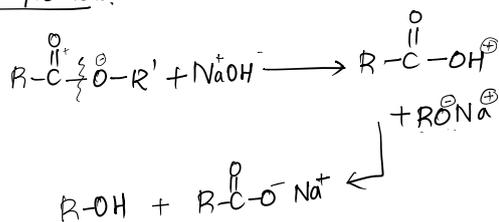
LAH: Ester & COOH:



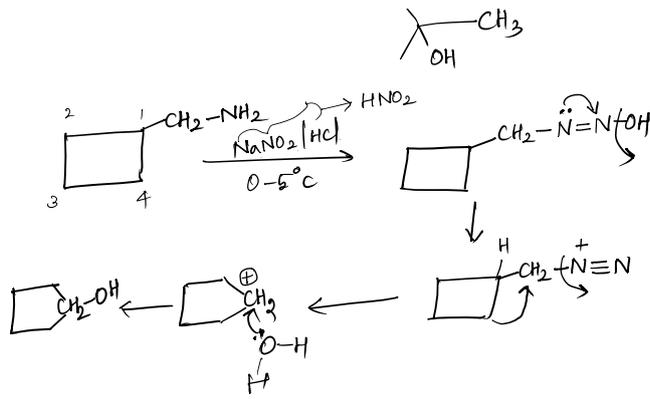
Ester hydrolysis:



Saponification:



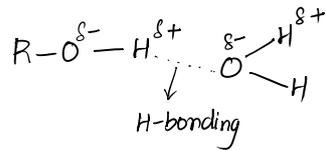
→ HNO₂



Properties:

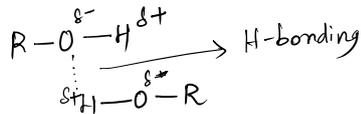
Physical properties:

> Soluble in water



> Branching ↑ Solubility ↓

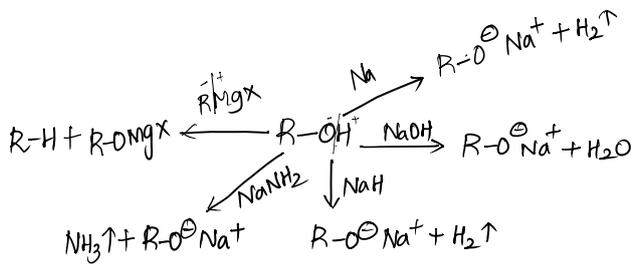
> High m.pt ↑ b.pt ↑



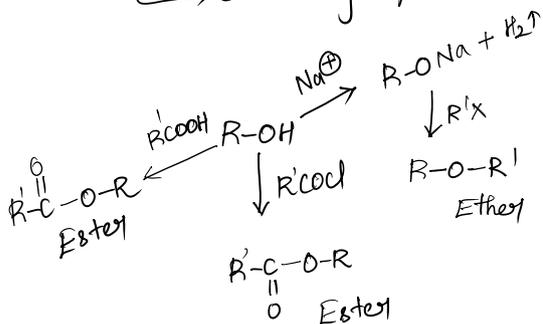
Chemical properties:

1) Breaking of -OH bond $\begin{cases} \text{Acid} \\ \text{Nu}^- \end{cases}$

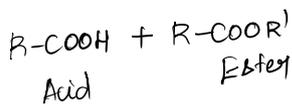
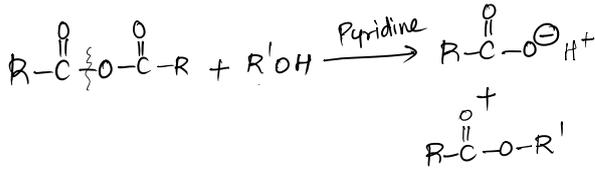
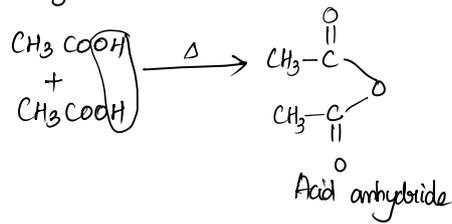
Acidity: less acidic than water (Except CH_3OH)
 $3^\circ < 2^\circ < 1^\circ < \text{CH}_3\text{OH}$



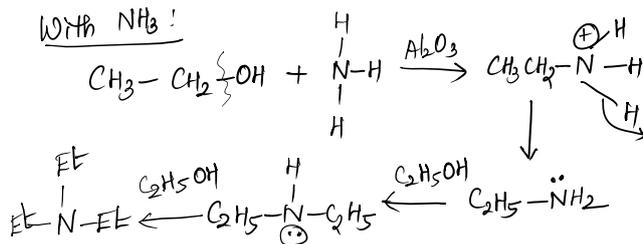
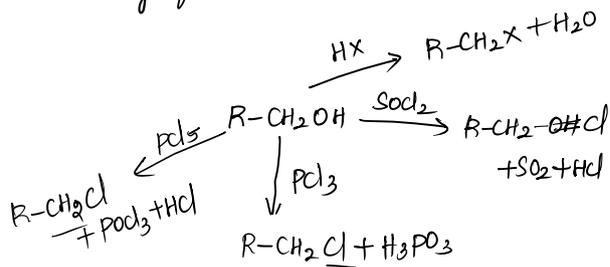
Acts as $\text{Na}^\ominus \rightarrow e^-$ hating species.



Using Acid anhydride



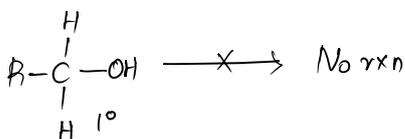
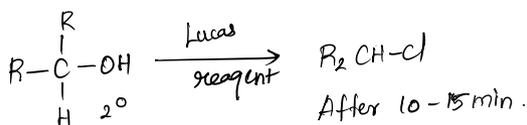
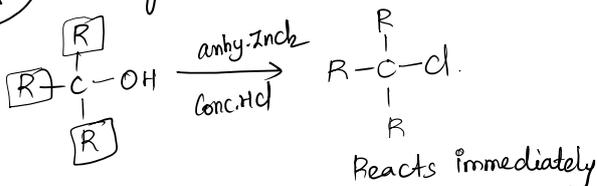
② Breaking of C-OH bond:



Lucas test:

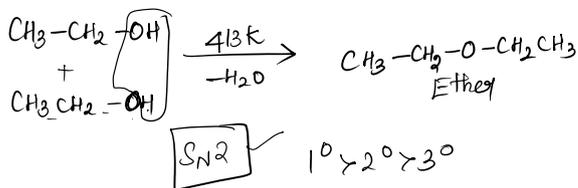
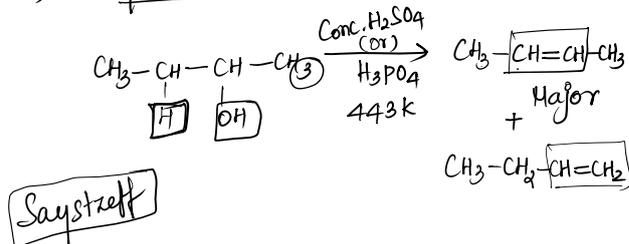
Lucas reagent: anhy. ZnCl_2 + conc. HCl

(S_N1) Distinguish 1°, 2° & 3° alcohol.

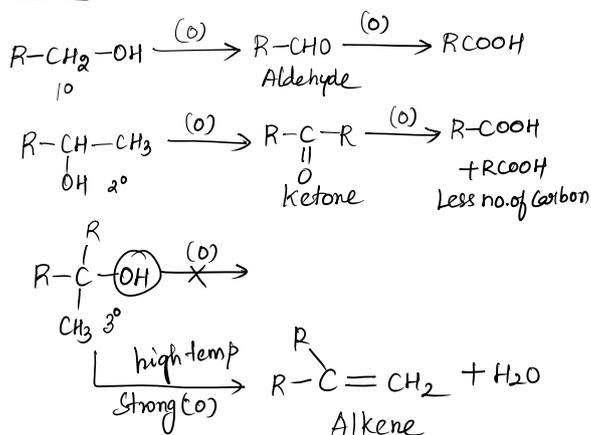


⑤ Elimination Reaction:

i) Dehydration:

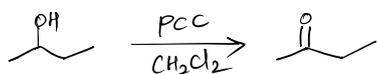
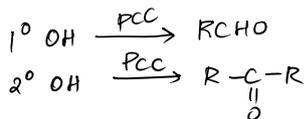


Oxidation



Mild Oxidising agent:

i) PCC:

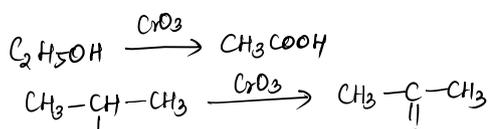
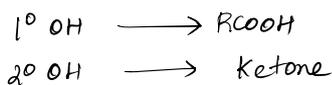


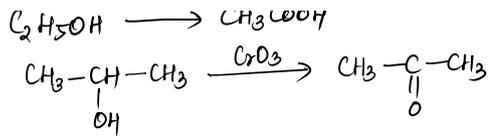
PDC - also used

PCC - not suitable for (o) of alcohol with acid sensitive group (acetal, epoxides)

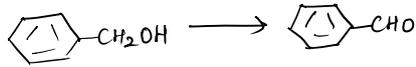
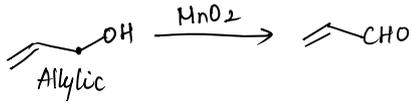
C=C and C≡C Unaffected

ii) Jone's reagent: CrO₃/H₂SO₄ in acetone





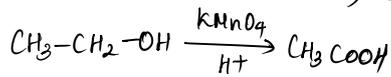
ii) MnO_2 : Allylic & benzylic alcohol.



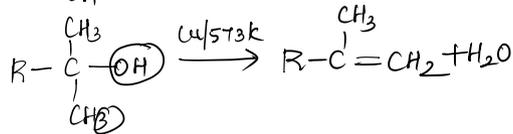
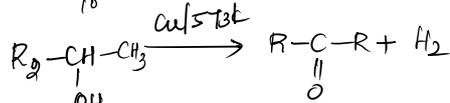
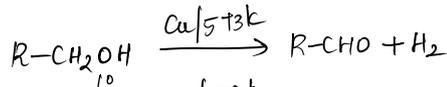
Strong Oxidising agents: i) $KMnO_4/H^+$

ii) $K_2Cr_2O_7$

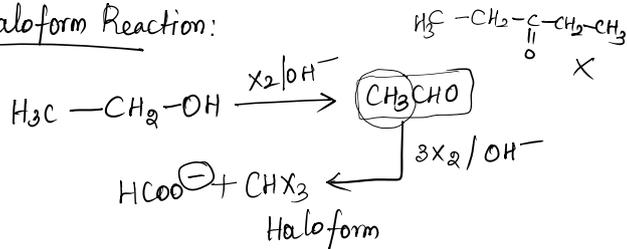
iii) Conc. HNO_3



Catalytic dehydrogenation:

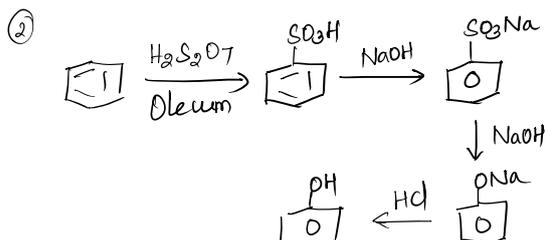
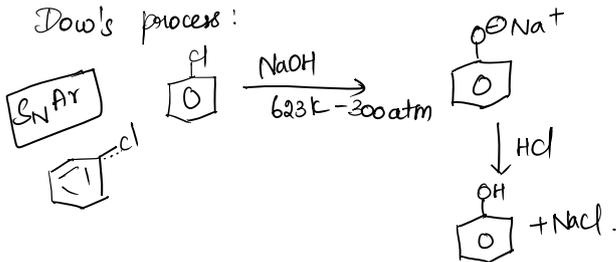


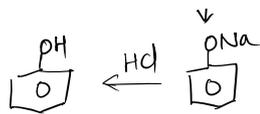
Haloform Reaction:



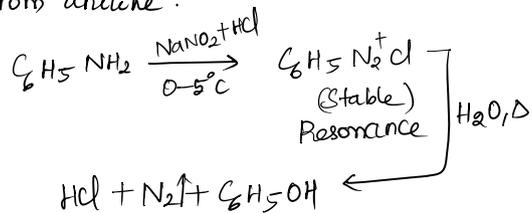
Preparation of phenol:

Dow's process:

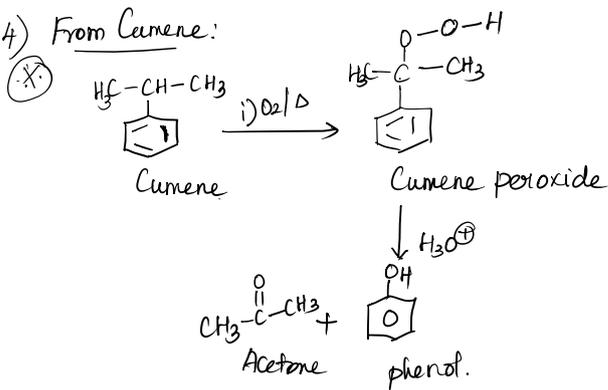




3) From aniline:

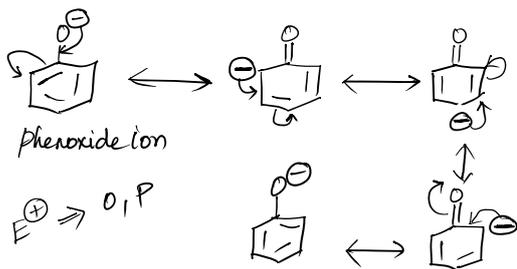
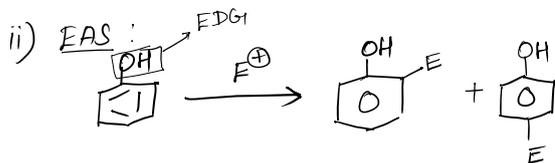
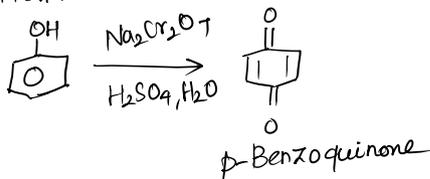


4) From Cumene:

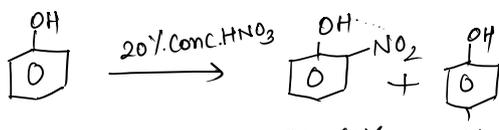
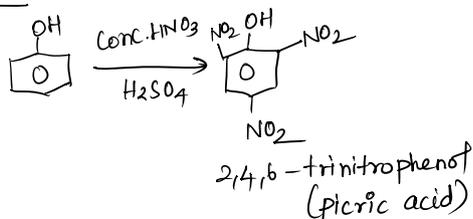


Chemical properties:

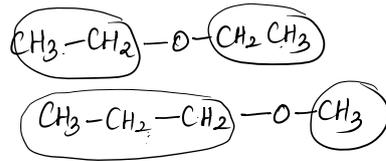
i) Oxidation:



i) Nitration:

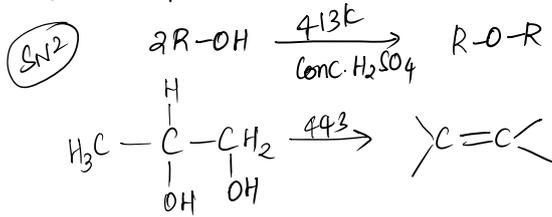


Metamerism:

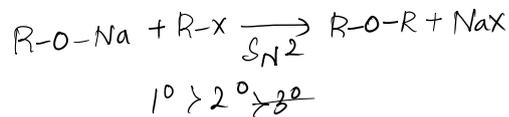


Preparation:

i) Dehydration of Alcohol:



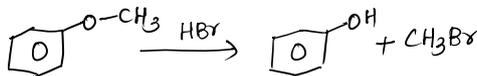
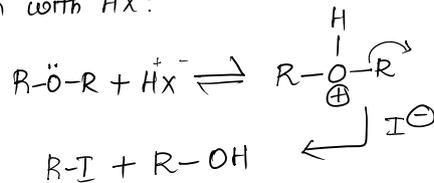
Williamson Ether:



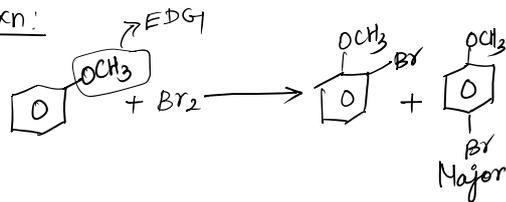
Physical prop: Volatile, b.pt ↓, Soluble in H_2O

Chemical prop:

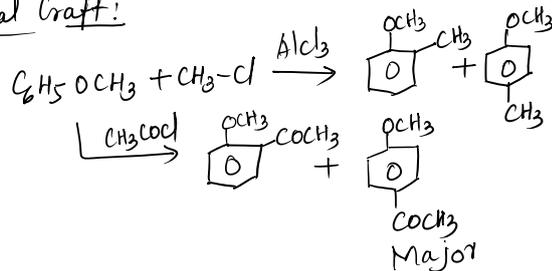
① Rxn with HX:



EAS rxn:



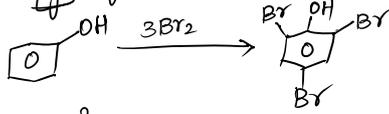
Friedel Craft:



① What amount of bromine will be required to convert [2g] of phenol into 2,4,6-tribromophenol.

Br PH Br

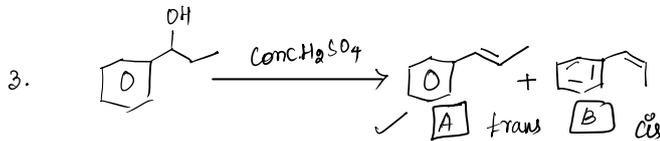
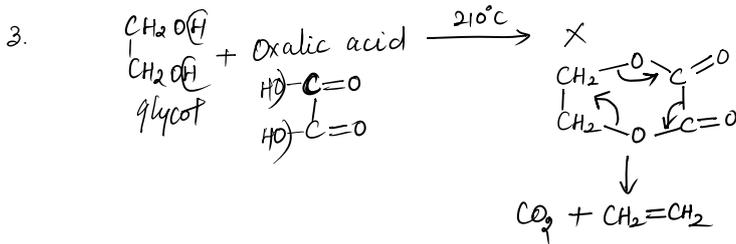
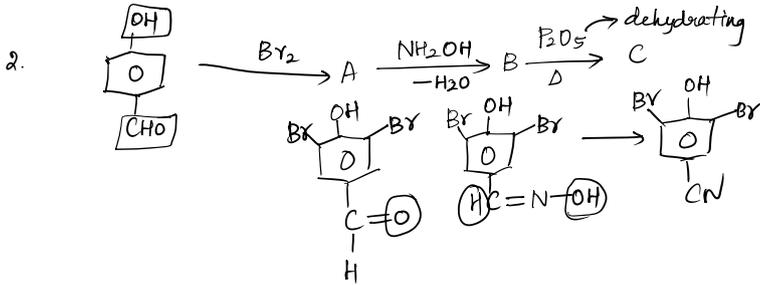
- 1) What amount of bromine will be required to convert 2g of phenol into 2,4,6-tribromophenol.



$$\text{Moles} = \frac{2}{94} = 0.021 \text{ mol}$$

$$\text{Br}_2 \text{ required} = 0.021 \times 3 = 0.064 \text{ mol}$$

$$\text{Mass of Br}_2 = 0.064 \times 160 = 10.22 \text{ g}$$

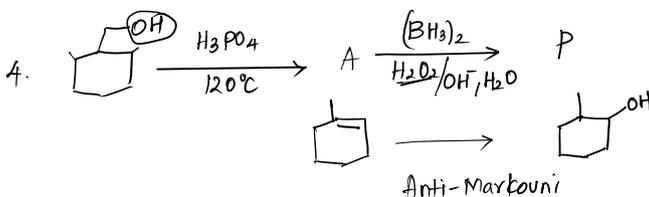


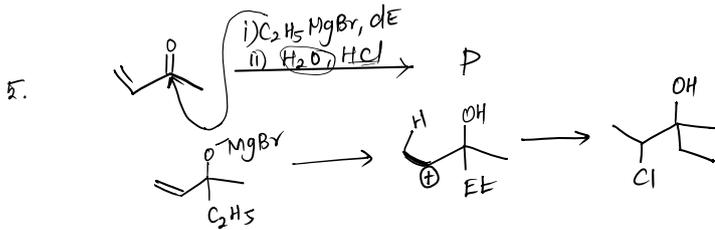
a) The rxn is not possible in acidic medium

b) Both cpds A & B are formed equally

✓ c) Cpd A will be major pdt

d) cpd B " major





- a) 2-Ethoxy-3,3-dimethyl butane
- b) 1-Ethoxy-3,3-dimethyl butane
- ✓ c) 2-Ethoxy-2,3-dimethyl butane
- d) 2-hydroxy-3,3-dimethyl butane

