

Assignment No: 2 CH- Alcohol, Phenol & Ether (1)

(A) Give Reason for following:

- i) Alcohols are more soluble in water than the hydrocarbons
- ii) Ortho-nitrophenol is more acidic than ortho-methoxyphenol.
- iii) Dipole moment of phenol is smaller than that of methanol.
- iv) In Kolbe's reaction, instead of phenol, phenoxide ion is treated with carbon dioxide. Why?
- v) Which is a stronger acid - phenol or cresol?
- vi) Phenol does not react with NaHCO_3 whereas carboxylic acid reacts.
- vii) Phenol is more easily nitrated than benzene.
- viii) Phenol is more acidic than methanol
- ix) The C-O-H bond angle in alcohols is slightly less than the tetrahedral angle ($109^\circ 28'$)
- x) $(\text{CH}_3)_3\text{C}-\text{O}-\text{CH}_3$ on reaction with HI gives $(\text{CH}_3)_3\text{C}-\text{I}$ and CH_3-OH as the main products and not $(\text{CH}_3)_3\text{C}-\text{OH}$ and CH_3-I .
- xi) Ethers are insoluble in water
- xii) Rectified spirit cannot be converted into absolute alcohol by simple distillation.
- xiii) Diethyl ether does not react with sodium.
- xiv) Phenols do not undergo substitution of the -OH gp.

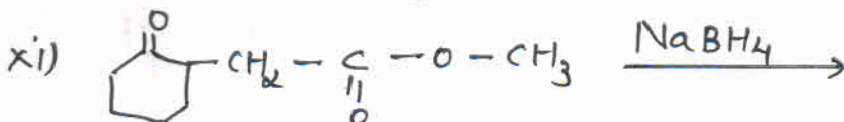
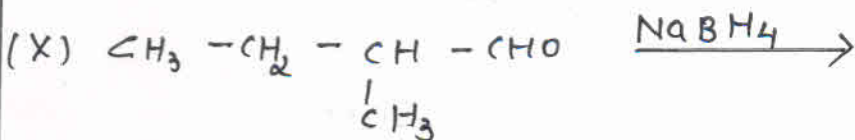
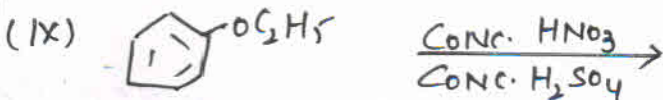
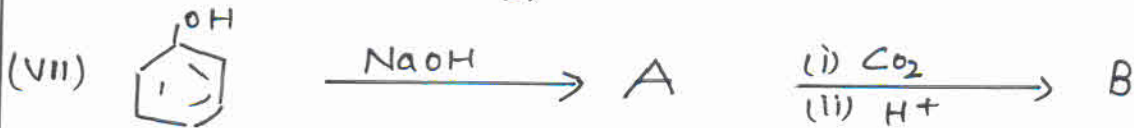
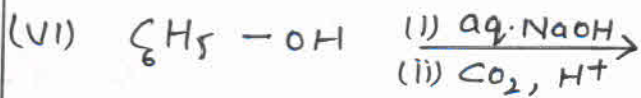
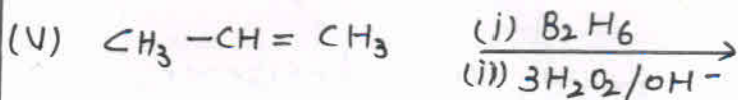
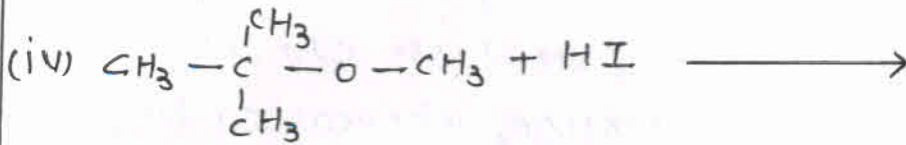
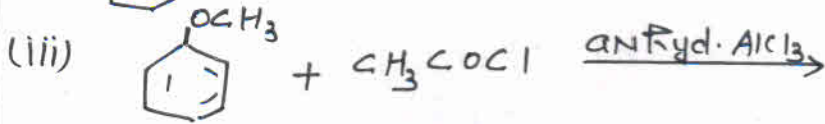
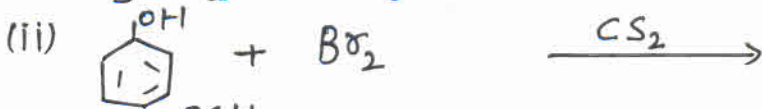
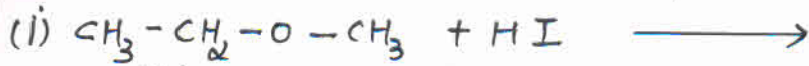
(B) Explain the following name reaction:

- (i) Kolbe's reaction
- (ii) Williamson's synthesis
- (iii) Reimer-Tiemann rxn
- (iv) Hydroboration oxidation

(C) Give mechanism for following:

- (i) Hydration of ethene to form ethanol.
- (ii) Acid dehydration of ethanol to yield ethane.
- (iii) Reaction of HI with methoxymethane.
- (iv) Formation of diethylether from ethanol in the presence of conc. H_2SO_4 acid.

3) Write structures of the product formed:

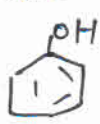
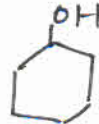



4) Convert the following

- i) chlorobenzene into phenol.
- ii) Cumene into phenol
- iii) Propene to Propan-1-ol
- iv) Ethanol to Propan-2-ol
- v) Ethyl magnesium chloride to Propan-1-ol
- vi) picric acid from phenol
- vii) Benzoinone from phenol
- viii) 2-Methylpropan-2-ol from methyl magnesium bromide

- ix) Phenol to anisole
- x) Propan-2-ol to 2-methylpropan-2-ol
- xi) Aniline to phenol
- xii) Phenol to benzyl alcohol
- xiii) Phenol to m-bromophenol
- xiv) Phenol to aspirin

(5) Give a chemical test to distinguish b/w the following pairs.

- i) Ethanol and phenol
- ii) Propan-2-ol and 2-methylpropan-2-ol
- iii) Ethanol and Diethyl ether
- iv) Propanol and t-butyl alcohol
- v) butan-1-ol and butan-2-ol
- vi) Phenol and Benzyl alcohol
- vii)  and 
- (ix) $\text{CH}_3 - \underset{\text{OH}}{\text{CH}} - \text{CH}_3$ and 

(6) Give equation for:

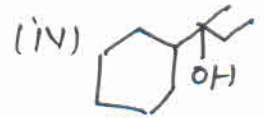
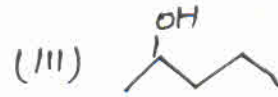
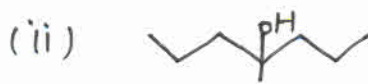
- (i) Friedel craft's reaction - alkylation in anisole
 - (ii) Nitration of anisole
 - (iii) Friedel craft acetylation of anisole.
 - (iv) Anisole is treated with CH_3Cl / Anhydrous AlCl_3
 - (v) $(\text{CH}_3)_3\text{C-OH}$ is treated with Cu at 573 K
 - (vi) Treating phenol with CHCl_3 in presence of aq. NaOH
- (7) Name the reagent used in the following reactions!

- (i) Oxidation of primary alcohol to a carboxylic acid.
- (ii) Oxidation of primary alcohol to aldehyde
- (iii) Bromination of phenol to 2,4,6-tribromophenol.
- (iv) Benzyl alcohol to benzoic acid
- (v) Butan-2-one to Butan-2-ol

(8) Alcohols react both as nucleophiles as well as electrophiles. Write one reaction of each type and describe its mechanism.

(9) Arrange water, ethanol and phenol in increasing order of acidity.

(10) Show how would you synthesise the following alcohols from appropriate alkenes?



(11) An aromatic compound 'A' on treatment with CHCl_3/KOH gives two compounds 'B' and 'C'. Both 'B' and 'C' give the same product 'D' when distilled with Zn dust. Oxidation of D gives E having molecular formula $\text{C}_7\text{H}_6\text{O}_2$. The sodium salt of E on heating with sodalime gives F which may also be obtained by distillation A with Zn dust. Identify A to F.

(12) A compound 'A' having molecular formula $\text{C}_4\text{H}_{10}\text{O}$ is found to be soluble in concentrated sulphuric acid. It does not react with sodium metal or potassium permanganate. On heating with excess of HI, it gives a single alkyl halide. Deduce the structure of compound A and explain all the reactions.

(13) A compound 'A' is optically active. On mild oxidation, it gives a compound 'B' but on vigorous oxidation gives another compound 'C'. C along with D is also formed from B by reaction with iodine and alkali. Deduce the structures of A, B, C, D.

(14) Arrange the following compounds in decreasing order of acidity.

