

(3 Hours)

Total Marks: 80

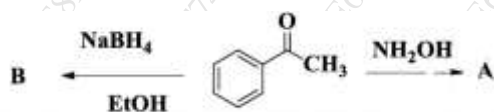
- N.B.: 1. All questions are compulsory**  
**2. Answer all sub questions together**  
**3. Figures to right indicate full marks**

Q1 a. Complete the given table stating the electronic effects of the following functional groups on the benzene nucleus (04)

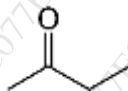
Groups	Inductive effect	Resonance effect
-SO <sub>3</sub> H		
-CHO		
-Br		
-NHCOCH <sub>3</sub>		

Q1b. Answer the following questions (Any Eight) (16)

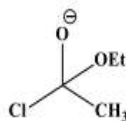
1. Identify A and B for following reaction.



2. Depict the tetrahedral intermediate involved in the reaction between acid halide with ethanol in presence of a base and predict the product formed.
3. Give the tautomer of the given molecule. State which form is more stable.



4. Justify using suitable examples: acid or base catalyst increase rate of equilibrium of hemiacetals but does not shift position of equilibrium
5. Draw a picture depicting the HOMO and LUMO of formaldehyde.
6. Lower the pK<sub>a</sub> of HX, better the leaving group ability of X- in carbonyl substitution reactions. Justify using a suitable example.
7. Cyanohydrin formation is an equilibrium reaction. Justify.
8. Identify the leaving group in given molecule. Arrange them in increasing order of leaving group ability

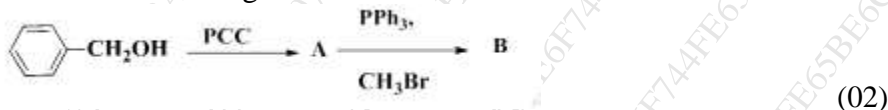


9. Aldehydes are more reactive than ketones in nucleophilic addition reactions; account for the same.

Q.2a Give the mechanism for the following reactions (Any three): (06)

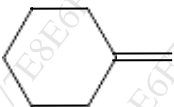
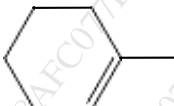
1. Cannizzaro reaction                      2. Kolbe's reaction  
 3. Mannich reaction                        4. Reimer Tiemann reaction

- b. 1. Give the product when p-chloronitrobenzene is treated with: (02)  
 i.  $\text{KNH}_2$  in liq. ammonia ii. 15%  $\text{NaOH}$  at  $160^\circ\text{C}$
2. Identify which of the following molecules can undergo nucleophilic aromatic substitution reaction: Bromobenzene or p-toluidine. Justify your answer. (02)
3. Identify A and B from the following reaction



Q.3 a Compare the reactivity of amides and acid chlorides (04)

b. Give the products for the following alkenes with the specified reagents (04)

Alkene	1. $\text{Hg}(\text{OAc})_2$ , 2. $\text{H}_2\text{O}$ , $\text{NaBH}_4$	1. NBS, 2. EtOH
		
		

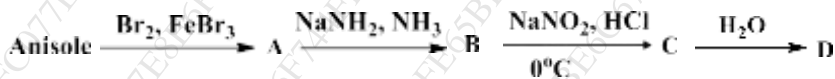
- c. Attempt the following conversions (Any four): (04)
- 1-pentene to butanoic acid
  - 2-Methylpropanoyl chloride to 2-Methylpropanamide
  - 2-Aminobenzoic acid to salicylic acid
  - Toluene to p-toluene sulfonic acid
  - Benzene to acetophenone

Q4 a. Using organomagnesium and organolithium compounds, suggest suitable schemes for synthesis of 2-Phenyl-2-butanol and n-Pentanol (04)

b. i) Give the mechanism for chlorination of toluene. (02)

ii) Indicate the position of nitration of 2-chloroaniline and designate whether the starting aromatic compound is activated or deactivated relative to benzene (02)

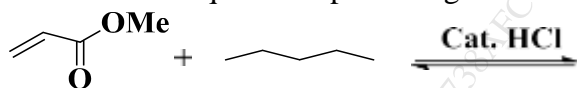
a. Identify A, B, C and D (04)



Q 5 a. Give the mechanism for acid catalyzed hydrolysis of amides and esters. (04)

OR

a. Answer the questions pertaining to following reaction:



i) Predict the product of reaction.

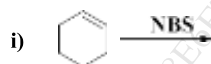
ii) Write the type of reaction involved.

iii) Write in detail mechanism for the same.

b. Compound A ( $C_7H_5O_4N$ ) reacts with  $POCl_3$  to give compound B ( $C_7H_4O_3NCl$ ).

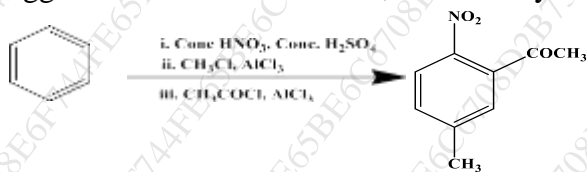
Compound B is reduced with  $Sn/HCl$  to compound C ( $C_7H_6ONCl$ ). Compound C on treatment with ammonia gives D ( $C_7H_8ON_2$ ). Identify A, B, C and D. (04)

c. Give the products of the following reactions (Any four): (04)

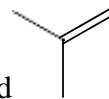


Q6 a. Comment whether addition of bromine to isomers of 2-Butene is stereospecific, stereoselective or both. Justify this statement by giving the mechanism of the above reaction. (04)

b. Predict whether the said order of reaction conditions would yield the desired product. Suggest suitable modifications, if necessary. (04)



b. Identify the product after the reaction of the given compound



with

i.  $KMnO_4/HIO_4$

ii.  $HBr, H_2O_2$

iii.  $Br_2/H_2O$

iv.  $H_2O/H^+$

(04)

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