

Roll No.

Sl. No. of Question Paper: 1435

Unique Paper Code : 2171302
 Name of the Paper : Paper-6, Organic Chemistry
 Name of the Course : B.Sc. (Erstwhile FYUP)
 Semester : III
 Duration : 3 hours
 Maximum Marks : 75

F-7

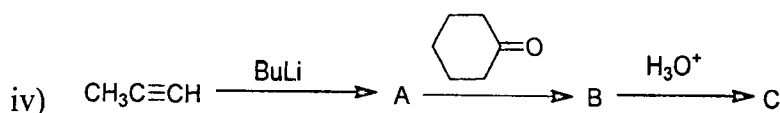
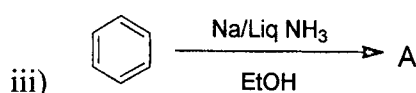
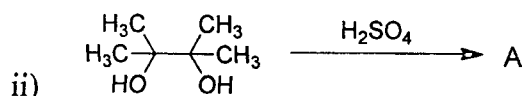
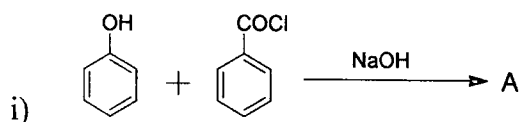
Instructions for Candidates:

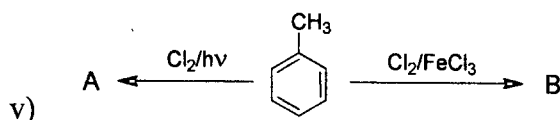
- Write your Roll No. on the top immediately on receipt of this question paper.
- Attempt **SIX** questions in all. Question no. 1 is compulsory.
- Question no. 1 carries 15 marks. Rest of the questions (Ques. no. 2 to 8) is of 12 marks each.

1. a) The compound A, C_7H_8 , on treatment with methylchloride and aluminium chloride, yields a mixture of two isomers B and C, C_8H_{10} , which are oxidized by potassium permanganate to the isomeric acids D and E, $C_8H_6O_4$, respectively. E gives F, $C_8H_4O_3$ on heating whereas D is unaffected by heat. Deduce the structures of compounds A to F. Give the equations involved and write the mechanism of conversion of A to B and C.

(9)

b) Identify the products and mention "Name Reaction" involved if any. (Any Four) (1.5×4)





2. a) Oxidation of cumene to get phenol is quite an economical process (commercial method of phenol preparation). Give the mechanism of this reaction. (4)

b) Account for the formation of *m*-MeOC₆H₄NH₂ from ammonolysis of either *o*-MeOC₆H₄Br or *m*-MeOC₆H₄Br. (4)

c) Write down the product(s) obtained when phenyl acetate is treated with AlCl₃ in an inert solvent. Name the reaction and explain the mechanism. (4)

3. Attempt **Any Four** questions. (3 × 4)

a) Giving an orbital picture of benzyne, explain why the life time of benzyne is very short?

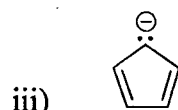
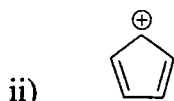
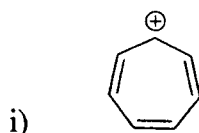
b) Why vinyl chloride is less reactive than allyl chloride towards nucleophilic substitution reaction?

c) Why diphenylethers give no reaction (even at high temperatures) when treated with hydrohalic acids?

d) Chlorine atom in chlorobenzene has deactivating influence for electrophilic substitution, yet it directs the incoming groups to *ortho*- and *para*- positions. Comment on it.

e) Why -OH group is more activating group than -OCOCH₃ group when attached to benzene ring?

4. a) Giving suitable explanation, state whether the following compounds are aromatic, non-aromatic or antiaromatic. (**Any Three**) (3)



b) Explain why Williamson's synthesis of *tert*-butyl ethyl ether using *tert*-butyl bromide and sodium ethoxide is not a good synthesis? (3)

c) How do you explain the formation of 2,3-dimethylbutan-2-ol from 3,3-dimethyl-but-1-ene on addition of water in acidic medium? (3)

d) Ketones cannot be prepared from RCOCl and Grignard's reagent R'MgCl. Why? (3)

5. a) Give a visible test (with suitable reactions) to differentiate between: (4)

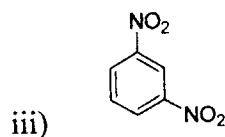
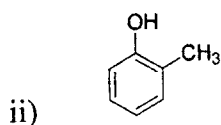
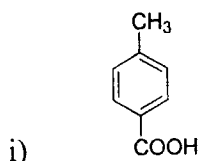
i) *n*-Propanol and *iso*-propanol

ii) Phenol and ethanol

b) Arrange the following in decreasing order of reactivity. Give suitable explanation. (4)

i) Benzene, toluene, nitrobenzene, bromobenzene (towards electrophilic substitution reaction)

- ii) $\text{CH}_3\text{CH}_2\text{CH}_2\text{-Cl}$, $(\text{CH}_3)_2\text{CHCH}_2\text{-Cl}$, $(\text{CH}_3)_3\text{C-CH}_2\text{-Cl}$ (towards $\text{S}_{\text{N}}2$ reaction)
- c) Explain with a suitable example the stereochemical aspect of $\text{S}_{\text{N}}1$ reaction. (4)
6. a) Convert the following using suitable reagents. (Any Three) (9)
- Benzene to *p*-chlorobenzoic acid
 - Benzene to fluorobenzene
 - Benzylalcohol to phenylacetic acid
 - Propylchloride to propanal
- b) Why benzene typically undergoes substitution reactions whereas alkenes undergo addition reactions? (3)
7. a) In Friedel-Crafts alkylation and acylation reactions, nitrobenzene is generally used as a solvent. Why does it not compete with aromatic substrates for this reaction? (3)
- b) The boiling points of alcohols are higher than those of ethers of similar molecular weights. Why? (3)
- c) Neopentyl halides are very slow in nucleophilic substitution reactions, whatever the experimental conditions. How can you account for this observation? (3)
- d) In the following di-substituted benzenes, indicate the position(s) where nitration reaction will occur. (3)



8. Write short notes giving emphasis on i) reaction involved, ii) mechanism with explanation and iii) limitations (if any). (Any Three) (3 × 4)
- Acid and base catalysed ring opening of epoxides.
 - Riemer-Tiemann reaction
 - Friedel-Crafts alkylation
 - Application of organolithium compounds in the synthesis of *primary*, *sec.* and *tert.* alcohols.