7102

2057

B.Sc. (H.S.) Chemistry 2nd Semester
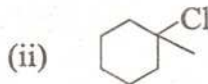### CHEMISTRY

Paper : Chem-202

(Organic Chemistry of Functional Groups–II)

Time allowed—Three Hours]   [Maximum Marks—75
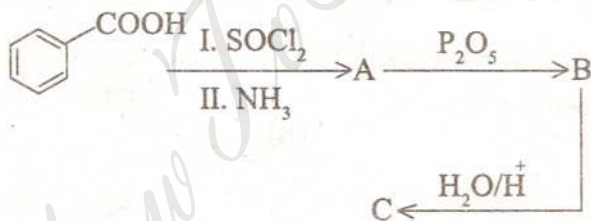
SECTION—A

Note :— Attempt ALL the questions of this section. Each question carries 1·5 marks.

1. Sketch the synthesis of DDT.

2. Arrange the following alkyl halide in order of increasing reactivity towards S_N1 type of reaction :—

    (i)   (ii)

    (iii)   (iv)

3. How will you synthesize isopropyl alcohol from :
    (a) Acetone
    (b) Propene ?

4. How will you convert phenol into :
    (a) Salicylic acid
    (b) o-Hydroxyacetophenone ?

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5. Electron releasing groups decrease the acidity of phenols while electron with drawing groups enhance the acidity of phenols, explain.

6. How will you explain the acidity of α-hydrogen in case of carbonyl compounds ?

7. Write down two methods for the conversion of acid chlorides into aldehydes.

8. How will you synthesize benzoic acid from bromobenzene ?

9. Why ethyl p-nitrobenzoate is saponified at much faster rate as compared to ethyl benzoate ?

10. Identify the compounds A, B and C in the following sequence of reaction :

$$\text{C}_6\text{H}_5\text{COOH} \xrightarrow[\text{II. NH}_3]{\text{I. SOCl}_2} A \xrightarrow{\text{P}_2\text{O}_5} B$$

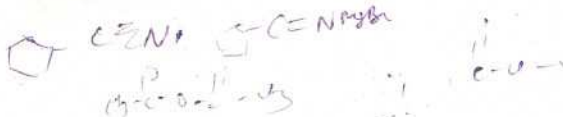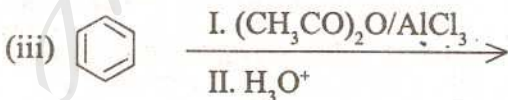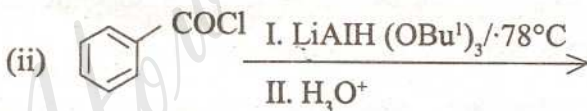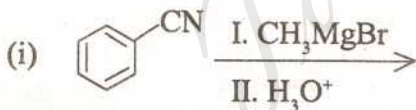$$C \xleftarrow{\text{H}_2\text{O}/\overset{+}{\text{H}}} $$

SECTION—B

Note :— Attempt any **EIGHT** questions. Each question carries 4·5 marks.

11. How will you explain the fact that allyl chloride undergoes substitution through S_N1 mechanism whereas propyl chloride reacts through S_N2 mechanism ?

12. Discuss the effect of polarity of solvent and nature of nucleophile on the reactivity of S_N1 and S_N2 reaction.

13. Reaction of 3, 3-dimethyl-2-butanol with HCl results in the formation of 2-chloro-2, 3-dimethyl butane rather than 2-chloro-3, 3-dimethyl butane. Account for this result and also write the mechanism.

14. Write the mechanism of Fries rearrangement. How will you establish that the reaction involves two-step mechanism ?

15. How will you prepare cis-1, 2-cyclohexane diol and trans-cyclohexane diol from cyclohexane ?

16. Discuss the mechanism of Cannizzaro reaction. Which type of aldehydes give this type of reaction ?

17. Complete the following reactions :

(i)
$$\text{C}_6\text{H}_5-\text{CN} \xrightarrow[\text{II. } H_3O^+]{\text{I. } CH_3MgBr}$$

(ii)
$$\text{C}_6\text{H}_5-\text{COCl} \xrightarrow[\text{II. } H_3O^+]{\text{I. } LiAlH(OBu^t)_3/\cdot 78°C}$$

(iii)
$$\text{C}_6\text{H}_6 \xrightarrow[\text{II. } H_3O^+]{\text{I. } (CH_3CO)_2O/AlCl_3}$$

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18. Write the mechanism of base catalyzed halogenation of enolisable ketones. What is the limitation of this reaction ?

19. Write one method for conversion of carboxylic acid to acid chloride, ester and amide.

20. Complete the following reactions :

(i) $CHCH_3$ $\xrightarrow{HCHO/(CH_3)_2NH}$

(ii) CHO $+ CH_3CH_2CHO \xrightarrow{OH}$

(iii) $\xrightarrow{C_6H_5COOOH}$
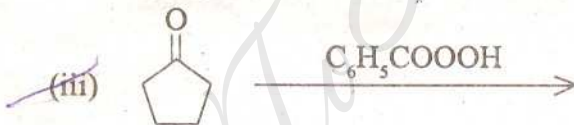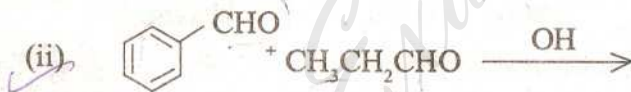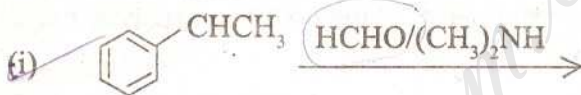
21. How will you synthesize malonic acid from chloroacetic acid ? Describe the action of heat on succinic acid and adipic acid.

22. Why amides are less reactive than acid chloride towards acyl nucleophilic substitution reactions ? How will you convert acid anhydride into ester and amide ?

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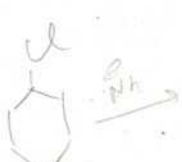
SECTION—C

Note :— Attempt any **TWO** questions. Each question carries **12** marks.

23. (a) Explain the addition-elimination mechanism for nucleophilic substitution in aryl halides. Which type of aryl halides gives substitution through this mechanism ?

    (b) Explain why aryl halides are inert towards nucleophilic substitution by S_N1 and S_N2 mechanism. 8,4

24. (a) What is cumene hydroperoxide process for synthesis of phenol ? Write its mechanism.

    (b) Write the mechanism of oxidative cleavage of 1, 2-glycol with HIO_4. 7,5

25. (a) Write the mechanism of Reimer- Tiemann reaction. How will you prove the intermediacy dichlorocarbene in this reaction ?

    (b) The bromination of phenol takes place without the presence of catalyst while the bromination of benzene requires catalyst. Explain, why ? 8,4

26. (a) Discuss the orientation of ring opening reaction of unsymmetrical epoxides under acidic and basic conditions.

    (b) Discuss the $A_{AC}2$ mechanism of ester hydrolysis. How will you establish that the reaction involves an intermediate not a transition state ? 5,7

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