(c) Convert: Phenol → p-aminophenol



# WEST BENGAL STATE UNIVERSITY

B.Sc. Honours 4th Semester Supplementary Examination, 2021

# **CEMACOR10T-CHEMISTRY (CC10)**

# **ORGANIC CHEMISTRY**

Time Allotted: 2 Hours Full Marks: 40

The figures in the margin indicate full marks.

Candidates should answer in their own words and adhere to the word limit as practicable.

All symbols are of usual significance.

# Answer any four questions taking one from each unit

## **UNIT-I**

(a) What is Mannich base?
 (b) Convert aniline to benzene.
 (c) State the action of NaNO<sub>2</sub> / HCl on:

 (i) N-methylaniline
 (ii) N, N-dimethylaniline

 (a) How we can generate carbene from diazo methane?
 (b) Write short notes on NEF Carbonyl synthesis.

## **UNIT-II**

2

- 3. (a) "In the Arndt-Eistert synthesis two equivalent of diazomethane is used." Explain the statement showing mechanism of the reaction.
  - (b) Predict the products in the following reactions and formulate plausible mechanism 2+2 for their formation.

i. Me 
$$\triangle$$
 ii. Ph  $\triangle$  iii.  $\triangle$  iii.  $\triangle$  iii.  $\triangle$  iii.  $\triangle$  iii.  $\triangle$  iii.  $\triangle$ 

(c) Explain the following rearrangement reaction in terms of thermodynamically and kinetically control product?

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4. (a) In the dienone-phenol rearrangement of compound A the phenyl group migrates but in the dienone-phenol rearrangement of compound B the –COOEt group migrates. Account for this observation.



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- (b) Show that Hofmann, Curtius, and Lossen reactions proceed through a common intermediate. Give proper evidence in favour of your answer.
- (c) Predict the product in the following reaction with plausible mechanistic explanation.

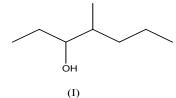
## **UNIT-III**

- 5. (a) Differentiate between stereoselective and stereospecific reaction with example.
  - (b) What is meant by 'illogical electrophile' and 'illogical nucleophile'? Give examples.
  - (c) Write down protection and deprotection method of Boc protected amine.
  - (d) Synthesize (A) from (B) using retrosynthetic approach,

$$NH_2$$
 $(A)$ 
 $(B)$ 

(e) Predict the major and minor product.

- 6. (a) Differentiate between diastereoselectivity and enantioselectivity with example.
  - (b) Define the terms disconnection and synthon.
  - (c) Write down protection and deprotection method of CBz protected amine.
  - (d) Synthesize (I) using retrosynthetic approach.



(e) Write down the synthetic equivalents of any *two* of the following synthons.

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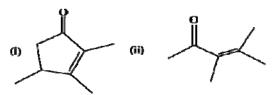
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# **UNIT-IV**

- 7. (a) How can you distinguish between anisole and *p*-cresol by UV spectroscopy?
  - (b) Calculate  $l_{\text{max}}$  values for the following compounds using Woodward Fieser rule. 2+2

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- (c) Why carbonyl stretching frequency in acetone is lower than that in acetyl chloride?
- (d) Write down different types of stretching and bending vibrations. 2+2
- (e) A compound C<sub>4</sub>H<sub>6</sub>O<sub>2</sub> shows a very strong IR band at 1720 cm<sup>-1</sup> and only one singlet signal in its <sup>1</sup>H NMR spectrum. Analyze the compound.
- (f) Distinguish *o*-hydroxy benzaldehyde and *p*-hydroxy benzaldehyde by IR 1 spectroscopy.
- 8. (a) A compound of molecular formula  $C_6H_{12}O$  shows a very strong IR band at 1705 cm<sup>-1</sup> and two singlet signals at  $\delta$  2.1 and 1.2 in its  $^1H$  NMR spectrum. Analyze the compound.
  - (b) Differentiate between *o*-dinitrobenzene and *p*-dinitrobenzene by <sup>1</sup>H NMR spectra.
  - (c) How can you distinguish between cyclohexanone and cyclopentanone by IR spectroscopy?
  - (d) The position of UV absorption maxima of aniline in aqueous solution are different from those of benzene but are almost identical with those of benzene in a solution of pH = 1.
  - (e) Between *cis*-stilbene and *trans*-stilbene, which one will absorb at longer wavelength and why?
  - (f) How do you monitor the completion of the below reaction by IR spectroscopy?



- (g) Draw <sup>1</sup>H NMR signals of CH<sub>3</sub>CH<sub>2</sub>OH showing the relative chemical shifts, integration and spin-spin coupling pattern.
  - **N.B.:** Students have to complete submission of their Answer Scripts through E-mail / Whatsapp to their own respective colleges on the same day / date of examination within 1 hour after end of exam. University / College authorities will not be held responsible for wrong submission (at in proper address). Students are strongly advised not to submit multiple copies of the same answer script.

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