This question paper contains 7 printed pages]

Your Roll No..............................................

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B.Sc. (H) CHEMISTRY/III Sem. B

Paper—CHHT-306 : Organic Chemistry—II

(Admission of 2010 and onwards)

Time : 3 Hours Maximum Marks : 75

(Write your Roll No. on the top immediately on receipt of this question paper.)

Answer any five questions.

All questions carry equal marks.

1. An unsaturated hydrocarbon A (C₆H₁₂) on ozonolysis gave two compounds B and C. The compound B gave a positive Fehling’s solution test and negative iodoform test. The compound C gave negative Fehling’s solution test and positive iodoform test. Compound B on reaction with dilute alkali solution followed by heating gave a compound D.

P.T.O.
Compound A was obtained back when D was treated with zinc amalgam in presence of hydrochloric acid. Identify A, B, C and D explaining the reactions involved. Name the reaction by which B is converted into D and write the mechanism of this reaction.

2. Explain the following:

(a) Vinyl chloride is less reactive than ethyl chloride towards nucleophilic substitution reactions.

(b) Compound I undergoes nucleophilic addition reaction at a faster than that in case of compound II:

\[ \overset{O}{\text{O}} \]
\[ \overset{\|}{X-\text{CH}_2-\text{C}-\text{H}} \]

I, \( X = \text{Cl} \)

II, \( X = \text{CH}_3 \)

(c) \( S_{N1} \) type of reactions normally proceed with retention of configuration.

(d) The rate in \( S_{N2} \) reaction increases with the increasing polarity of solvent.

(e) Carboxylic acids do not form oxime, though they have a \( \overset{\text{O}}{\text{C} = \text{O}} \) group.
3. 

(a) How do you explain the formation of $m$-toluidine along with $p$-toluidine on reaction of $p$-chlorotoluene with potassium amide in liquid ammonia?

(b) What products are formed when calcium salts of various dicarboxylic acids are heated?

(c) Write the reaction sequence involved in the ring opening of:

\[
\begin{align*}
\text{CH}_3 \\
\text{H}_3\text{C} - \text{CH} - \text{C} - \text{C}_2\text{H}_5 \\
\text{O}
\end{align*}
\]

with methanol in presence of acid. Also explain the formation of different products on reaction with sodium methoxide.

(d) Write a method to synthesise citric acid using reformaterski reaction.

\[4+4+4+3=15\]

P.T.O.
4. (a) What happens when 2-bromopentane is treated with alcoholic KOH? Name the rule which governs the formation of major product.

(b) Giving reasons, arrange the following in order of preference to be used as acetylating agent:

\[
\text{CH}_3\text{C}^\text{−}\text{O}^\text{−}\text{C}_2\text{H}_5, \text{CH}_3\text{C}^\text{−}\text{Cl}, \text{CH}_3\text{C}^\text{−}\text{O}^\text{−}\text{C}^\text{−}\text{CH}_3
\]

(c) Write the most common mechanism for acid-catalysed ester hydrolysis.

(d) Write a test to distinguish between propan-2-ol and 2-methylpropan-2-ol.

(e) Arrange the following compounds in increasing order of their acidity. Give reasons for your answer:

\[
\text{CH}_3\text{−CH}_2\text{−OH}, \text{CH}_3\text{−COOH}, \text{F}^\text{−}\text{CH}_2\text{−COOH}.
\]
5. (a) How will you carry out the synthesis of any three of the following from ethyl acetoacetate or malonic ester?

(i) Pentan-1, 5-dioic acid

(ii) 5-Ethylbarbituric acid

(iii) 3-Methylbutan-2-one

(iv) Cinnamic acid.

(b) What products are formed when anisole is heated with HI? Explain with the help of mechanism.

(c) How does a Grignard reagent react with an ester?

Explain with the help of an example. 

9+3+3=15

6. (a) Complete the following reactions:

(i) \[ \text{CH}_3\text{C} \text{O} \text{C}_2\text{H}_5 \xrightarrow{\text{C}_2\text{H}_5\text{ONa}} ? \]
(ii) \[
\text{O} \\
\text{CH}_3
\]

\[
\text{Anhydrous AlCl}_3 \xrightarrow{\Delta} ?
\]

(iii) \[
\text{O} \\
\text{CH} = \text{CH-C-OH}
\]

\[
\xrightarrow{\text{HCl}} ?
\]

(iv) \[
\text{CH}_3-\text{CH}_2-\text{CH-CH}_2-\text{C-OH} \xrightarrow{\Delta} ?
\]

(v) \[
\text{C}_2\text{H}_5-\text{S-C}_2\text{H}_5 + \text{H}_2\text{O}_2 \rightarrow ?
\]

(vi) \[
\text{CH}_2-\text{OH} \xrightarrow{\text{HIO}_4} ?
\]

(b) 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?
7. Write short notes on any three of the following. Give emphasis to:

(i) the functional groups which undergo these reactions,

(ii) products formed,

(iii) reaction conditions and

(iv) the mechanism involved.

(a) Benzil-benzilic acid rearrangement

(b) Reimer-Tiemann reaction

(c) Hofmann bromamide degradation

(d) Wittig reaction.  

$5 \times 3 = 15$