Total number of printed pages–7

1 (Sem–4/AR) CHE 02 (A)

2026

Anandaram Dhekial Phookan College Library
Acc. No.
Date
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CHEMISTRY

(Major/Minor–1)

Paper : CHE0400204

(Organic Chemistry–I)

Full Marks : 45

Time : 2 hours

The figures in the margin indicate full marks for the questions.

1. Answer the following questions : 1×5=5

(a) Which of the following is the most reactive carboxylic acid derivative ?

(i) Amide

(ii) Ester

(iii) Acid Chloride

(iv) Acid anhydride

(b) In this reaction acetamide is converted to methanamine

(i) Gabriel phthalimide synthesis

(ii) Carbylamine reaction

(iii) Stephen's reaction

(iv) Hoffmann bromination reaction

(c) Which of the following factors is not responsible for the denaturation of protein ?

(i) Heat

(ii) Charge

(iii) pH–change

(iv) Organic solvent

(d) 2,3– Benzopyrrole is

(i) Quinoline

(ii) Isoquinoline

(iii) Acridine

(iv) Indole

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(e) What is the wave length range for UV–spectrum of light ?

(i) 400 *nm* to 700 *nm*

(ii) 700 *nm* to 1 *nm*.

(iii) 0.01 *nm* to 10 *nm*

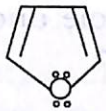
(iv) 10 *nm* to 400 *nm*

2. Answer the following questions : ***(any five)*** 2×5=10

(a) "Aniline is a weaker base than cyclohexylamine".

(b) Complete the following reactions :

(i) $CH_3-\overset{O}{\overset{\|}{C}}-Cl + C_2H_5MgCl \xrightarrow[-65°C]{FeCl_3}$ 1

(ii)  $\xrightarrow{(CH_3CO)_2O,\ BF_3}$ 1

(c) Explain why boiling point of carboxylic acids are higher than the corresponding alcohols.

(d) (i) Arrange the following in decreasing order of their basic strength

$C_6H_5NH_2$, $C_2H_5NH_2$, $(C_2H_5)_2NH$, NH_3 1

(ii) Name *two* nitro compounds which are used as explosives. 1

(e) Explain why infrared spectroscopy is called vibrational spectroscopy. Why the infrared (IR) peaks are not very sharp. 1+1=2

(f) What information canbe obtained from the UV–spectral measurement ?

(g) What is Sanger's reagent ? What kind of bonding is responsible for the tertiary structure of protein ?

(h) What is the structural formula of Nicotine and Hygrine ? 1+1=2

(i) How will you prepare furan from furoic acid ? Out of pyrrole and furan which is more aromatic ? 1+1=2

(j) Complete the reaction with mechanism $CH_3 - COOH + SOCl_2 \rightarrow$

3. Answer ***any four*** from the following : 5×4=20

(a) What type of transitions are observed in α, β–unsaturated carbonyl compounds ? How absorption maximum and intensity are shifted when carbonyl group is not conjugated ? $2\frac{1}{2}+2\frac{1}{2}=5$

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(b) What is the essential requirement for IR absorption ? How hydrogen bonding affects the vibrational frequencies ? How would you distinguish between ethanol and propanone on the basis of IR–spectroscopy ? 1+2+2=5

(c) Name and write mechanism of the following reaction :

$$CH_3 - COOH + HN_3 \xrightarrow{H_2SO_4} R - \ddot{N}H_2 + CO_2 + N_2$$

1+4=5

(d) What do you mean by Zwitter ions and isoelectric points of amino acids Explain. $2\frac{1}{2}+2\frac{1}{2}=5$

(e) How can you prepare nitromethane from chloroacetic acid $(ClCH_2COOH)$? Discuss nitro–aci tautomerism. During nitration of benzene with a mixture of nitric acid and sulphuric acid, sulphuric acid acts as a catalyst. Explain. 1+2+2=5

(f) How does pyridine react with $NaNH_2$? What is Madelung indole synthesis ? Explain the aromatic character of pyrrole and thiophene. 1+2+2=5

(g) What is the medicinal uses of Morphine and nicotine. How will you convert nicotine into hygrinic acid. 2+3=5

(h) (i) How would you distinguish primary, secondary and tertiary amines by using Hinsberg test? 3

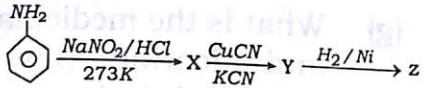
(ii) How would you prepare chlorobenzene from aniline? 2

4. Answer A ***or*** B ***or*** C ***or*** D, ***any one*** from the following : 10×1=10

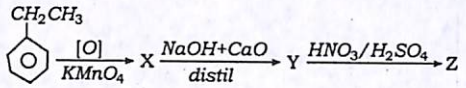
(A) Discuss in detail different types of fundamental molecular vibrations. What do you mean by number of fundamental vibrations in polyatomic molecules? How are they related to number of degrees of freedom in the molecule? 5+2+3=10

(B) Discuss the factors which affects the position of ultraviolet bands. Describe the Woodward–Fieser rules for calculating absorption maxima in dienes. Cyclopentene absorbs light at 190 *nm*. What is the chroomophore responsible for it? What type of transition is responsible for it? 4+4+1+1

(C) (a) Find out the products *X*, *Y* and *Z*.

(i) 

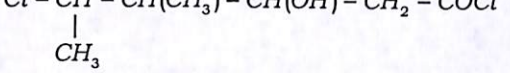
1+1+1=3

(ii) 

1+1+1=3

(b) (i) Write down the mechanism of acid catalysed hydrolysis of ester. 3

(ii) Name the following compound according to IUPAC nomenclature



1

(D) (a) Write short notes on : ***(any two)*** 3×2=6

(i) Gabriel's phthalimide synthesis

(ii) Ullmann reaction

(iii) Electromagnetic radiation

(iv) Physiological action of alkaloids

(v) Carbylamine reaction

(b) Elucide the structure of indole. 4

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