M.Sc. II - Sem. III - Oct. 2016

Organic Chemistry - Paper III

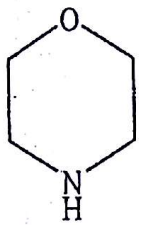
QP Code : 77745

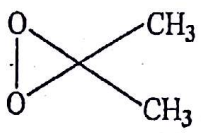
(2½ Hours) **[Total Marks : 60**

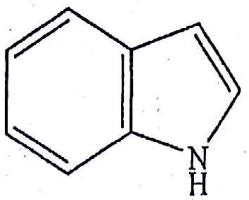
N. B. : (1) **All** questions are **compulsory.**
(2) **Figures** to the **right** indicate **full** marks.

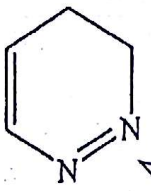
1. (a) Attempt **any two** of the following :– **8**

(i) Name the following compounds according to the system of nomenclature mentioned alongside the structure :–

I)  Common name

II)  Systematic Hantzsch-Widman System

III)  Common name

IV)  Replacement nomenclature

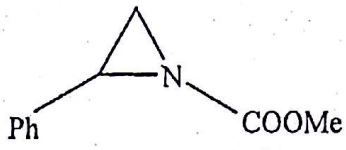
(ii) Draw structures for the following :–

(I) Furo [3,2-d] pyrimidine
(II) 2H-1,2-benzoxazine
(III) 4-Thia-2-oxo cyclohex-3-ene
(IV) 2H-Furo [3,2-b] pyran

(iii) (I) Explain : The chemical reactions of three membered heterocycles are mainly ring opening reactions.

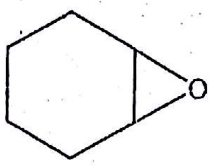
(II) Complete the following reactions :–

A)



Me_2CuLi, ether, 0^0C

B)



$LiCH_2CN$, THF, 0^0C

C)

HCl

(iv) (I) How will you prepare imidazole from,

(A) α-halocarbonyl compound

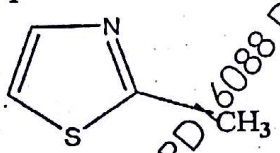
(B) Tosylmethylisocyanide

(II) Draw resonance structures for imidazole and explain why electrophilic attack takes place at 4(5) position.

(b) Attempt **any one** of the following :– 4

(i) Complete the following reactions :–

I

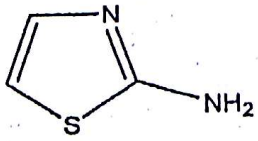


N_2O_4, BF_3, △

II.

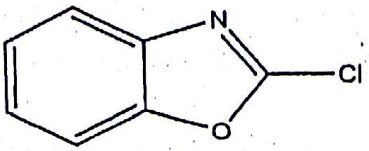
KOH, $MeSO_2Cl$, 0^0C

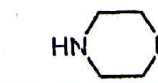
III



Br_2, AcOH, △

IV





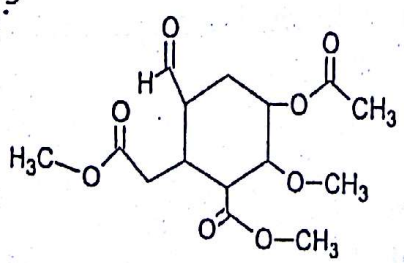
Et_3N

(ii) (I) Give the preparation of isoxazole from,
(A) 1,3-diketone
(B) nitrile oxide
(II) What is the action of ^{-}OH on isoxazole?

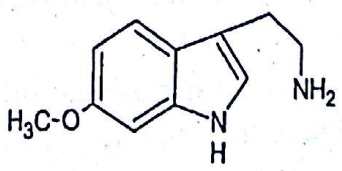
2. (a) Attempt **any two** of the following :– 8
(i) Give an account of the methylation studies used in the structure determination of lactose.
(ii) Write notes on :–
(I) Deoxy sugars
(II) Aminosugars
(iii) Give analytical evidences in support of the structure of β-carotene.
(iv) Give the synthesis of bombykol from acetylene.

(b) Attempt **any one** of the following :– 4
(i) Give structural features and biological importance of
(I) anthocyanins
(II) porphyrins
(ii) Discuss oxidative studies in support of structure of papaverine.

3. (a) Attempt **any two** of the following :– 8
(i) In the synthesis of 4-demethoxydaunomycin, how is ethylacetoacetate converted to 5,12-dimethoxy-2(2-methyl-1,3-dithiolan-2-yl)-1,4-dihydronaphthacene?
(ii) How is phloroglucinol converted to 4,6-dimethoxy-benzofuranone?
Draw the structure of 4-demethoxydaunomycin.
(iii) How is decalinedione prepared from resorcinol? Draw the configuration of the two enantiomers of griseofulvin.
(iv) How is reserpine synthesised from the following compounds :



and



(b) Attempt **any one** of the following :– 4

(i) Draw the structure of β-vetivone.
How are prostaglandins classified?

(ii) How is structure of PGE_1 elucidated?

4. (a) Attempt **any two** of the following :– 8

(i) Explain in brief : Relaxation phonomenon and Relaxation time in NMR spectroscopy.

(ii) Explain the following spin notations with example :
(I) AB system
(II) $AB_2 - AX_2$ system.

(iii) An organic compound with molecular formula $C_{10}H_{13}NO_2$ exhibits the following spectral data :
IR (cm^{-1}) : 3402 (s), 3318 (s), 3025(w), 1695 (s), 1602(s) and 1580(m)
^1H NMR δ (ppm) : 1.25 (6H, d), 4.2 (2H, broad), 4.75 (1H, m), 6.7 (2H, d) and 7.9 (2H, d).
Deduce the structure of compound with justification.

(iv) An organic compound with molecular formula $C_7H_6O_2$ shows the following spectral data :
IR (cm^{-1}) : 3350, 2833, 2760, 1667, 1616 and 1580.
^1H NMR δ (ppm) : 6.79 (2H, m), 7.3 (2H, m), 9.59 (1H, s) and 10.85 (1H, s and exchangable with D_2O)
Interpret the given spectral data and deduce the structure of the compound.

(b) Attempt **any one** of the following :– 4

(i) Explain the principle of FT-IR spectroscopy.
Discuss the application of ^{19}F NMR spectroscopy.

(ii) Explain in brief ^{31}P NMR spectroscopy.
IR spectra of methylsalicylate exhibits peaks at 3300, 3050, 2910, 1590 and 1540 cm^{-1}. Assign these peaks with justification.

5. Attempt **any four** of the following :– 12

(a) Name the following compound by
(i) recognized common name
(ii) systematic Hantzsch-Widman system.

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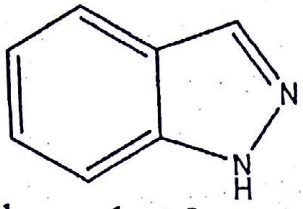
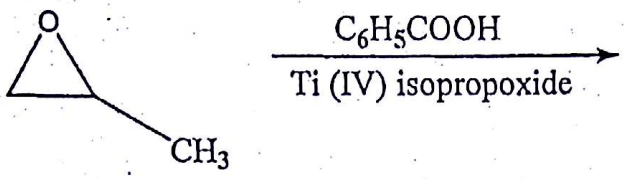
(iii) replacement nomenclature.



(b) (i) Write the product formed :



(ii) Discuss thermal rearrangement of isoxazole to oxazole.

(c) (i) What are insect pheromones?

(ii) Give the physiological importance of morphine.

(d) Give the synthesis of ubiquinone.

(e) What are insect growth regulators?
Discuss the structural features of gibberelic acids.

(f) Draw the sturcture of JH_2. Give the application of arylacetic acids.

(g) Explain in brief : NOE difference spectra.

(h) Write a note on Long range coupling.