NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2024_2 EXAMINATION

COURSE CODE: CHM 421
COURSE TITLE: HETEROCYCLIC CHEMISTRY
COURSE UNIT: 2
TIME: 2 HOURS
INSTRUCTION: ANSWER QUESTION ONE AND ANY OTHER TWO QUESTIONS

Question one score 30 marks with the other two scoring 20 marks each

QUESTION ONE

(1a) i. In term of atomic composition, differentiate between benzene and pyridine (2 marks)
ii**.** Briefly explain how isoquinoline can be isolated from a mixture and why? (4 marks)

(1b) i. Identify what happens when quinoline is exposed to light (2 marks)
ii**.** Mention the method of synthesis of isoquinoline that is efficient (2 marks)
iii. What makes indole be oxidized easily? (2 marks)

(1c) i. briefly describe the reaction known to be modification of Bischer-Napieralski synthesis (2 marks)
ii. Identify the conditions that promote N-alkylation, N-acylation and susphonation of indole and give one example. (4 marks)

(1d) i. What are Bisbenzylisoquinolium? (2 marks)
ii. Identify two effects of neurotoxins. (4 marks)

(1e) i. Briefly explain Parkinson's disease. (2 marks)
ii**.** Outline the two starting materials required in Discher indole synthesis

(4 marks)

QUESTION TWO

(2a) Briefly discuss the isolation of quinoline by Gerhand method. (3 marks)

(2b) Outline the scheme for the synthesis of 6-methoxylisoquinoline. (7 marks)

(2c) In a cyclic form show the reactions of coumarin with Conc. H_2S0_4, NaOH, $Br_2/AlCl_3$ at 40^OC and $Me_3O_+BF_4$ (10 marks)

QUESTION THREE

(3a) i. With the aid of structure only, differentiate between morphine and heroin (8 marks)

ii. Which method of synthesizing indole gives high yield and can generate substituted indole (2 marks)

(3b) i. Compare the basicity of quinoline and pyridine (2 marks)

ii**.** Briefly explain why tryptophan is an essential amino acid (3 marks

(3c) Explain the general physical and chemical properties of indole (5 marks)

QUESTION FOUR

(4a) i. Give the IUPAC name of Sodium Cromoglycate (2 marks)

ii. Identify the part of the body where 80% of total serotonin is located (2 mark)

iii. Write the IUPAC name of serotonin (2 marks)

(4b) i. Why is quinine used for photochemistry as fluorescent standards (2 marks)

ii. State the use of L-stereoisomer of tryptophan (2 marks)

iii. Apart from serving as buildings blocks in protein biosynthesis, mention any function of tryptophan. (3 marks)

(4c) Describe niacin under the following headings formular, other names, uses, colour, symptoms of deficiency and solubility. (7 marks)

QUESTION FIVE

(5a) i. Describe cromolyn (cromglicic acid) and mention the use (3.5 marks)

ii. Mention the functions of auxin (3 marks)

(5b) i. Discuss warfarin taking into consideration; colour, formula and uses (3 marks)

ii. Draw the structure of Sodium Cromoglycate (4 marks)

(5c) Briefly distinguish between anthocyanine and anthocyadine. (6.5 marks)