



NATIONAL OPEN UNIVERSITY OF NIGERIA
UNIVERSITY VILLAGE, PLOT 91 CADASTRAL ZONE, NNAMDI AZIKIWE
EXPRESS WAY,
JABI - ABUJA.
FACULTY OF SCIENCES
DEPARTMENT OF CHEMISTRY
2024 1 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. Identify the heterocycle portion of quinoline that act as a base (1 mark)
ii. Under what condition will the ring rupturing of quinoline lead to formation of pyrazine-2, 3-dicarboxylic acid? (3 marks)
- (1b) i. Explain without equation chichibabin type of reaction. (2 marks)
ii. What is the compound with a bicyclic heterocycle, which contains a benzene ring fused to a pyridine ring? (2 marks)
iii. At what positions on the ring does Quinoline undergo electrophilic substitution? (2 marks)
- (1c) Show how to prepare 2,3-dimethylquinoline using Pfitzinger synthetic approach (8 marks)
- (1d) i. Explain how to prepare enantiomerically pure warfarin (2 marks)
ii. Highlight one major bottleneck of Friedlander approach for the synthesis of quinoline (2 marks)
iii. Highlight structural difference between quinaldine and lepidine. (2 marks)
- (1e) i. Identify the infection that is being treated with sentaconazoa nitrate (Dermofix). (1 marks)
ii. Draw the structure of 2,2'-Hexadecamethylenedioquinolinium Dichloride (3 marks)
iii. Which of the synthesis involve the use of O-aminobenzaldehydes and O-aminobenzoylformate respectively and a two-carbon fragment as the starting material (2 marks)

QUESTION TWO

- (2a) i. The rate of nitration of quinoline in 80-90 % of sulphuric acid is of the same order as that of N-methylquinolinium salt, what does that suggest? (2 marks)