



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 416
COURSE TITLE: ORGANIC SYNTHESIS
COURSE UNIT: 2
TIME: 2 HOURS
INSTRUCTION: Answer question one and any other two questions.

QUESTION ONE

- (1a) Describe the processes involved in Wolf-Kishner's reduction of pentanal to pentane. (10 marks)
- (1b) Benzoic acid is a commonly used preservative in food and beverages, showing how it can be prepared from toluene. (4 marks)
- (1c) Using chemical structures only, differentiate molozonide from ozonide. (4 marks)
- (1d) Analyze using chemical structures how hydroxylation of alkenes yields glycols. (6 marks)
- (1e) What is Jones reagent used in the oxidation reaction. (6 marks)

QUESTION TWO

- (2a) What is Raney nickel? (5 marks)
- (2b) Provide the structures of the products formed from the reaction of
(i) 2,3-dibromopentane with KOH. (5 marks)
- (ii) 1,1-dichloroheptane with NaNH_2 and water. (5 marks)
- (iii) 2-Chlorobut-2-ene with KOH. (5 marks)

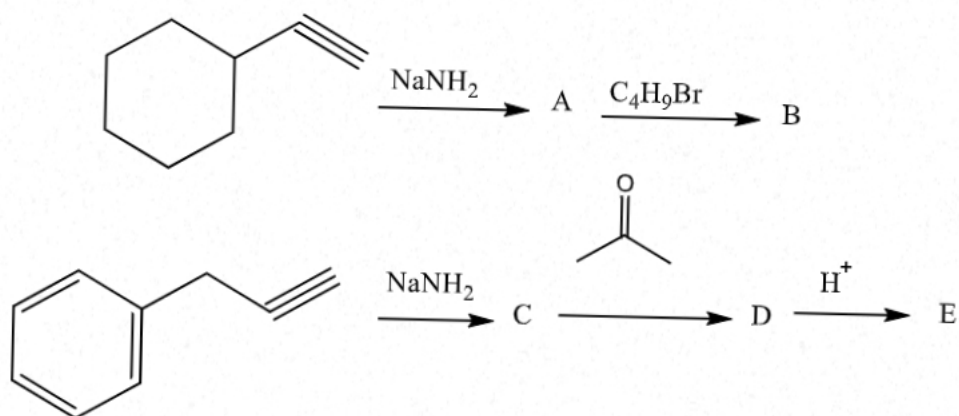
QUESTION THREE

- (3ai) Describe the synthesis of 4-methylcyclohexanone from an alcohol using chemical structure only.

(5 marks)

(3a) Draw the chemical structure of the oxidation reaction of propan-1-ol using KMnO_4 . (5 marks)

(3b) Provide the products of the reactions below



(10 marks)

QUESTION FOUR

(4a) What is Wittig reaction? (5 marks)

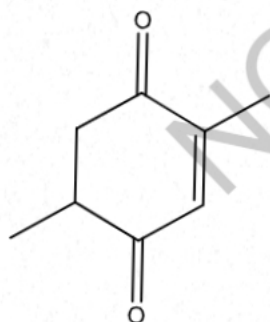
(4b) Describe the synthesis of phosphorus ylide

(4c) What are the limitations of Wolf-Kishner's reaction?

(5 marks)

QUESTION FIVE

(5a) Cortisone is a pregnene steroid hormone which serves as prodrug. Demonstrate using structures only, how this important compound can be synthesized from the compound below



(15 marks)

(Total = 15 marks)

(5b) How would you prepare 1,4-cyclohexadiene using Diels-Alder reaction.

(5 marks)