

CHUKA



UNIVERSITY

## UNIVERSITY EXAMINATIONS

EXAMINATION FOR THE AWARD OF  
DEGREE IN CRIMINOLOGY AND SECURITY STUDIES

CHEM 334: ORGANIC CHEMISTRY IV

STREAMS: BSc (CHEMISTRY)

TIME: 2 HOURS

DAY/DATE: TUESDAY 13 /07/ 2021

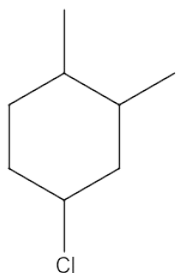
11.30 AM – 1.30 PM

**INSTRUCTIONS:**

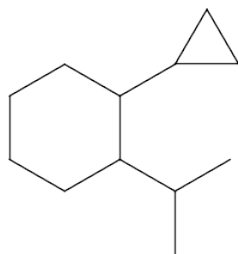
- Answer Question one (Compulsory) and any other Two questions.

**QUESTION ONE [30 MARKS]**

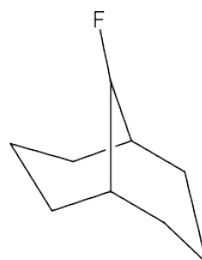
(a) Write the IUPAC name of each of the following compounds

**(6 marks)**

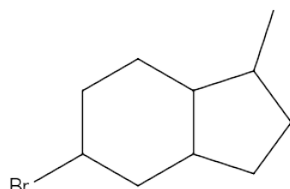
(i)



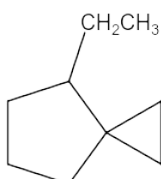
(ii)



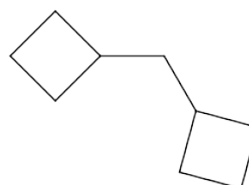
(iii)



(iv)



(v)



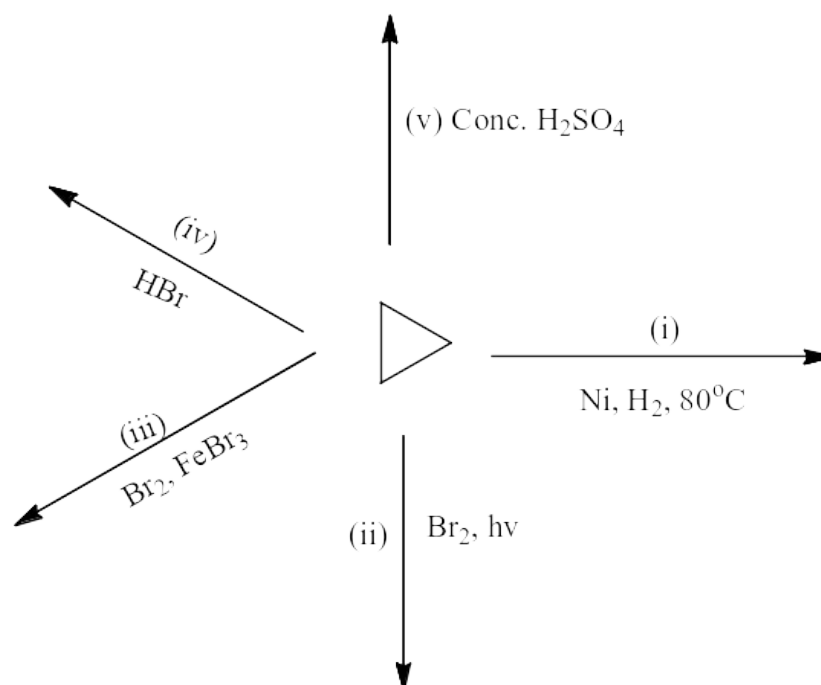
(vi)

(b) Discuss Baeyer theory in cycloalkanes using suitable examples

(6 marks)

(c) Write the structure of the major organic product(s) for each of the following reactions

(5 marks)



(d) Write equations for the synthesis of cyclobutane using the following methods (4 marks)

(i) [2 + 2] photochemical cycloaddition

(ii) Freund's method

(iii) Wislicenus method

(iv) from cyclobutene

(e) Write equations for the synthesis of phenylalanine using the following methods (6 marks)

(i) Phthalimidomalonic ester synthesis

(ii) Hell-Volhard-Zelinsky method

(iii) Strecker synthesis

(f) Write the major organic product(s) of naphthalene with the following reagents **(3 marks)**

(i) Na, CH<sub>3</sub>CH<sub>2</sub>OH      (ii) O<sub>3</sub> then Zn, H<sub>2</sub>O

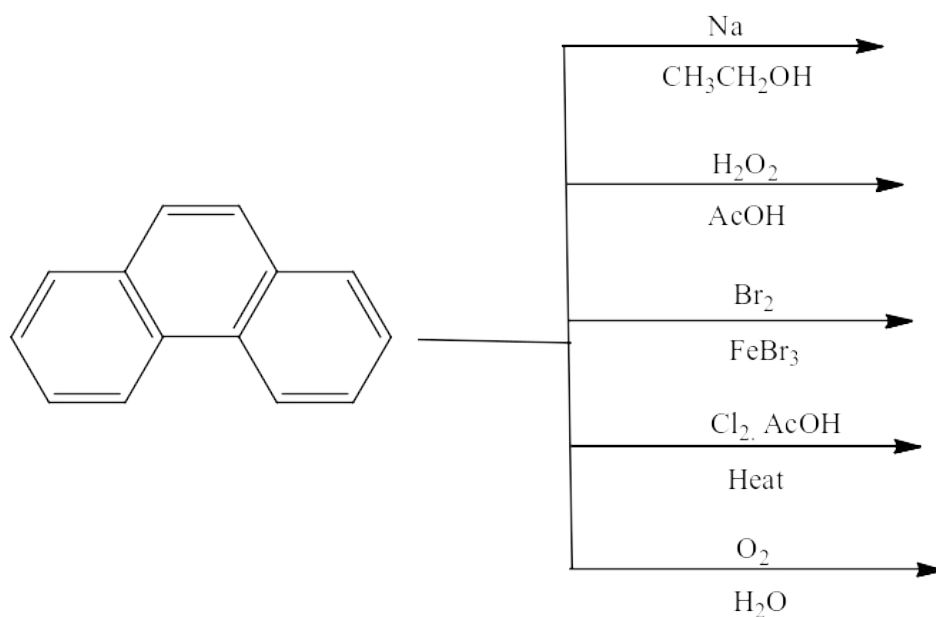
(iii) Ethanoyl chloride, AlCl<sub>3</sub> in tetrachloroethane

**QUESTION TWO [20 MARKS]**

(a) Write equations for the synthesis of anthracene using the following methods **(6 marks)**

(i) Haworth synthesis      (ii) Diels- Alder reaction

(b) Write the major organic product(s) of the following reactions **(5 marks)**



(c) Explain how the sequence of amino acids in peptides and proteins is determined

**(6 marks)**

(d) Write equations for the stepwise synthesis of cyclopropane using the Perkin's method

**(3 marks)**

**QUESTION THREE [20 MARKS]**

(a) Outline the synthesis of naphthalene from  $\beta$ -benzylidene-propenoic acid (6 marks)

(b) Write the major organic product(s) of anthracene with each of the following reagents

(6 marks)

(i) Maleic anhydride      (ii)  $\text{HNO}_3$ , acetic anhydride      (iii)  $\text{H}_2\text{SO}_4$ , Heat

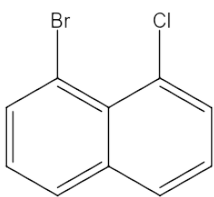
(iv)  $\text{Br}_2$       (v) Dilute  $\text{HNO}_3$       (vi) Na, Ethanol

(c) Discuss the structure of proteins (8 marks)

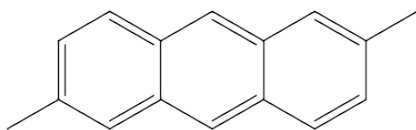
**QUESTION FOUR [20 MARKS]**

(a) Write the names of the following compounds

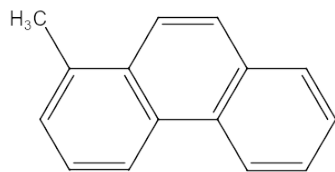
(4 marks)



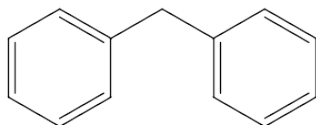
(i)



(ii)



(iii)



(iv)

(b) Design a stepwise synthesis of Tyr-Ala-Val tripeptide using the solid-phase peptide synthesis method. (8 marks)

(c) Write equations for the synthesis of cyclopentane using the following methods (**4 marks**)

(i) Dieckmann reaction                      (ii) Tharpe-Ziegler reaction

(d) Discuss the physical properties of cycloalkanes (**4 marks**)

.....