

UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION – 2016

TITLE OF PAPER : Advanced Organic Chemistry

COURSE NUMBER : C 403

TIME : Three Hours

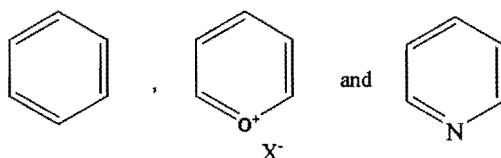
INSTRUCTIONS:

Answer any five questions of the seven questions and every question holds 20 marks.

NB: all questions are to be answered in a separate answer sheet.

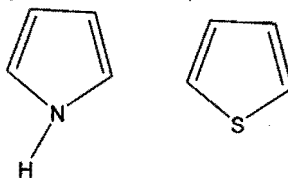
Answer any five of the seven questions and all questions have 20 marks each

1. a) Compare and discuss the reactivity of the following heterocyclic compounds taking benzene as the frame of reference. (5)

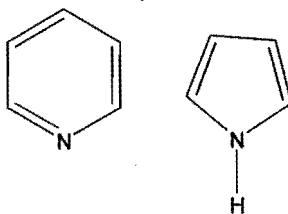


- b) How would compare the stability of 3 and 4 as well as 5 and 6 membered heterocyclic rings in nature and their ease of formation in the laboratory? Explain the reasons for your answer and elaborate with an example. (5)

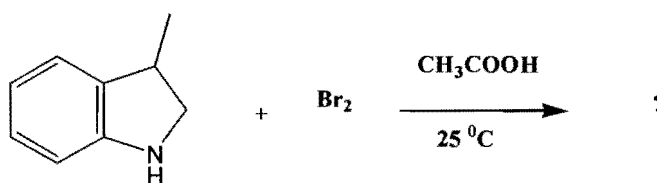
- c) Briefly describe the structure and bonding characteristics in pyrrole and thiophene in terms of orbital hybridization. What is the impact in reactivity of these two heterocyclic compounds? (5)



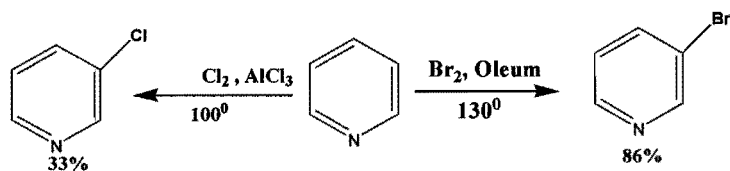
- d) Explain why pyridine is more basic than pyrrole even though both the nitrogen heteroatoms have lone pair electrons that can be protonated in an acid base reaction. (5)



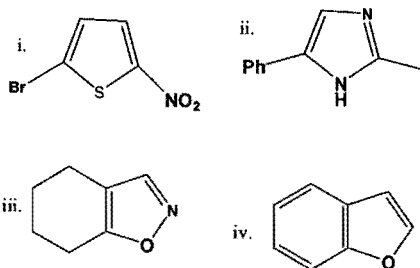
2. a) Predict the major reaction products expected from each of the following reactions of the heterocyclic compounds. (6)



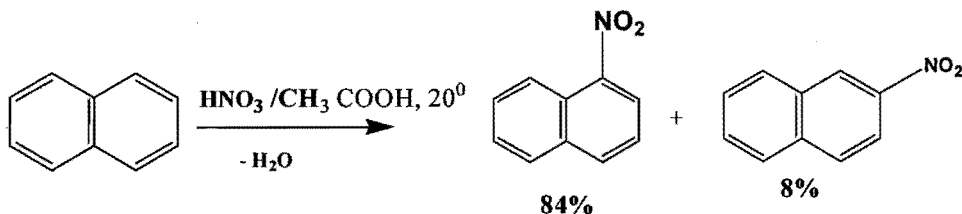
- b) Discuss the reduction in yield of the two Halogenation of Pyridine reactions. (6)



c) Give a brief outline of a synthesis for each of the following heterocyclic compounds. (8)

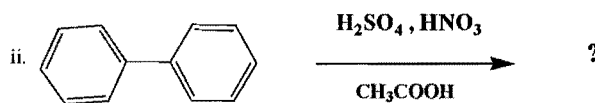
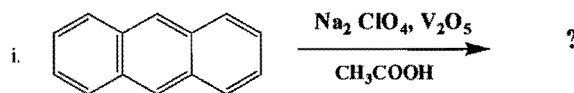


3. a) Explain why the difference in yield between the two nitration products? (4)



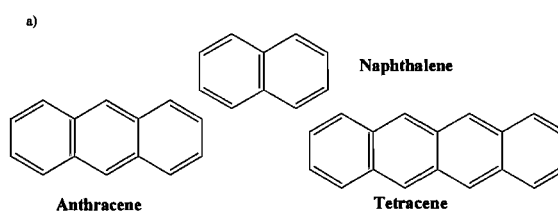
b) Benzene, polycyclic benzenoids and cyclic conjugated polyenes can be aromatic when they have a set of π electrons. Put the relation and indicate the once that are aromatic and not aromatic. (3)

c) What are the reaction products of the following reactions? (6)

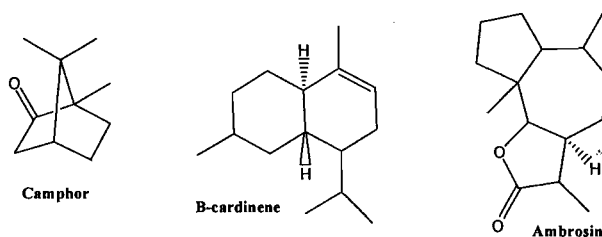


iii) Explain why electrophilic substitution occurs in naphthalene preferentially at C-1 rather than C-2. (4)

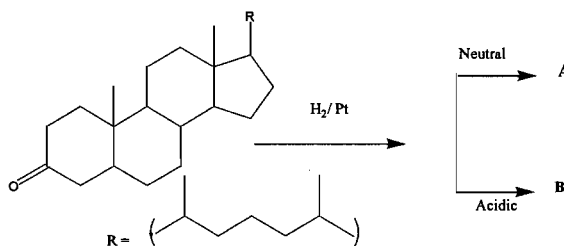
d) How does aromatic property relate to higher polycyclic hydrocarbons such as Naphthalene, Anthracene and Tetracene? Give reasons for your answer. (3)



4 i) The following Terpenes are made up of more than one isoprene units. Draw the compounds and with dotted lines identify the five carbon units corresponding to the isoprene units in each compound. (6)



ii) What are the reaction products A and B? (4)



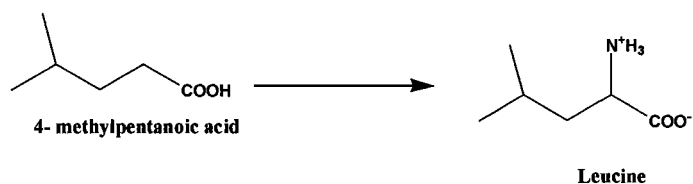
iii) In the compounds of estradiol and testosterone indicate the structural difference and similarity between the two compounds. (6)

iv) What is the precursor of these two physiologically active compounds? (4)

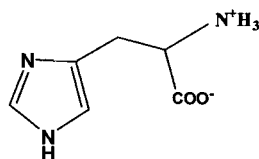
5. Write a short essay on natural alkaloids and flavonoids with specific focus on the following general aspects. (20)

- i) Definition
- ii) Occurrence and distribution
- iii) Properties
- iv) Importance in human health care

6 a) Suggest a synthesis of Leucine from 4-methylpentanoic acid. (4)



b) Outline a synthesis of Histidine. (4)



c) Discuss the chemistry of fats and carbohydrates with examples. (12)

7. Discuss the biosynthesis of the following natural products. (20)

- i) Terpenes (5)
- ii) Alkaloids (5)
- iii) Flavonoids (5)
- iv) What is the importance of understanding the biosynthesis of Natural products?(5)