

**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION 2008/09**

TITLE OF PAPER : **ADVANCED ORGANIC
CHEMISTRY**

COURSE NUMBER : **C403**

TIME : **THREE HOURS**

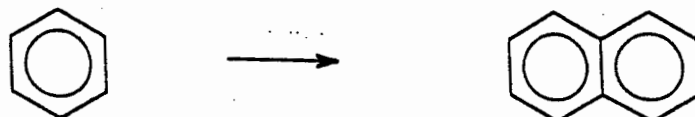
INSTRUCTIONS : **ANSWER ANY FOUR
QUESTIONS. EACH QUESTION
CARRIES 25 MARKS.**

*You are not supposed to open this paper until permission to do so
has been granted by the Chief Invigilator.*

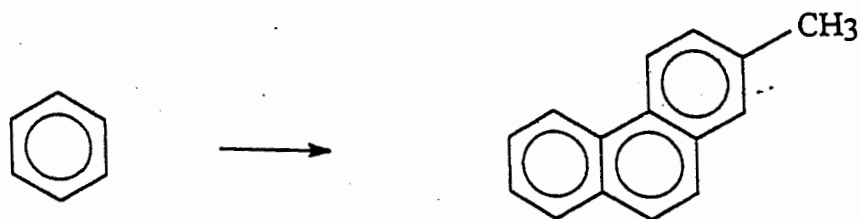
QUESTION 1

(a) Show all steps in the following transformations:

(i)



(ii)



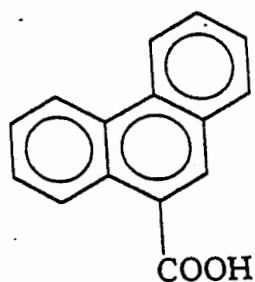
[10]

(b) Account for the observation that the bromination of naphthalene usually gives α -bromonaphthalene more than β -bromonaphthalene. [5]

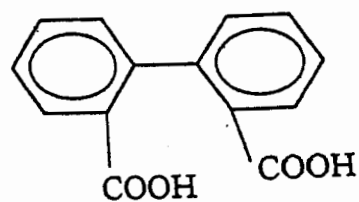
(c) Write the mechanism of the electrophilic attack of bromine on anthracene in the presence of a Lewis acid, and show the possible products. [5]

(d) Outline how you would convert phenanthrene to the following products: [5]

(i)



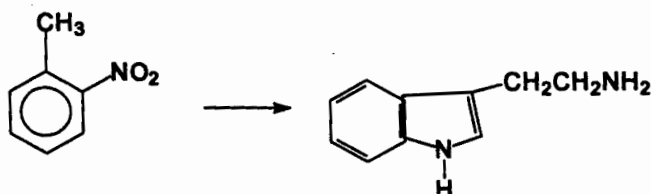
(ii)



QUESTION 2

(a) Outline how o-nitrotoluene could be converted to tryptamine.

[10]



(b) Account for the following observations:

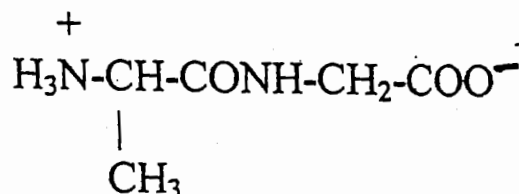
- (i) Nucleophilic substitution takes place on pyridine more readily than electrophilic substitution. [3]
- (ii) Nucleophilic substitution takes place on position 2 and 4 of pyridine. [5]
- (iii) Pyridine can act as a base while pyrrole does not. [2]
- (iv) Electrophilic substitution takes place on position 3 of pyridine. [5]

QUESTION 3

- (a)
 - (i) Give the experimental evidences with necessary explanation and equations in support of the cyclic structure of glucose. [10]
 - (ii) Give the Haworth structures of the two cyclic forms of D-glucose, name them and explain why they are interconvertible in solution. [5]
- (b)
 - (i) What do you understand by the term "epimers"? [3]
 - (ii) Explain why glucose and fructose give the same osazones. [3]
 - (iii) What is the use of osazones? [2]
 - (iv) What do you understand by the term "anomeric carbon atom"? Give an example to illustrate. [2]

QUESTION 4

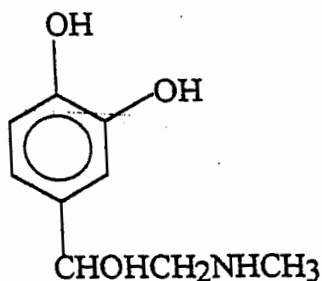
- (a) Write briefly on the structure of proteins. [6]
- (b) Show how the following peptide may be synthesized using protecting groups. [7]



- (c) Using glycine as an example, show how amino acids react with the following reagents: [6]
- (i) Nitrous acid (ii) Acetyl chloride (iii) Ninhydrin
- (d) Outline the biosynthesis of an unsaturated fatty acid from acetyl coenzyme-A. [6]

QUESTION 5

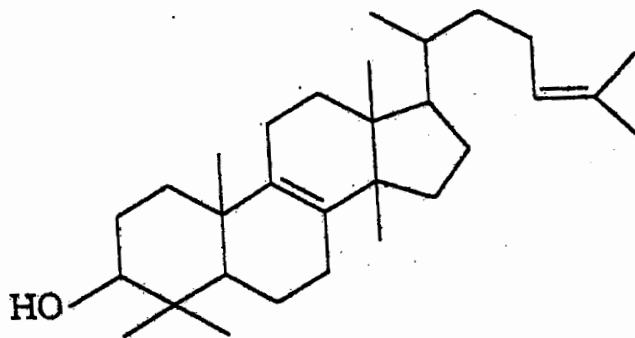
- (a) Write briefly on the alkaloids indicating what they are, their major sources and their importance to man. [6]
- (b) Give experimental evidences in support of the following structure of adrenaline (epinephrine). [8]



- (c) Outline the steps in the synthesis of adrenaline from catechol. Explain how such a synthesis gives rise to a racemic mixture while the adrenaline biosynthesised is stereochemically pure. [8]
- (d) What is the importance of adrenaline? [3]

QUESTION 6

- (a) (i) What do you understand by the term "isoprene rule"? [2]
- (ii) Name the biogenetic isoprene unit and show the mechanism of its biosynthesis from acetic acid. [8]
- (b) Write the mechanism involved in the biosynthesis of lanosterol from farnesyl pyrophosphate, and show how the carbon atoms of the steroidal nucleus are numbered. [9]



lanosterol

- (c) Outline the steps in the following transformation: [6]

