

**UNIVERSITY OF SWAZILAND
SUPPLEMENTARY EXAMINATION 2009/10**

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

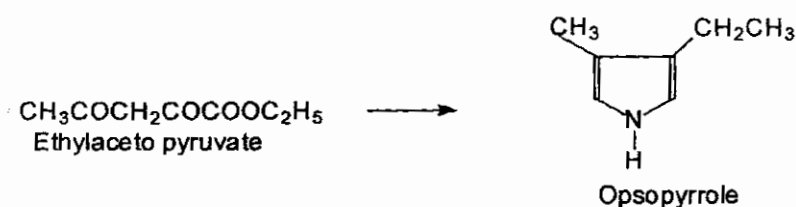
- (a) Write equations to show two methods by which benzyl chloride can be converted to diphenylmethane (4)
- (b) Outline steps in the conversion of triphenylcarbinol to tetraphenylmethane (4)
- (c) Write equations of the reactions of chromic acid with the following:
- (i) Diphenylmethane (2)
 - (ii) Biphenyl (2)
- (c) Write the structure and name of the product of the reaction of copper powder with each of the following:
- (i) Iodobenzene (2)
 - (ii) p-Iodotoluene (2)
 - (iii) o-Chloronitrobenzene (2)
- (d) (i) Write equations to show two methods by which phenylmagnesium bromide can be converted to biphenyl and give the conditions for the reactions. (5)
- (ii) Name the mechanism for the reaction in (d) (i) above and any byproduct of the reaction. (2)

QUESTION 2

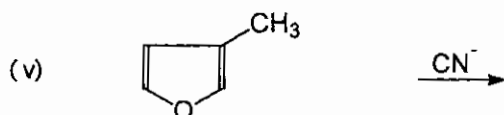
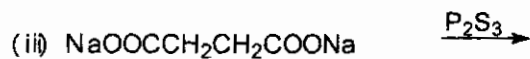
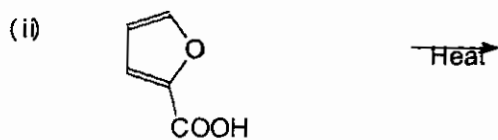
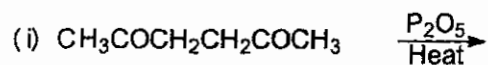
- (a) Outline all steps in the conversion of toluene to 1,6-dimethylnaphthalene. (10)
- (b) Outline all steps in the conversion of naphthalene to anthracene. (7)
- (c) Write the structure and name of the product of the reaction of each of the following reagents with phenanthrene:
- (i) Bromine in presence of iron (iii) bromide (2)
 - (ii) Potassium dichromate in acetic acid (4)
 - (iii) Sodium in pentanol (2)

QUESTION 3

- (a) Write all steps in the following conversion: (5)



(b) Complete the following reactions and name the products. (10)



(c) Account for the following:

(i) Thiophene is more aromatic than pyrrole while pyrrole is more aromatic than furan. (3)

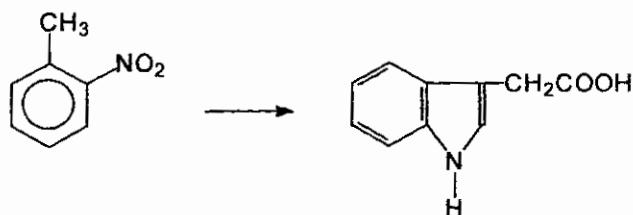
(ii) Amines react with acids but pyrrole does not. (3)

(d) Write the resonating structures of pyrrole and indicate positions of electrophilic attack on it. (4)

QUESTION 4

(a) Write the resonance structures of furan and predict the orientation of electrophilic attack on it. (7)

(b) Outline all steps in the conversion of o-nitrotoluene to auxin. (12)



(c)(i) Outline all steps in the conversion of pentosan to furan. (5)

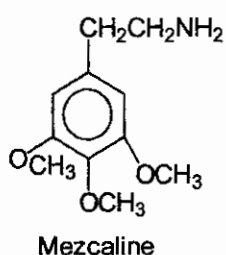
(ii) Name a common crop in Swaziland which is a good source of pentosan. (1)

QUESTION 5

- (a) Briefly describe the four classes that carbohydrates can be grouped into and name an example of each class. (8)
- (b) Outline all steps in the conversion of glucose to heptanoic acid. (5)
- (c) Write the structure of sucrose and explain why it is a non-reducing sugar. (3)
- (d) Outline steps in the biosynthesis of fatty acids using palmitic acid, $\text{CH}_3(\text{CH}_2)_{14}\text{COOH}$, as an example. (9)

QUESTION 6

- (a)(i) What is an alkaloid? (2)
- (ii) Write briefly on the importance of alkaloids and give appropriate examples (4)
- (b) Outline all steps in the conversion of 3,4,5-trimethoxy benzoic acid to mezcaine



- (c) Write the product of the reaction of mezcaine with the following reagents: (6)
- (i) HNO_2 (2)
- (ii) HI (2)
- (iii) KMNO_4 (2)
- (d) Outline all steps in the following transformation: (7)

