THE OPEN UNIVERSITY OF SRI LANKA

B. Sc DEGREE PROGRAMME / STAND ALONE COURSE 2006 / 2007

LEVEL 5 - FINAL EXAMINATION

CHU 3126 / CHE 5126 - ORGANIC CHEMISTRY

DURATION: 2 1/2 HOURS

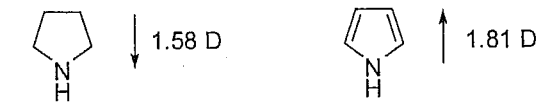
Tuesday 12th May 2007 10.00 - 12.30 a.m.

Answer any FOUR (04) questions only.

If you have answered more than four questions, only the first four answers will be marked.

1. (a) Explain the following observations.

(i) Dipole moment of pyrrolidine and pyrrole are as indicated below.



pyrrolidine pyrrole

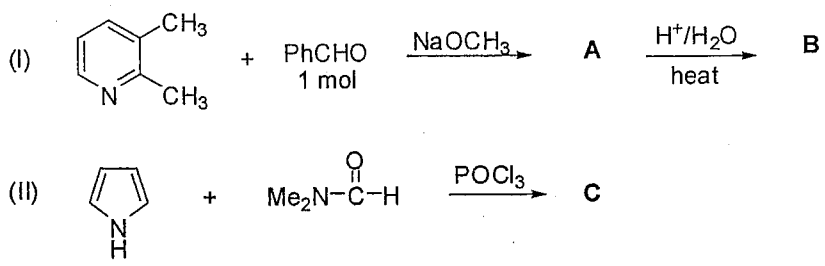
(20 Marks)

(ii) Pyrrole has a pK_b value of 13.6 while that of pyridine is 8.96.

pyrrole pyridine

(15 Marks)

(b) (i) Identify the structures of the products **A** – **C** formed in the reactions given below.



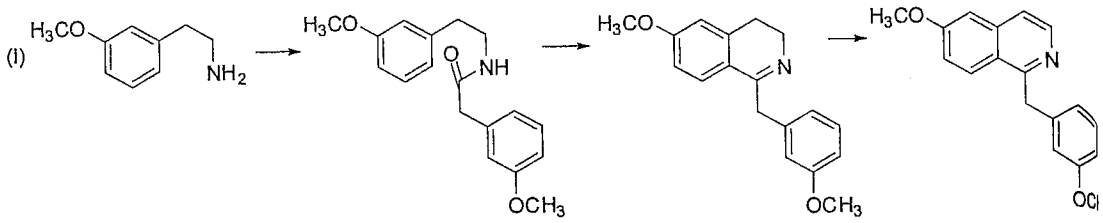
(ii) Give the mechanisms for the formation of product **A.**

(iii) Explain why the product **A** is the major product in reaction (I).

(40 Marks)

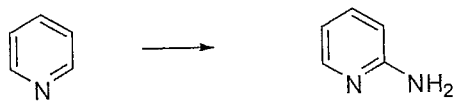
(c) Giving the necessary reagents and reaction conditions indicate how you would effect the following conversions?

(I)



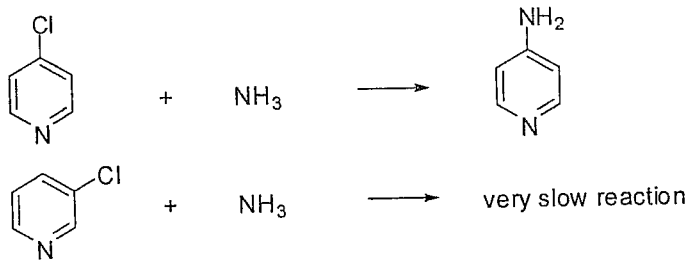
(15 Marks)

(II)



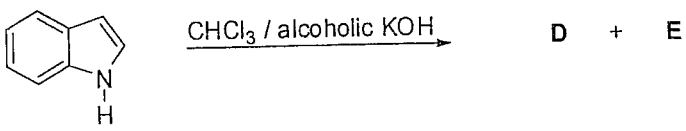
(10 Marks)

2. (a) Considering the mechanism of the reaction explain the observations given below.



(25 Marks)

(b) Identify the structures of products **D** and **E** obtained in the reaction given below. Give the mechanism for the formation of the products.

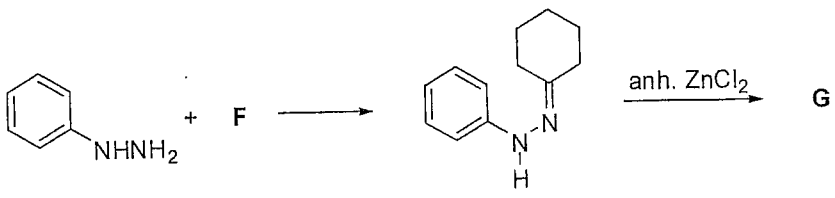


(20 Marks)

(c) Giving the necessary reagents and reaction conditions indicate how you would effect the following reactions.

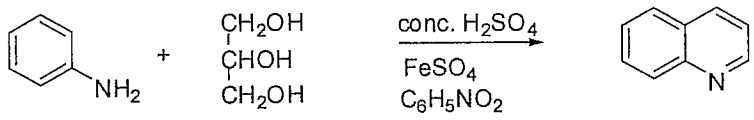
(10 Marks)

(d) Identify the structures of the compounds **F** and **G** in the following reactions.



(10 Marks)

(e) Skraup synthesis used in the synthesis of quinoline is as shown below.



(i) Explain the role of glycerol, concentrated sulphuric acid, nitrobenzene and ferrous sulphate in the above reaction.

(ii) Give the possible mechanism for the reaction.

(35 Marks)

3. (a) Show how you would carry out the following syntheses using **organo metallic reagents.**

i. 

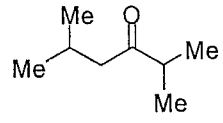
ii. 

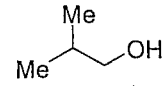
iii. 

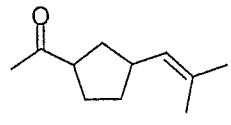
iv. 

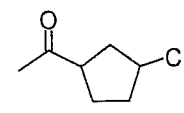
(40 Marks)

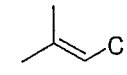
(b) Giving necessary reagents and conditions outline a route to synthesize the following.

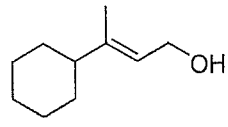
i. 

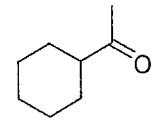
from 

ii. 

from 

and 

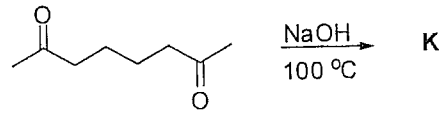
iii 

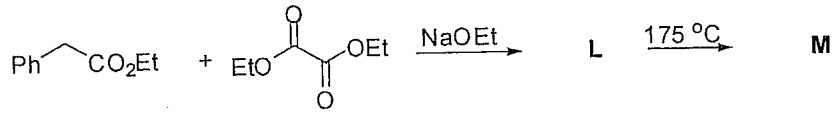
from 

and $BrCH_2CO_2Et$

(60 Marks)

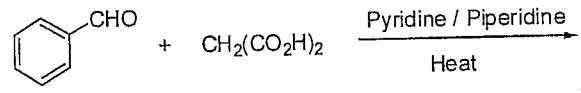
4. (a) Give the structures of compounds (**K**, **L** and **M**) of the following reaction schemes.

i. 

ii. 

(15 Marks)

(b) Consider the following reaction.



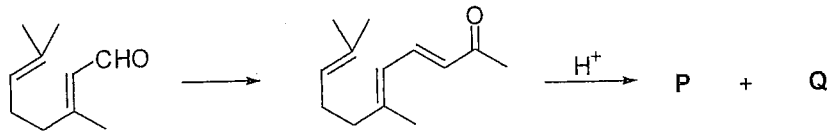
i. Giving the mechanism predict the structure of the product.

In an experiment, 0.530g of benzaldehyde was reacted with 0.570g of malonic acid using above reaction conditions to obtain 0.520g of the product.

ii. Using appropriate calculations determine the limiting reagent of the reaction?
iii. Calculate the expected yield of the reaction.
iv. Calculate the percentage yield of the product.

(50 Marks)

(c) Consider the following reaction scheme.



citral *pseudo* ionone

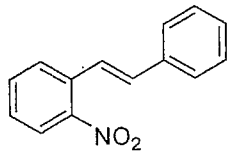
i. Giving necessary reagents, conditions and mechanism, show how you would synthesize *pseudo* ionone from citral.

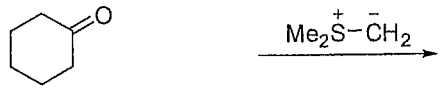
(20 Marks)

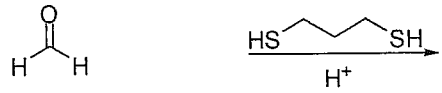
ii. Giving appropriate mechanism predict the structures of **P** and **Q**

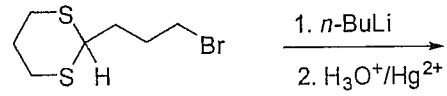
(15 Marks)

5. (a) Give the product of any **five (05)** of the following reactions?

i. 

ii. 

iii. 

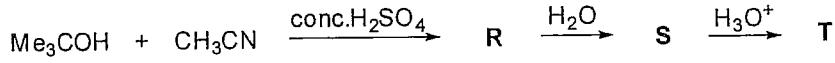
iv. 

v. 

vi. 

(25 Marks)

(b) The following reaction scheme depicts an example of Ritter reaction. Identify the missing compounds/intermediates **R**, **S** and **T**.



What is the use of Ritter reaction?

(25 Marks)

(c) Giving necessary reagents and conditions show how you would effect the following conversions.

i. 

ii. 

iii. 

(50 Marks)

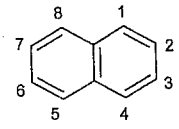
6. Answer any **TWO (02)** of **PARTS A, B** and **C**

PART A

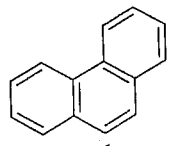
(a) Bond lengths of C1 – C2 and C2 - C3 bonds of naphthalene are 1.365 A° and 1.404 A° respectively. Explain the above statement.

(15 Marks)

(b) Resonance energy of phenanthrene (387.0 kJ mol^{-1}) is not equal to a compound containing three benzene rings.
N.B. Resonance energy of benzene is 150.6 kJ mol^{-1}.

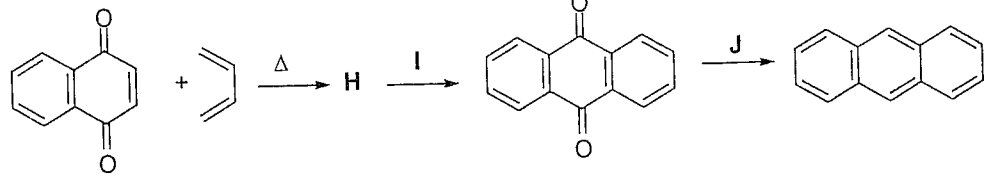


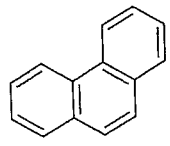
naphthalene


phenanthrene

(10 Marks)

(c) Identify the compounds **H – K** in the following reaction sequences.

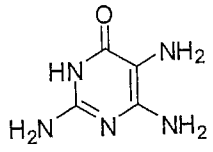
i. 

ii. 
Br_2 / CCl_4 **K**

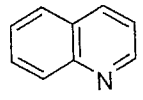
(25 Marks)

PART B

Identify the structures of the compounds (**L – P**) of the following reactions.

i. 

HCO_2H, Δ **L** Δ **M**

ii. 

i. *n*-BuLi, ii. H_2O **N**

iii. 

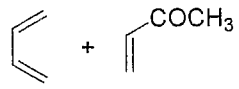
+ $CH_3CO_2NO_2$ Ac_2O, -10 °C **O**

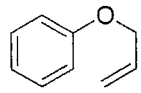
iv. $CH_3COCH_2CH_2COCH_3$ P_2S_5 **P**

(50 Marks)

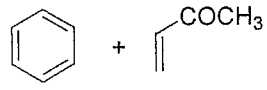
PART C

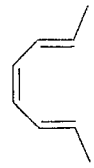
Give the structures products **Q** - **U** of the following reactions.

i.  **Q**

ii.  **R**

iii.  **S**

iv.  **T**

v.  **U**

(50 Marks)

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