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MAIN EXAMINATION

JANUARY - APRIL 2017 TRIMESTER

FACULTY OF SCIENCE

DEPARTMENT OF CHEMISTRY

REGULAR PROGRAMME

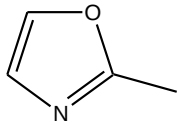
CHEM 410: CHEMISTRY OF HETEROCYCLIC COMPOUNDS

Date: APRIL 2017	**Duration: 2 Hours**
INSTRUCTIONS: Answer Question ONE and any other Two Questions	

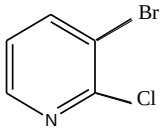
Q1 a) Give the IUPAC names of the following compounds **(5 marks)**

(i)

(ii)



(iii)



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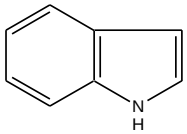

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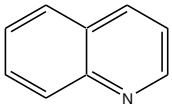


b) Draw the structures of the following compounds

i) 3- methoxyoxole/(3-methoxyoxafuran).

ii) 2,3,5-trimethylazole /2,3,5-trimethylpyrrole.

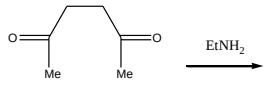
iii) Indole.

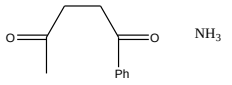
iv) 3,5,6-trimethylpyridine.

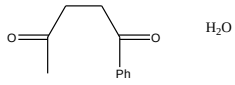
v) aziridine.

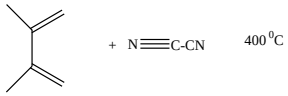
(c). Complete the equations below to show the major organic compound formed

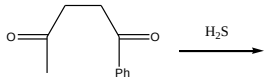
(5 marks)

(i). 

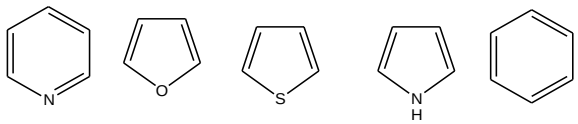
(ii) 

(iii) 

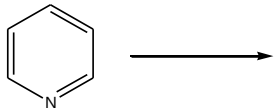
(iv) 

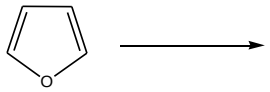
(v) 

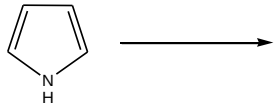
d) Arrange the following compounds in decrasing order of aromaticity **(5 marks)**



e) Give structure of the products formed when pyridine, pyrrole and furan are catalytically hydrogenated

i 

ii 

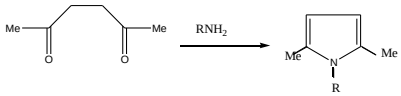
iii 

(5 marks)

f) Explain why pyrrole is less basic than alphatic amines **(5 marks)**

Q2 a) Using the equestion below show how pyrrole is synthesized by the Paal-Knorr method.

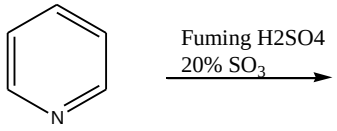
(10 marks).

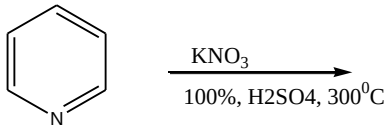


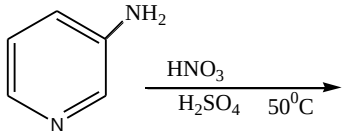
b). Explain why electrophilic attack on pyridine takes place at 3-position and not at the 2-position . **(10 marks)**

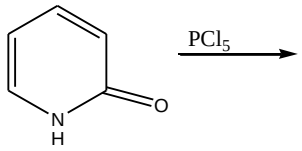
Q3 **a).** Explain why electrophilic attack on pyrrole takes place at 2-position and not at the 2-position . **(10 marks)**

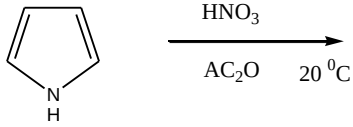
b). Draw the structure of the main organic compound formed by the following reactions **(5 marks)**

i) 

ii). 

iii) 

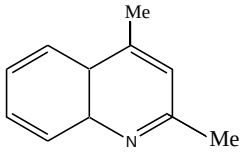
iv) 

v 

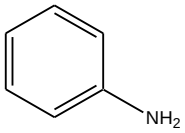
c. Explain why nucleophilic substitution of pyridine takes place at 2- or 4-positions

(5 marks)

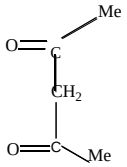
Q4 a) Show how Compound **R** a quinoline can be prepared from a reaction of compound S and compound **T** using the Combes synthesis.



Compound R



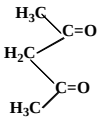
Compound S



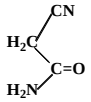
Compound T

(10 marks)

b) Explain how pyridine is synthesized using compound V and compound W



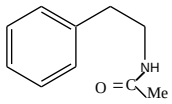
Compound V



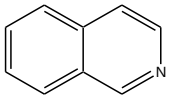
Compound W

(10 marks)

Q5**.** Isoquinoline is synthesed by Bischler-Napieralski. Starting with compound U show how the compound is formed. **(10 marks)**



Compound U



Isoquinoline

b) Explain why 5-member ring are refered to as pi-excessive ring systems. Use pyrrole as an example **(10 marks)**

END