JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF MATHEMATICAL & ACTUARIAL SCIENCE

UNIVERSITY EXAMINATION FOR THE BACHELORS DEGREE IN SCIENCE

4TH YEAR 1ST SEMESTER 2013/2014 ACADEMIC YEAR

CENTRE: MAIN SCHOOL BASED

COURSE CODE: SCH 401

COURSE TITLE: HETEROCYCLIC CHEMISTRY

EXAM VENUE: CR 1 **STREAM: (BSc. Actuarial, Bed,)**

DATE: 04/05/2014 **EXAM SESSION: 9.00 – 11.00 AM**

TIME: 2 HOURS

Instructions:

1. **Answer ALL questions in section A and ANY other 2 questions in section B**
2. **Candidates are advised not to write on the question paper.**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

Section A - Compulsory [30 marks]

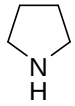
1. In heterocyclic chemistry what is the recommended IUPAC replacement for. (6 marks)
    a. Oxygen
    b. Sulfur
    c. Nitrogen
2. Draw the structure for the following heterocycles. (4 marks)
    a. Thiacyclobutane
    b. Aziridine
    c. Oxetane
    d. Oxirane
3. Give the names of the following heterocyclic compounds . (6 marks)

a. 

b. 

c. 

d. 

e. 

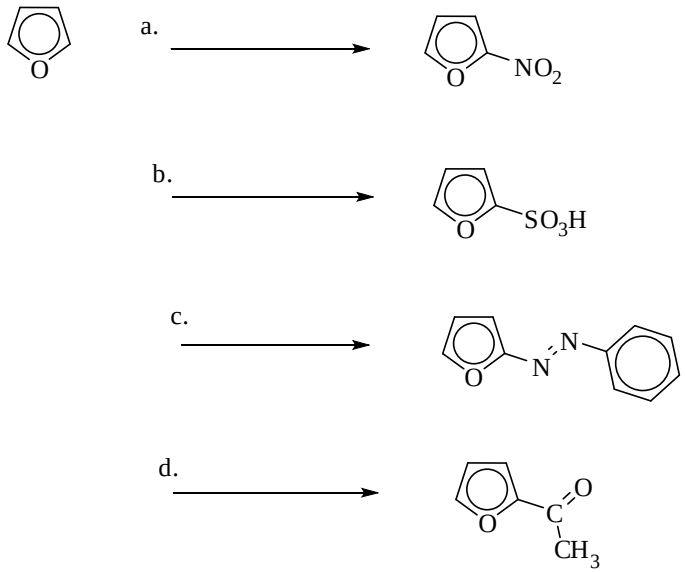
f. 

4. Name five pharmaceuticals that contain the pyrimidine ring and what they treat. (10 marks)
5. Draw and show the differences between quinoline and isoquinoline. (4 marks)

SECTION B

QUESTION 2 (20 MARKS)

1. Name and draw three nucleic bases that contain the pyrimidine ring. (6 marks)
2. Give the reagents required for the following reactions. (8 marks)

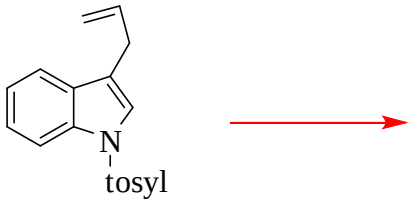


3. Name four indole based pharmaceuticals and what they treat. (6 marks)

QUESTION 3 (20 MARKS)

4. Name five pyridine based agrochemicals. (5 marks)
5. Give the products and reagents/reaction conditions for the following Heck intramolecular cyclization reactions: (6 marks)

i.



ii.

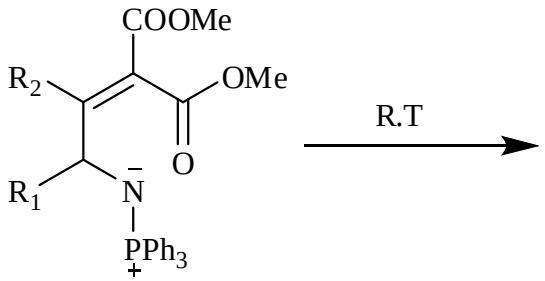
6.. Name two common porphyrins and their associated uses in the living system. (4 marks)

7.Draw the structures of the five nucleobases. (5 marks)

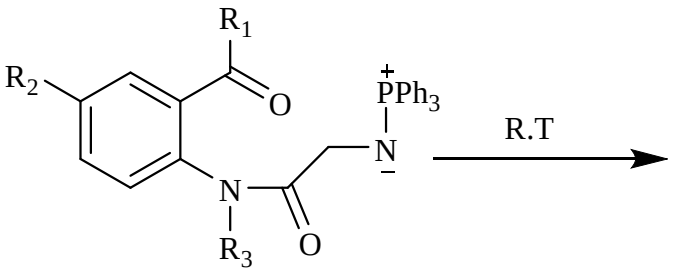
QUESTION 4 (20 MARKS)

1. Predict the products of the following Aza-Wittig reactions: (8 marks)

i.

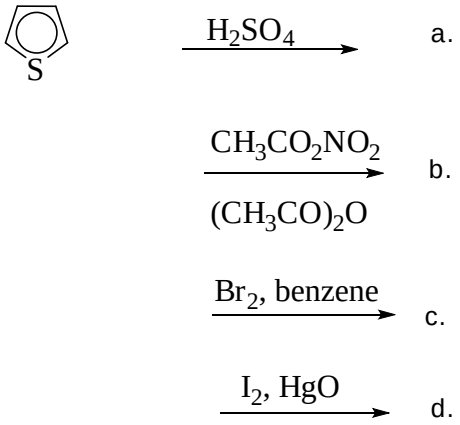


ii.



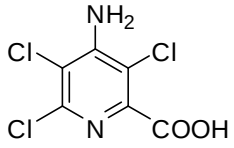
2. Name four prominent pyrimidine-based agrochemicals (4 marks)

3. Draw the structures of the expected products from the following chemical reactions.
. (8 marks)



QUESTION 5 (20 MARKS)

1. Picloram (**a**) is a pyridine based herbicide that selectively kills broad leaf weeds. Outline its synthesis of starting with 2-methylpyridine. (8 marks)



a

2. Name three vitamins into which heterocyclic systems are incorporated. (3 marks)
3. Outline using a scheme the synthesis of a 1,3-thiazole from a bromoketone and a thioamide. (9 marks)