



UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE

ALLIED HEALTH SCIENCES DEGREE PROGRAMME

FIRST BPHARM PART II EXAMINATION - FEBRUARY 2013

PH1213 - PHARMACEUTICAL CHEMISTRY II

DATE: 18.02.2013

TIME: 9.00 a.m.-12.00 noon

INDEX NO:

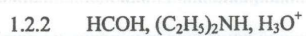
-
- *Answer all six (06) questions on this paper itself*
 - *Write your answer in the space provided for each question. Please note that the space provided is sufficient for the answer and that extensive answers are not expected*
-

For Examiner's Use Only

Question No	Marks
01	
02	
03	
04	
05	
06	
Total	
Percentage	

89

1.2 Write the structural formulae for the products formed when propanone (acetone) reacts with each of the following reagents.



(10 x 5 marks)

18

02. Answer all parts.

2.1 Explain the following.

2.1.1 Electrophilic substitution of pyridine predominantly takes place at C-3 position, not in C-4 position.

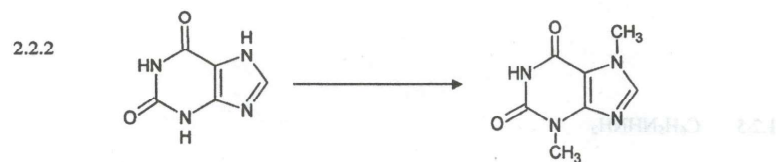
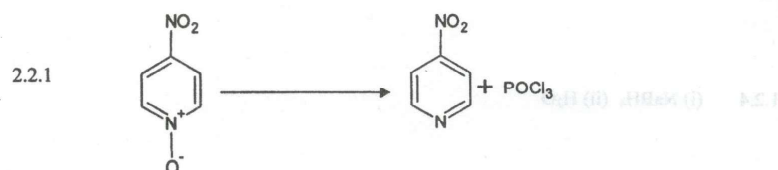
.....
.....
.....
.....
.....

2.1.2 Pyrrole is a weaker base than pyridine.

.....
.....
.....
.....
.....

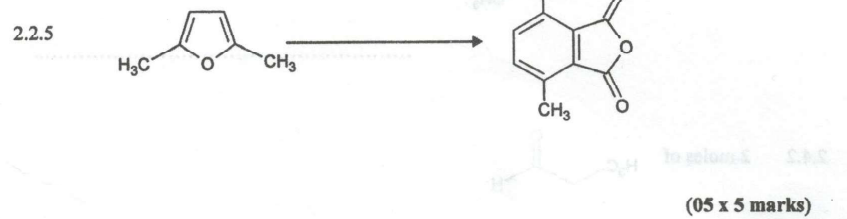
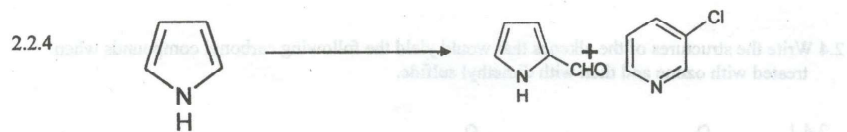
(15 x 2marks)

2.2 Show how the following conversions can be carried out.



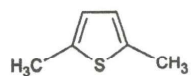
(15 x 2 marks)

90



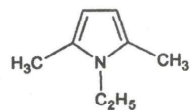
2.3 Outline the synthesis of the following compounds starting from non-heterocyclic precursors.

2.3.1



(10 x 5 marks)

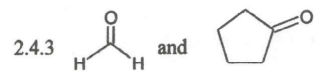
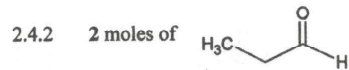
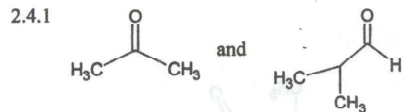
2.3.2



(10 x 2 marks)

109

2.4 Write the structures of the alkenes that would yield the following carbonyl compounds when treated with ozone and then with dimethyl sulfide.



(05 x 3 marks)

2.5 Predict the products formed on oxidation of each of the following with periodic acid:

2.5.1 2,3-Butanediol

2.5.2 1,2,3-Butanetriol

(05 x 2 marks)

91

03. Answer all parts.

3.1 Explain the stability of benzene,

3.1.1 using the theory of resonance.

.....

.....

.....

.....

3.1.2 using π molecular orbital structure.

.....

.....

.....

.....

(15 x 2 marks)

3.2 Give two experimental evidence which can be used to explain the exceptional stability of aromatic compounds (Note: use benzene as the example).

.....

.....

.....

.....

.....

.....

.....

(20 marks)

3.3 According to Huckel theory, one requirement for aromaticity is that the compound should be planar. How does planarity contribute to the aromaticity?

.....

.....

.....

.....

.....

.....

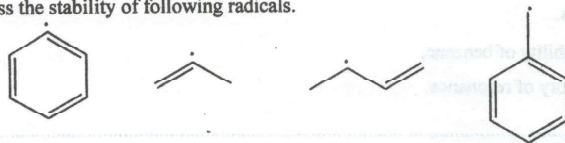
.....

.....

.....

(15 marks)

3.4 Discuss the stability of following radicals.



.....

.....

.....

.....

.....

.....

.....

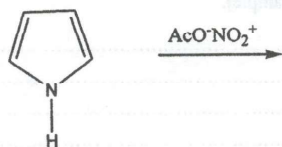
.....

.....

.....

(20 marks)

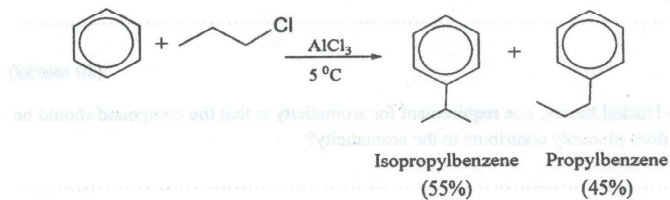
3.5 Draw the chemical structure of the product formed in the following reaction of pyrrole.



(15 marks)

4.0 Answer all parts.

4.1 Giving plausible mechanism, explain the formation of products shown below.



.....

.....

.....

.....

.....

.....

.....

.....

.....

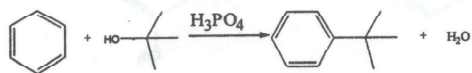
.....

(10 marks)

92

4.2

4.2.1 How is an electrophile generated in the following reaction?



.....
.....
.....
.....
.....

(10 marks)

4.2.2 Give two reaction schemes for the conversion of benzene to phenol.

.....
.....
.....
.....
.....
.....
.....
.....
.....

(20 marks)

4.3 Giving necessary reagents, reaction conditions and intermediates formed, show how you would do the following conversions.

4.3.1



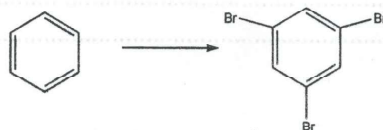
4.3.2



4.3.3



4.3.4



4.3.5



(12 x 5 marks)

93

05. Answer all parts.

5.1.1 Give three-letter codes and one-letter codes for one acidic and one basic amino acid.

.....
.....

(05 marks)

5.1.2 Name two amino acids having nonpolar side chains and give three-letter codes of them.

.....
.....

(05 marks)

5.1.3 Draw the chemical structures of alanine and serine.





(05 marks)

5.2 Using the following data determine the amino acid sequence of heptapeptide P.

Complete hydrolysis of P gives, Ala, Arg, Gly, Lys, Met, Thr, Tyr.

The treatments I-IV of P gives the following results

- I. with 2,4 DNP followed by acid hydrolysis gives DNP-Gly.
- II. with carboxypeptidase gives Ala.
- III. with trypsin cleaves the peptide P into three small peptides L, M, N with following compositions.
L- Ala, Thr M- Lys, Met, Tyr N- Arg, Gly
- IV. with 2, 4 DNP followed by acid hydrolysis M gives DNP-Tyr.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

SP

.....
.....
.....

(25 marks)

5.3 Draw the structures of the following purine and pyrimidine derivatives and give their trivial names.

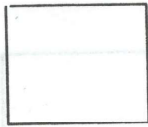
5.3.1 6-amino purine

5.4.2 2-amino-6-oxy purine

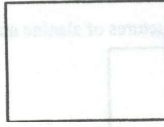
5.4.3 2,4-dioxy pyrimidine

5.4.4 2,4-dioxy-5-methyl pyrimidine

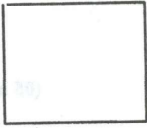
5.4.5 2-oxy-4-amino pyrimidine



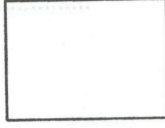
(i).....



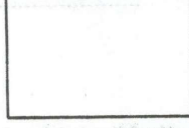
(ii).....



(iii).....



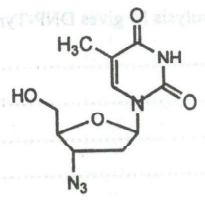
(iv).....



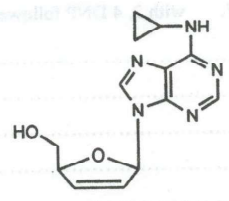
(v).....

(05 x 5 marks)

5.4 The structures of two nucleoside drugs, Zidovudine and Abacavir are shown below:



Zidovudine (AZT)



Abacavir

5.4.1 Number the pyrimidine or the purine ring

5.4.2 Number the sugar unit

5.5.3 Indicate the N-glycosidic bond

(15 marks)

TNP

06. Answer all parts.

6.1 Explain the term "a fatty acid".

.....
.....
.....

(05 marks)

6.2 "Oils are made up of triglycerides and a triglyceride is made up of two types of molecules".
Draw the structure of a triglyceride molecule.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....

(10 marks)

6.3 What are the differences between fats and oils?

.....
.....
.....
.....
.....
.....

(05 marks)

6.4 What decides whether a mixture of triglycerides will be a solid or a liquid at room temperature?

.....
.....
.....
.....
.....
.....
.....

(10 marks)

6.5 Explain the relationship between a fatty acid and a wax.

.....
.....
.....
.....

(05 marks)

95

6.6 Define the term "polymer".

.....
.....
.....
.....
.....

6.7 "Polymers play a wide role in pharmaceutical field in drug delivery applications". List some of the applications. (05 marks)

.....
.....
.....
.....
.....
.....

(10 marks)

6.8 What are the two complementary definitions of acids and bases?

6.8.1

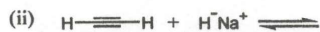
6.8.2

(10 marks)

6.9 Draw the products of each of the following reactions. Show movement of electron pairs using curved arrows. Label the acid, base, conjugate acid and conjugate base in each reaction.

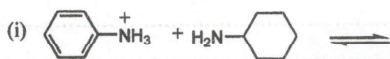


.....



(20 marks)

6.10 Complete the following acid base reactions and predict the direction of equilibrium (to the right or left) for each. pK_a of conjugate acids of aniline, cyclohexylamine, pyridine, piperidine, and imidazole, are 4.6, 10.6, 5.2, 11.2, and 7.0 respectively.



(20 marks)

@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@@