



UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE

ALLIED HEALTH SCIENCES DEGREE PROGRAMME

FIRST BPHARM PART II EXAMINATION – NOVEMBER 2015

PH 1213: PHARMACEUTICAL CHEMISTRY II (SEQ)

TIME: THREE (03) HOURS

INSTRUCTIONS

- Answer **all** questions.
- Do not use any correction fluid.
- Answer questions in the space provided.
- Marks will be deducted for illegible hand writing.

01. Answer all parts

1.1. Name two components which should be combined to obtain a triglyceride. **(08 marks)**

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1.2. Stearic, oleic, linoleic and linolenic are commonly found fatty acids in the plants. Explain briefly, how the melting point of each fatty acid varies with their respective chemical structure.

(20 marks)

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1.3. Define the term “iodine value”. **(05 marks)**

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1.4. Giving chemical reactions where appropriate, describe briefly the principle of the Wijs method pertaining to the lipid analysis.

(20 marks)

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1.5. Explain briefly the role of antioxidants. **(05 marks)**

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1.6. Draw the chemical structure of the antioxidant BHT. **(06 marks)**

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1.7. Write down the types of polymers classified according to the number of applied monomers. **(20 marks)**

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1.8. Giving an appropriate schematic diagram for each type, classify the types of copolymers. **(16 marks)**

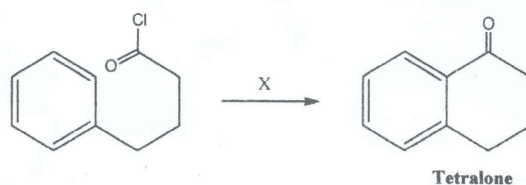
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02. Answer all parts

2.1 Using appropriate structures, explain why benzene does not decolorize aqueous solution of bromine.

(10 marks)

2.2 Tetralone can be synthesized by the following reaction:



2.2.1 What is the most suitable reagent(s), "X" for this conversion?

2.2.2 Write down the mechanism for the formation of the tetralone.

2.2.3 How would you transform tetralone into phenylcyclohexane as shown below?.



2.2.4 Starting from benzene how would you prepare the same compound, phenylcyclohexane?

(36 marks)

2.3

2.3.1 "Although chlorine in chlorobenzene acts as an ortho, para director, benzene ring in chlorobenzene is deactivated". Justify this statement giving necessary reasons.

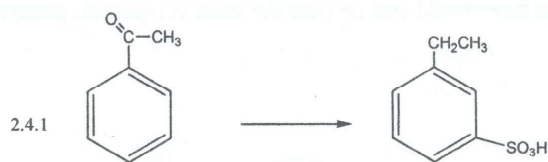
2.3.2 Chlorobenzene shows special reactivity towards nucleophiles as shown below.

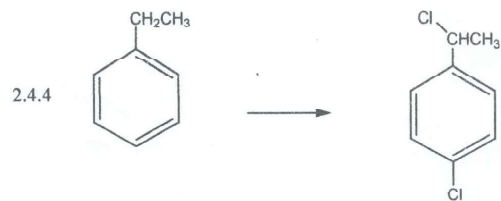
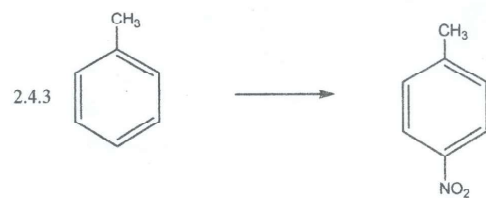


Give a plausible mechanism for the above nucleophilic substitution reaction.

(30 marks)

2.4 Giving necessary reagents and reaction conditions, show how you would carry out following transformations.

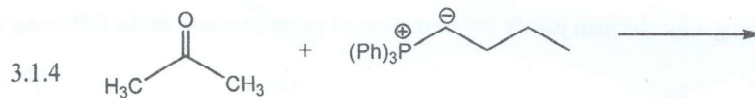
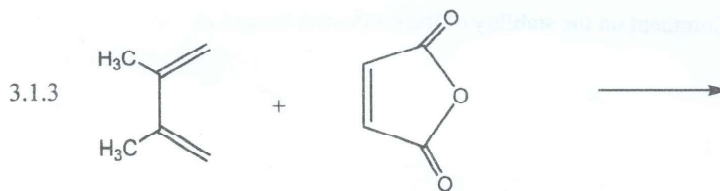
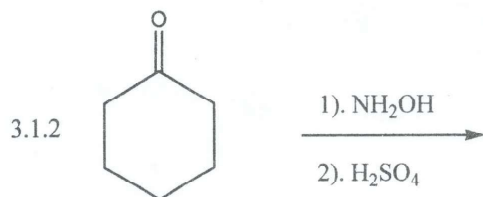
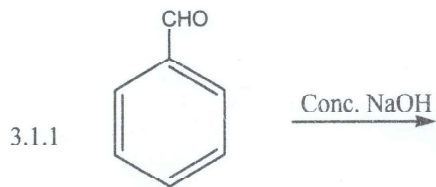




(24 marks)

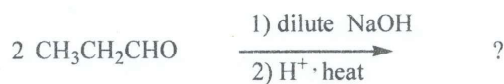
03. Answer all parts

3.1 Draw the structures of the product(s) formed in the following reactions.



(24 marks)

3.2 Consider the reaction below;



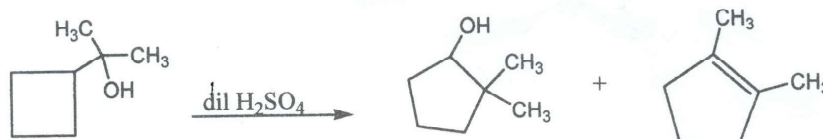
3.2.1 Draw the structure of product(s) that you would expect to form in the above reaction.

3.2.2 Give a plausible mechanism for the formation of product(s) given above 3.2.1.

3.2.3 Comment on the stability of the product(s) formed above.

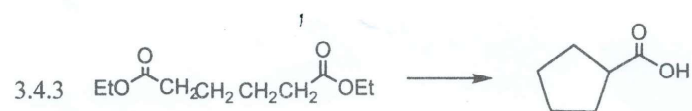
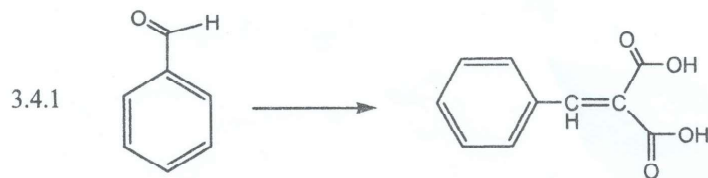
(26 marks)

3.3 Giving a mechanism justify the formation of given products in the following reaction.



(20 marks)

3.4 Giving necessary reagents, reaction conditions and intermediates formed, explain how would you effect following syntheses.



(30 marks)

04. Answer all parts

4.1

4.1.1 Draw the resonance structures for 1, 3-butadiene.

4.1.2 Of the structures drawn above, which structure(s) contributes to the properties of 1,3-butadiene mostly? Explain your answer.

(20 marks)

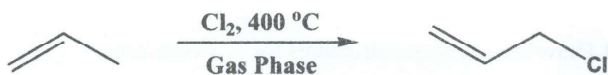
4.2

4.2.1 Draw the structure(s) of allyl radical.

4.2.2 Draw the energy level diagram of the π -molecular orbitals of allyl radical with necessary electron filling.

4.2.3 Comment on the stability of the allyl radical according to the energy level diagram drawn above.

4.2.4 Giving a plausible mechanism, explain the formation of the product in the following reaction.



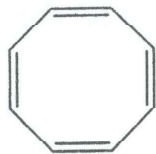
4.2.5 Explain why above reaction is possible through the reactive intermediate given by you in part 4.2.4

(30 marks)

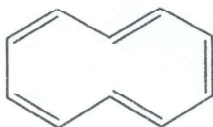
4.3

4.3.1 Give four criteria in Huckel rule. Briefly explain the importance of each criterion for aromaticity.

4.3.2 Determine the aromaticity of following molecules/ions applying Huckel rule;



1.3.2.1



1.3.2.2



1.3.2.3



1.3.2.4

(25 marks)

4.4

4.4.1 "Although furan is an aromatic compound, it can act as a diene for Diels-Alder reaction".
Explain this statement giving an example with necessary structures.

4.4.2 Of pyridine and pyrrole which one is more basic? Explain your answer.

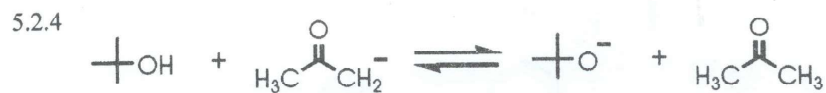
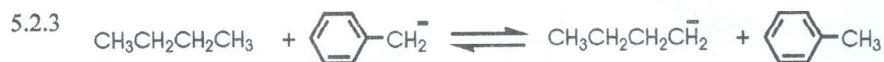
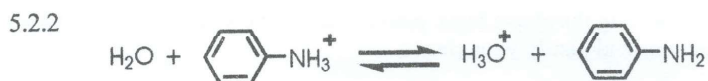
(25 marks)

05. Answer all parts

5.1 Consider the species CH_3O^- , NH_2^- , and CH_3COO^- . Rank these ions in order of increasing basicity, and explain briefly your answer.

(10 marks)

5.2 Indicate the direction favored by equilibrium in the following acid-base reactions.



(08 marks)

5.3 Complete each of the following reactions giving missing reactants/products and indicate whether the equilibrium is favored to the right or left.



(12 marks)

5.4 Explain why

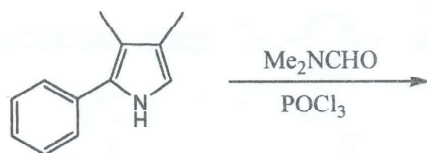
5.4.1 Pyrrole is more reactive towards electrophiles than benzene.

5.4.2 Pyridine is less reactive than benzene in electrophilic substitution.

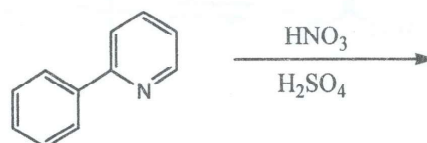
(20 marks)

5.4.3 Considering the above facts, predict the products that might be formed in the following two reactions and justify your choice.

5.4.3.1



5.4.3.2



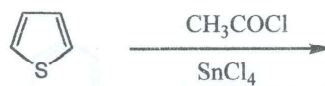
(15 marks)

5.5 Predict the products of each of the following reactions and write down a mechanism for the formation of the product in the last reaction (5.5.6)

5.5.1



5.5.2

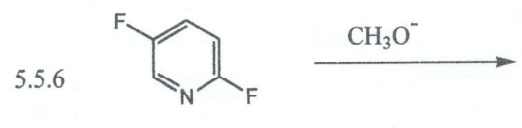
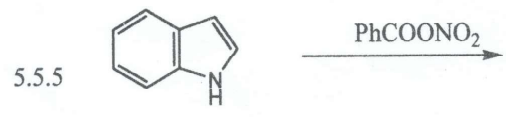


5.5.3



5.5.4





(35 marks)

49

Index No:.....

06. Answer all parts

6.1

6.1.1 Give the definition of carbohydrates.

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(05 marks)

6.1.2 Name the process by which carbohydrate is synthesized in the plants.

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(05 marks)

6.1.3 Briefly explain mutarotation of glucose.

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(05 marks)

6.1.4 List **five (05)** uses of sorbitol.

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(05 marks)

6.2

6.2.1 Give the name, three-letter code, and chemical structure for **one (01)** each of the **acidic, basic and aromatic** amino acids.

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(15 marks)

6.2.2 Indicate the charge (positive, negative or neutral) of the each of the above amino acids at physiological pH (7.4).

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(06 marks)

6.3

6.3.1 Comment on the bond lengths of C-N peptide bond and its N-C^α bond in a peptide. Give reason(s) for your answer.

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(06 marks)

6.3.2 Give a short account on protein structures.

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(08 marks)

6.4 The following treatments were carried out for the peptide **Q** with the amino acid sequence of Gly-Ala-Lys-Trp-Leu-Arg-Met-Ile. Derive the product(s) obtained after each treatment.

6.4.1 with 2,4 DNP followed by acid hydrolysis;

6.4.2 with chymotrypsin;

6.4.3 with carboxypeptidase;

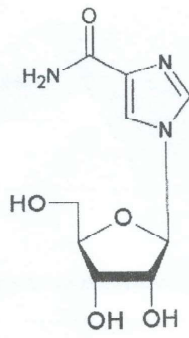
6.4.4 with trypsin;

(15 marks)

6.5 Draw structural formulae to illustrate **three** tautomeric forms of uracil.

(15 marks)

6.6 The structures of a nucleoside drugs, **Ribavirin** is shown below:



Ribavirin

- 6.6.1 number the nitrogen base
- 6.6.2 number the sugar unit
- 6.6.3 draw structures of its cyclic and acyclic monophosphates

(15 marks)
