



UNIVERSITY OF RUHUNA – FACULTY OF MEDICINE
ALLIED HEALTH SCIENCES DEGREE PROGRAMME
FIRST BPHARM PART I EXAMINATION – JUNE 2015
PH 1112: PHARMACEUTICAL CHEMISTRY I (SEQ)

TIME: TWO HOURS

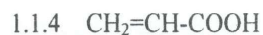
INSTRUCTIONS

- Answer **all four (04)** questions.
- Do not use any correction fluid.
- Answer questions in the space provided for each question.
- Marks will be deducted for illegible hand writing.

01. Answer **all** parts

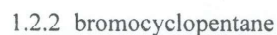
1.1. Give the IUPAC names of the following compounds.

(28 marks)



1.2. Draw the structures for the following compounds.

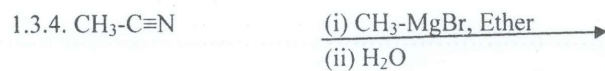
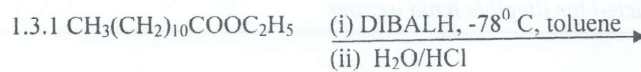
(40 marks)



1.2.5 2-nitrobenzenecarbaldehyde

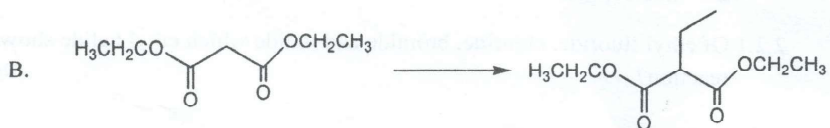
1.3. Give the chemical structures of the products for the following chemical reactions.

(32 marks)



02. Answer all parts.

2.1 Consider the following two conversions and answer the questions below:



2.1.1 Draw the structure of the reactive intermediate needed to be generated in order to perform each of the above conversions and explain the stability of each.

(12 marks)

2.1.2 Give the reagents/reaction conditions which are necessary to generate above reactive intermediate in each reaction.

(08 marks)

A:

B:

2.1.3 Which type of solvents are suitable for the above two reactions? Name a solvent for each reaction. Justify your choice.

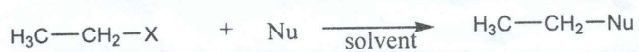
(08 marks)

A:

B:

2.1.4 Indicating the reagents, reactants needed and the intermediates formed write the mechanism for the formation of the given product in each reaction. (12 marks)

2.2 Consider the following nucleophilic substitution reaction of ethyl halides:



X = F, Cl, Br, I

Nu = nucleophile

2.2.1 Of ethyl fluoride, chloride, bromide and iodide which ethyl halide shows the fastest reaction? **(06 marks)**

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2.2.2 Justify your answer to above in 2.2.1. **(06 marks)**

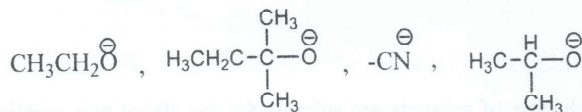
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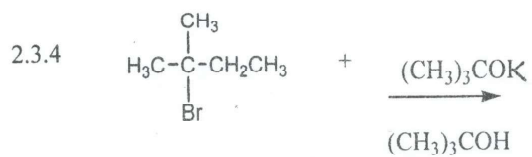
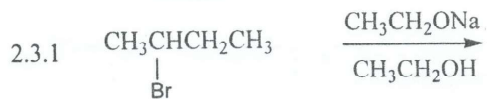
2.2.3 Of the nucleophiles given below, which nucleophile shows the slowest reaction in the above reaction? **(08 marks)**



2.2.4 Giving a mechanism of the reaction, explain your answer above in 2.2.3.

(10 marks)

2.3 Giving emphasis to regiochemistry and stereochemistry whenever necessary draw the structure of the product(s) formed in each of the following reactions. When more than one product is formed, indicate which is major. (30 marks)

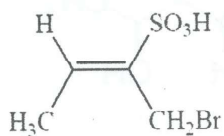


03. Answer all parts3.1 Write **structures** and **names** for all the possible isomers of dichlorocyclopropane.

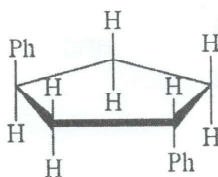
(12 marks)

3.2 Label the following as cis or trans; E or Z as is appropriate.

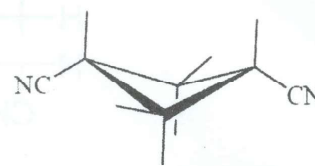
(12 marks)



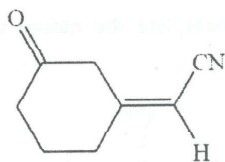
3.2.1



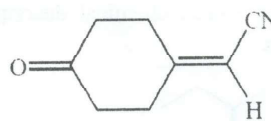
3.2.2



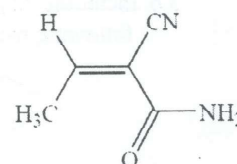
3.2.3



3.2.4



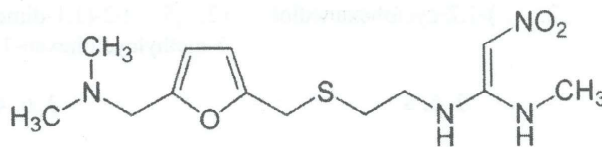
3.2.5



3.2.6

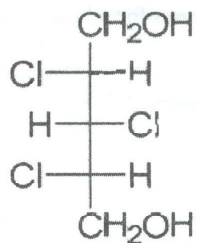
3.3 Assign the E,Z configuration at **all** of the double bonds of the Zantac which is anti-stomach acid medication.

(06 marks)



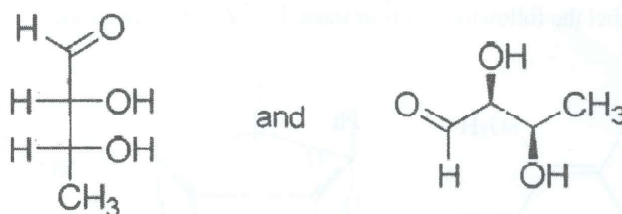
Zantac

3.4 Label each asymmetrical carbon in the compound shown below as R or S.



(05 marks)

3.5 What is the relationship between the following two molecules? (identical, enantiomers, diastereomers?)



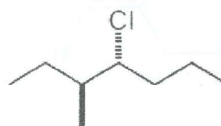
(05 marks)

3.6 Including appropriate stereo chemical descriptors complete the names of each of the following molecules.



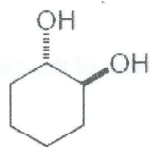
(3.....,5.....)-3,5-dimethylheptane

3.6.1



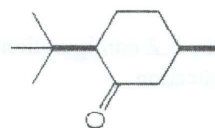
(3.....,4.....)-4-chloro-3-methylheptane

3.6.2



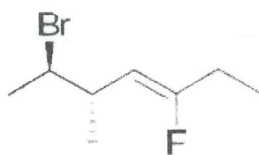
(1.....,2.....)-1,2-cyclohexanediol

3.6.3



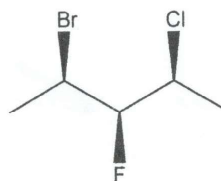
(2.....,5.....)-2-(1,1-dimethylethyl)-5-methylcyclohexan-1-one

3.6.4



(2...,3...,4...) -2-bromo-5-fluoro-3-methyl-4-heptene.

3.6.5



(2...,3...,4...) -2-bromo-4-chloro-3-fluoropentane

3.6.6

(20 marks)

3.7 Give the **major organic products** formed in each the following reactions.
Explain whether the product mixtures have an optical rotation or will $[\alpha]_D = 0$?



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(20 marks)

3.8 The observed rotation, α , of a 0.3 g sample of natural cholesterol which is a pure single isomer, in 15 mL chloroform solution contained in a 10-cm Polarimeter tube is -0.78° .

3.8.1 Calculate the specific rotation of cholesterol.

(10 marks)

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3.8.2 A **mixture** of natural and synthetic cholesterol which is entirely enantiomer of the natural one, has specific rotation of $[\alpha]_D^{20}$ of -13° .

What fraction of the mixture is natural cholesterol?

(10 marks)

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04. Answer all parts.

4.1 The solutions of inorganic and organic solutes are present in the body fluids.

4.1.1 Indicate the relative fluid volume and solute composition of each of the fluid compartments of the body.

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(24 marks)

4.1.2 What is meant by "anionic gap".

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(08 marks)

4.1.3 List the possible routes by which water enters and leaves the body.

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(16 marks)

4.1.4 What are the two major forms of phosphorous found in the plasma?

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(08 marks)

4.1.5 Explain briefly how the above two forms of phosphorous act as a buffer system in the body.

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(12 marks)

4.2

4.2.1 What is the major function of skin protectives and state the desirable properties of them?

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(12 marks)

4.2.2 Give three uses of TiO_2 as a protective.

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(12 marks)

4.2.3 Give two uses of Zn as a trace metal in the human body.

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(08 marks)

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