



UNIVERSITY OF RUHUNA-FACULTY OF ALLIED HEALTH SCIENCES
DEPARTMENT OF PHARMACY
FIRST BPHARM PART I EXAMINATION – NOVEMBER/ DECEMBER 2019
PH 1112 PHARMACEUTICAL CHEMISTRY I (SEQ)

TIME: TWO HOURS

INSTRUCTIONS

- There are three Parts **A**, **B** and **C** of the SEQ paper.
- Answer all questions in each part in the given space.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.

Part A

01. Answer **all** parts.

1.1 Give the IUPAC names of the following compounds. *(32 marks)*



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1.2 Draw the structures for the following compounds. (32 marks)

1.2.1 3-methylbutyne

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1.2.2 2,3-dichloropropanal

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1.2.3 1-chloro-2,4-dinitrobenzene

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1.2.4 4-ethylcyclohexanone

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1.3 Write down the necessary reagents and reaction conditions for the following reactions.

(16 marks)

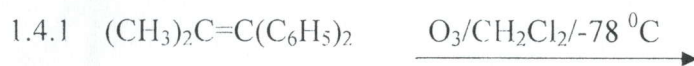


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1.4 Write down the possible products of the reactions given below. (20 marks)



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Part B

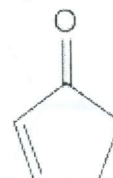
02. Answer all parts.

2.1 Draw as many of the best Lewis resonance structures for the two molecules below and describe whether each would be a **major** or **minor** contributor. Draw also a resonance hybrid that illustrates partial charges and multiple bonds. (15 marks)

2.1.1



2.1.2



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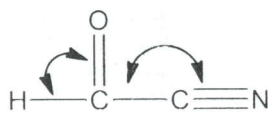
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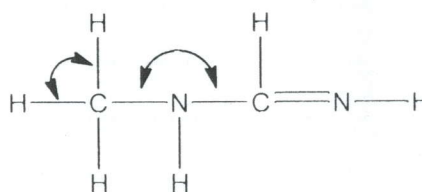
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2.2 Draw Lewis wedge/dashed-bond structures that illustrate the most stable **three dimensional** structures of the following two molecules and indicate the hybridization state of all atoms other than hydrogen. Give bond angles indicated by curved arrows in the given Lewis structures. (25 marks)

2.2.1



2.2.2



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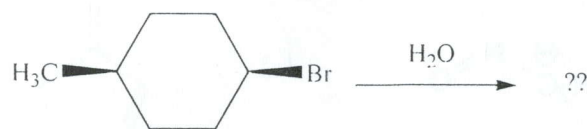
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2.3 Giving reasons, predict the stereochemistry of the product/s of the following substitution reaction. Clearly illustrate the stereochemistry of the product/s, using wedge-dashed wedge-line representations. (Hint: think about the type of substitution and mechanism) (30 marks)



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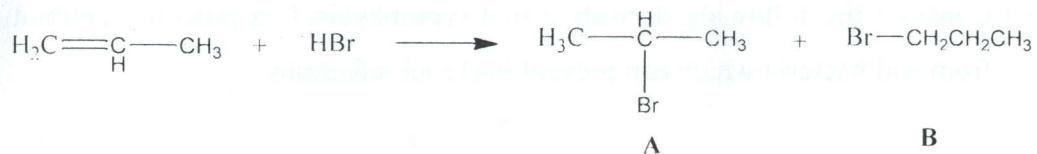
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2.4 Consider the following addition reaction:



2.4.1 Of the products **A** and **B** above, which is the major product? (10 marks)

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2.4.2 Write down the mechanism of the above reaction (for both products) and explain why the product you mentioned above becomes the major product.

(20 marks)

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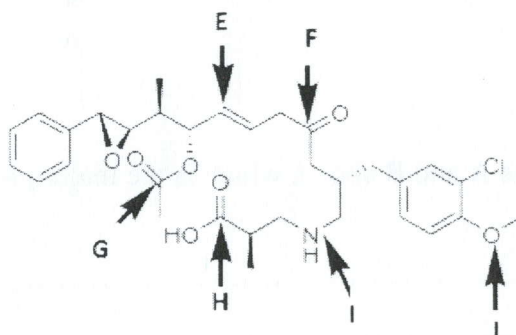
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03. Answer all parts.

3.1 Consider the following derivative of Cryptophycin-1, a potential antibiotic isolated from soil bacteria which can prevent bacterial infections.



3.1.1 Identify the various functional groups labeled with letters (E-J) above.

(10 marks)

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3.1.2 “The carbon atom labeled as E is perfectly trigonal planar with an exact bond angle of 120° ”. Giving reasons, justify your answer.

(10 marks)

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3.1.3 What is the total number of aromatic components (if any) in the structure above?

(10 marks)

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3.1.4 What is the number of isomers possible? Will this molecule exhibit optical isomerism? Briefly explain.

(10 marks)

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3.1.5 Assign all configurations of the molecule according to *R/S* and *E/Z* systems. (35 marks)

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3.2
3.2.1 Draw 3-dimensional structures of the four different stereoisomers of 1,2,3-trichlorocyclobutane. (15 marks)

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3.2.2 Identify achiral structures, meso compounds, pairs of enantiomers and diastereomers, (10 marks)

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Part C

04. Answer all parts

4.1 Fluids present in human body are important in regulating daily activities.

4.1.1 List **three** ions each present in intracellular fluid and extracellular fluid in the human body. (10 marks)

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4.1.2 Write a short account on the functions of phosphorus in human body.

(15 marks)

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4.1.3 Briefly explain how does water as a body fluid help to maintain body temperature.

(10 marks)

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4.2 Topical agents are important for human health.

4.2.1 What are “topical agents”?

(05 marks)

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4.2.2 Briefly discuss about the three groups of topical agents with their specific action.

(15 marks)

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4.2.3 Categorize the following chemicals according to the groups you have mentioned in 4.2.2.

(20 marks)

Chemical	Group
Titanium dioxide
Iodine
Zinc stearate
Hydrogen peroxide
Aluminium chloride
Zinc oxide
Silver nitrate
Zinc sulfate
Chloramines
Calamine

4.3 The human body consists of about 50 elements.

4.3.1 Define the term “essential elements”.

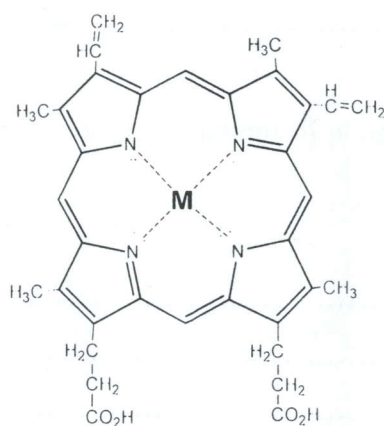
(05 marks)

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4.3.2 Part of the porphyrin ring system is shown below. Give the names of the compounds when the metal ion in the middle named as “M” is replaced with following metals. (10 marks)



4.3.2.1 M = Fe

4.3.2.2 M = Co

4.3.3 List **two** functions of copper, which is a trace element found in human body.

(10 marks)

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