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UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FIRST BPHARM PART I EXAMINATION – FEBRUARY 2022

PH 1112 PHARMACEUTICAL CHEMISTRY I (SEQ) –OLD SYLLABUS

TIME: TWO HOURS

INSTRUCTIONS

- There are **four** questions in parts **A**, **B** and **C** in this paper.
- Answer **all** questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

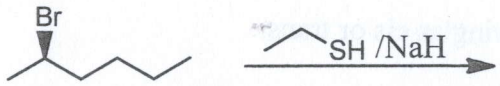
PART A

01.

1.1 Which of the following alkyl halides would undergo S_N2 reaction most rapidly? Giving reason(s), arrange them in the order of increasing rate. ***(20 marks)***

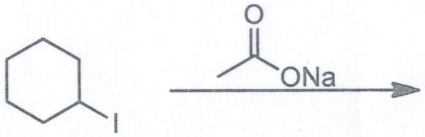
(**A**) CH_3CH_2-Br (**B**) CH_3CH_2-Cl (**C**) CH_3CH_2-I (**D**) CH_3CH_2-F

1.2 Draw the product of the following reaction and explain the role of NaH, giving a mechanism for the reaction. (***15 marks***)

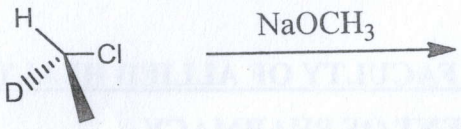


1.3 Draw the organic product expected from each of the following reactions (make sure to indicate stereochemistry where appropriate and to include stereoisomers if any). Also indicate whether each reaction shown below is likely to proceed by an S_N1 or S_N2 mechanism. (***35 marks***)

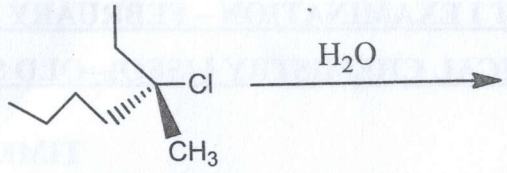
1.3.1



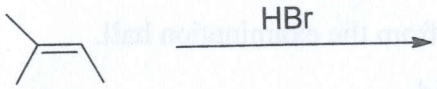
1.3.2



1.3.3



1.4 Consider the addition of H-Br to 2-methylbut-2-ene:



There are two possible products arising from the two different ways of adding H-Br across the double bond but only one is observed. Draw the structures of the two possible products and explain why only one is observed. ***(30 marks)***

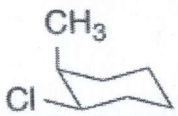
02.

2.1 Draw a structural formula for each of the following molecules and then, using the δ+/δ- convention, label any dipoles that are present in each molecule. ***(20 marks)***

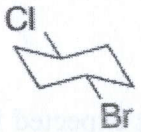
CH_3OH, CH_3COOH, CH_3CHCl_2, $CH_3CH_2NH_2$

2.2 Label each of the following as cis or trans. ***(20 marks)***

2.2.1

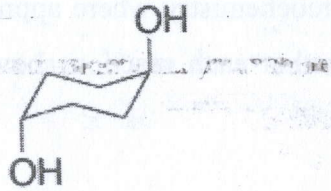


2.2.2

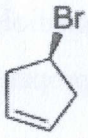


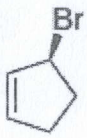
2.2.3

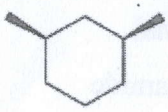
2.2.4

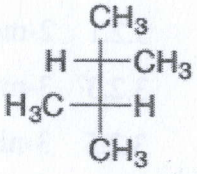


2.3 Label each of the following molecule as chiral, achiral, or meso-achiral. **(*20 marks*)**

2.3.1 

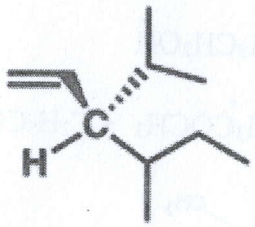
2.3.2 

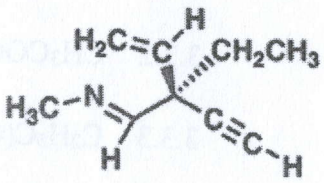
2.3.3 

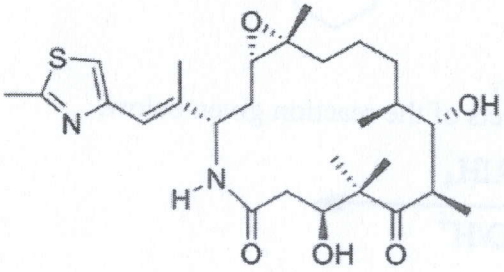
2.3.4 

2.4 A carboxylic acid with a molecular formula $C_3H_5O_2Br$ is optically active. Draw the structure of the R isomer. **(*10 marks*)**

2.5 Assign E/Z or R/S configuration for the following molecules. **(*30 marks*)**

2.5.1 

2.5.2 

2.5.3 

PART B

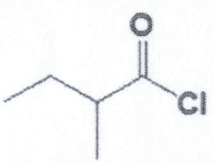
03.

3.1. Give the IUPAC names of the following compounds. ***(30 marks)***

3.1.1 $(CH_3)_2C{=}CIH$

3.1.2 $CH_3CH(CH_3)CClBrCOOH$

3.1.3 $CH_3{-}CH_2{-}C{\equiv}C{-}CH_2{-}CH_3$

3.1.4 

3.1.5. $C_6H_5CH_2CHO$

3.2. Draw the structures for the following compounds. ***(40 marks)***

3.2.1 2-methylpentanal

3.2.2. propanedioic acid

3.2.3 3-methylbutanamide

3.2.4. ethylpropanoate

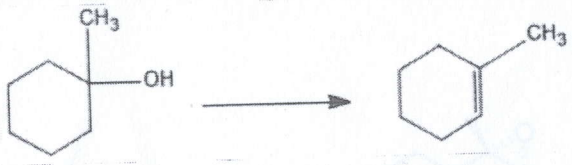
3.2.5 3-nitrobenzenecarboxylic acid

3.3. Write down the necessary reagents and reaction conditions for the following conversions. ***(24 marks)***

3.3.1 

3.3.2 $CH_3COOH \longrightarrow CH_3CH_2OH$

3.3.3 $C_2H_5C(CH_3)=C(CH_3)_2 \longrightarrow CH_3COCH_3 + C_2H_5COCH_3$

3.3.4 

3.4. Write down the possible products of the reaction given below. ***(06 marks)***

$$CH_3COCH_3 \xrightarrow[2.\ H_2O/H^+]{1.\ LiAlH_4}$$

PART C

04.

4.1 The human body consists of about 50 elements.

4.1.1 Define the term "essential element". ***(04 marks)***

4.1.2 Categorize following elements as bulk and trace metals. ***(16 marks)***

Na, Cu, Ca, Mg, Fe, V, K, Mn

4.1.3 Zn is an essential element found in human body. Write a short account on the importance of Zn in biological systems. ***(25 marks)***

4.2 Topical agents are important for human health.

4.2.1 What are "topical agents"? ***(05 marks)***

4.2.2 List the three groups of topical agents. ***(05 marks)***

4.2.3 Categorize the following chemicals (10) according to the groups that you have mentioned in 4.2.2. ***(30 marks)***

Alum, Calamine, Chloramines, Hydrogen peroxide, Selenium sulfide, Silver nitrate, Titanium dioxide, Zinc chloride, Zinc stearate, Zinc sulphate.

4.3 Briefly describe functions of body fluids. ***(15 marks)***

Your answer should contain the following points.

Fluids dissolve and transport substances

Fluids account for blood volume

Fluids help maintain body temperature

Fluids protect and lubricate body tissues

Aid in the removal of cellular metabolic waste

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