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UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FOURTH BPHARM PART I EXAMINATION – MARCH/APRIL 2026

PH 4112 ADVANCED MEDICINAL CHEMISTRY I – SEQ

TIME: TWO HOURS

INSTRUCTIONS

- There are **four** questions in parts **A** and **B** of 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.

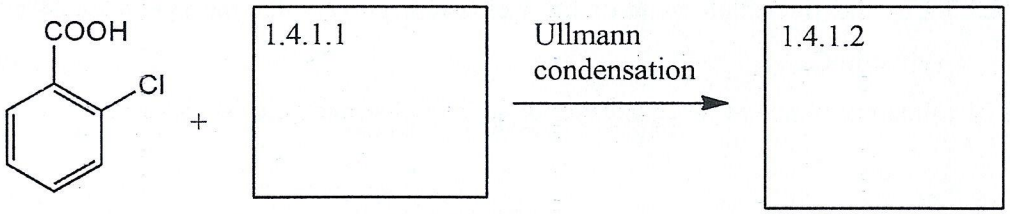
1.1 List the three structural modifications of morphine related to its Structure Activity Relationship (SAR) that alter its pharmacological activity. (***15 marks***)

1.2 Briefly explain the SAR of morphine after one of the structural modifications mentioned above in part 1.1. (***25 marks***)

1.3 Propose a suitable synthetic pathway for diamorphine starting from morphine. (***20 marks***)

1.4 Give the missing compounds/ reagents in the following reactions. (***40 marks***)

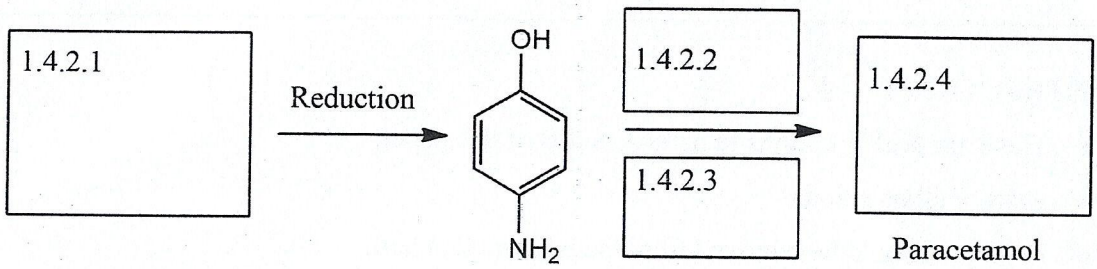
1.4.1



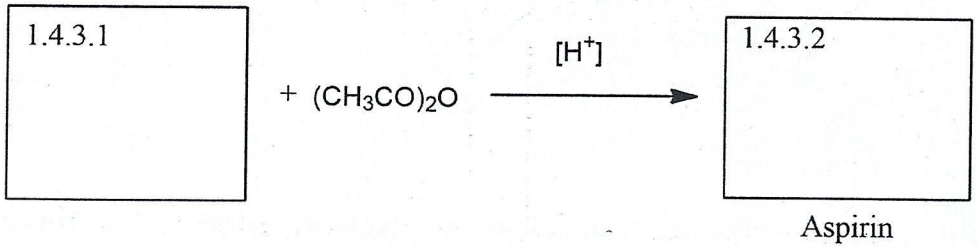
2,3-Dimethylbenzamine

Mefenamic acid

1.4.2



1.4.3



02.

2.1

2.1.1 State the purpose of conducting bioassays in drug discovery and development. (***15 marks***)

2.1.2 Briefly explain Bioassay-Guided Fractionation. (***20 marks***)

2.2

2.2.1 What are anti-vitamins? (***10 marks***)

2.2.2 Give two examples for anti-vitamins. (***10 marks***)

2.2.3 List the five main steps of the Reichstein process for the synthesis of ascorbic acid (vitamin C). (***25 marks***)

2.3 List the importance of inorganic compounds in pharmaceutical industry. (***20 marks***)

PART B

03.

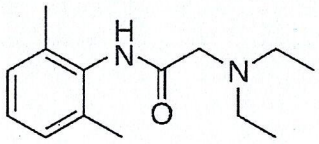
3.1 Illustrate the biosynthetic pathway of acetylcholine, clearly indicating all intermediates and enzymes involved. (***30 marks***)

3.2 Methacholine is an acetylcholine analogue containing methyl group at the β-position relative to the quaternary N atom. Propose a synthetic pathway for methacholine. (***30 marks***)

3.3 Discuss the SAR of acetylcholine analogues, using acetylcholine as the core structure. (***40 marks***)

04.

4.1 Structure of lidocaine is given below.

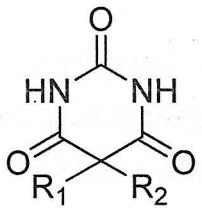


4.1.1 State two clinical indications for lidocaine. (*05 marks*)

4.1.2 Propose a synthetic pathway for lidocaine, starting from 2,6-dimethylnitrobenzene. (*30 marks*)

4.2 Chloral hydrate is a hypnotic sedative agent. Starting from trichloroacetaldehyde, outline the synthetic pathway for chloral hydrate. (*15 marks*)

4.3 The parent structure of barbiturates is given below. Briefly describe three SARs of barbiturates. (*15 marks*)



4.4 Name two clinically important prostaglandin analogues and state one therapeutic use for each. (*10 marks*)

4.5 Using a flowchart, illustrate the key steps of biosynthesis of prostanoids from membrane phospholipids. (*25 marks*)

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