



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

SECOND BPHARM PART II EXAMINATION – SEPTEMBER 2020

PH 2244 MEDICINAL CHEMISTRY AND PHARMACOGNOSY IA (SEQ)

TIME: THREE HOURS

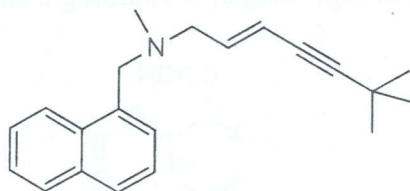
INSTRUCTIONS

- There are **six** questions in the parts **A, B, C** and **D** in the SEQ 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

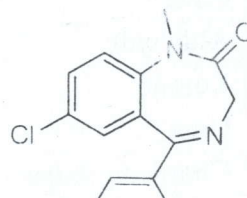
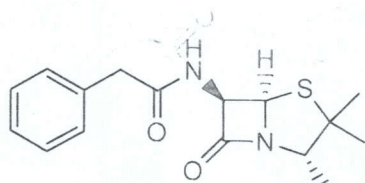
01. Answer all parts.

- 1.1 The partitioning of a drug between two phases can be quantified by a partition coefficient.
- 1.1.1 State the importance of having a balance of lipophilicity and hydrophilicity in a Drug. (10 marks)
- 1.1.2 Describe the logP value of a drug. (05 marks)
- 1.1.3 Explain why octanol is the carbonic solvent of choice to determine the partition coefficient of a drug. (05 marks)
- 1.2 A patient requests for a recommendation for treatment for the itching and burning sensation on his feet. Your recommendation to this patient is terbinafine, a very effective topical antifungal agent sold over the counter as a cream.

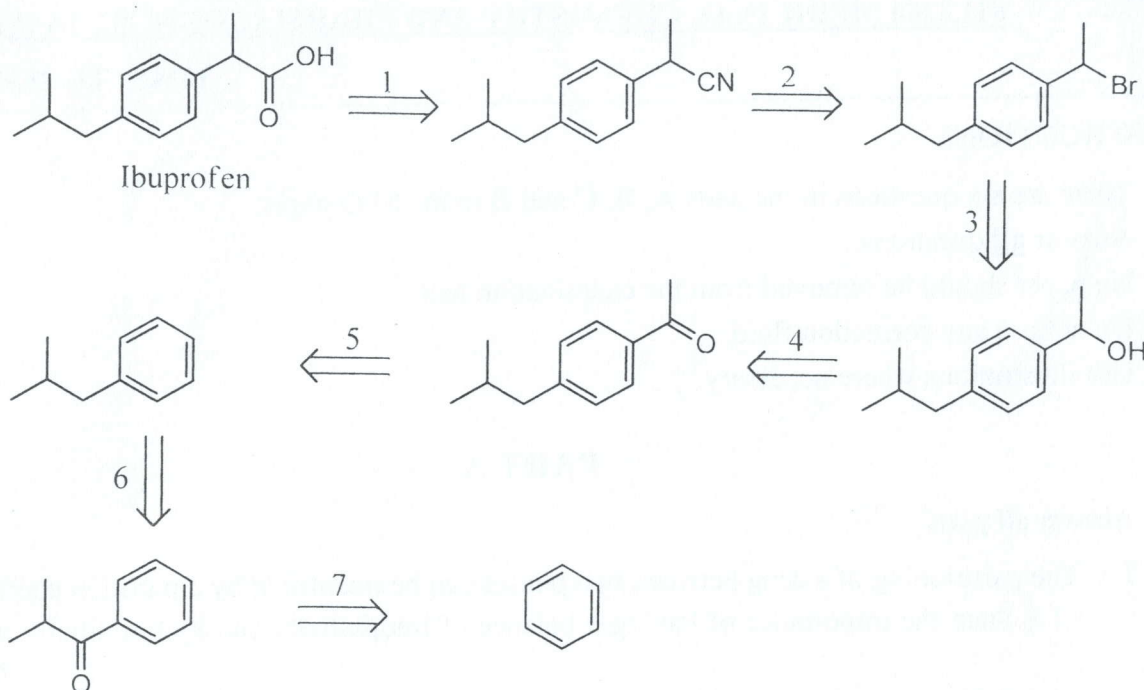


Terbinafine

- 1.2.1 Identify all of the functional groups (features) present in terbinafine. (08 marks)
- 1.2.2 Indicate whether they are hydrophilic or hydrophobic and contribute to water solubility or lipid solubility. (07 marks)
- 1.2.3 Which of the groups mentioned in 1.2.1 will facilitate the absorption of this medication into the skin? (05 marks)
- 1.2.4 If oral ingestion is employed as the route of drug delivery due to its ease of administration, what would be simplest way of enhancing the aqueous solubility of this drug? (05 marks)
- 1.3 Lipinski's rule or "rule of fives" helps in distinguishing between drug like and non-drug like molecules.
- 1.3.1 State the Lipinski's rule. (06 marks)
- 1.3.2 Find whether the following two widely used drugs, penicillin G and diazepam, obey this rule. (14 marks)



- 1.4 The preparation of a target organic drug compound can be mapped using retrosynthetic analysis. The retro synthesis of ibuprofen is given below. Give necessary reagents for the forward synthesis of ibuprofen starting from benzene. (35 marks)

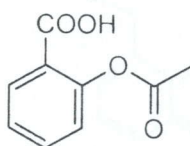


02. Answer all parts.

2.1 The concept of bioisosteric modifications was introduced as a method of choosing minor modifications on lead compounds.

2.1.1 What is meant by "bioisostere" and "bioisosteric replacement"? (10 marks)

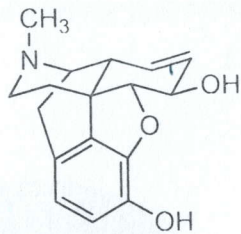
2.1.2 Draw **three** analogs of aspirin, each containing a single bioisosteric substitution. (10 marks)



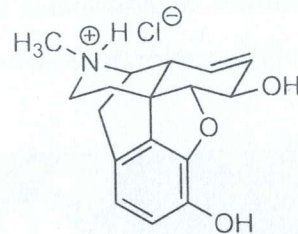
Aspirin

2.2 The solubility potentials for different functional groups have been calculated empirically by T. Lemke. He estimated the solubility potential as the number of carbons that each functional group will help to dissolve. A table of solubility potentials is given in the table below:

Functional Group	Solubility potential as number of carbons (in a poly functional molecule)
Alcohol	3-4
Phenol	3-4
Amine	3
Carboxylic acid	3
Ester	3
Amide	2-3
Ether	2
Aldehyde	2
Ketone	2
Urea	2
Charged groups	20-30

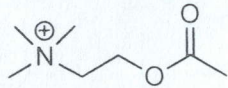


morphine

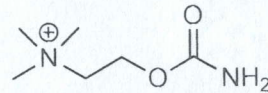


morphine hydrochloride

2.3 Carbachol which is an acetylcholine analogue, is a parasympathomimetic agent used to treat urinary retention and glaucoma.



Acetylcholine



Carbachol

Acetylcholine is rapidly hydrolyzed by cholinesterase. The synthetic analog, carbachol is more resistant to hydrolysis, and have a longer durations of action. Explain. (15 marks)

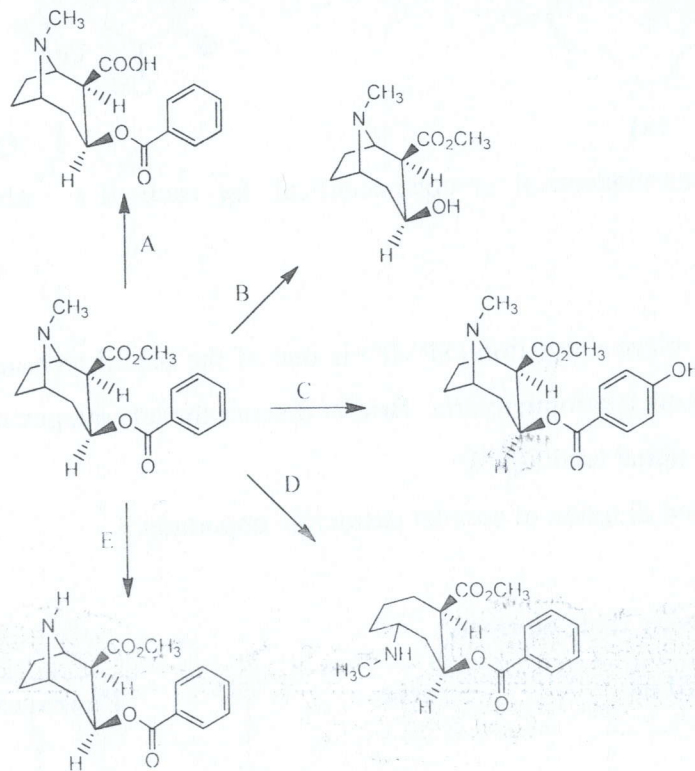
2.4 What does QSAR stand for? Explain the purpose of it? (10 marks)

2.5 Knowledge of the metabolism of xenobiotics is essential for an understanding of pharmacology and therapeutics, toxicology and the management of disease.

2.5.1 What are xenobiotics? (10 marks)

2.5.2 Show how Phase I metabolism of acetonitrile (CH_3CN) results in a substance more toxic than the originally ingested substance. (10 marks)

2.5.3 Identify the nature of the reactions (A-E) and enzymes corresponding to all likely phase I metabolic pathways for the drug shown in the scheme below. (15 marks)



PART B

03.

3.1 Siddha is one of the systems of medicine practice in Sri Lanka.

3.1.1 Name **five** elements that correspond to the five senses of the human body in Siddha medicine. (10 marks)

3.1.2 Name **five** types of common preparations of Siddha medicine. (10 marks)

3.2

3.2.1 "Pharmacological crude drug classification is more useful than alphabetical crude drug classification." Justify your answer. (30 marks)

04.

4.1 Terrestrial animals are considered as one of the important sources of natural products.

4.1.1 Identify the animals shown in the **Figure 1**. (10 marks)



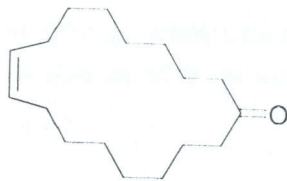
(a)



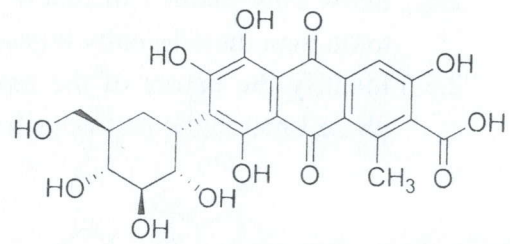
(b)

Figure 1

4.1.2 Following chemical structures **x** and **y** indicate the major compounds isolated from the animals **a** and **b** respectively. Identify these compounds. (10 marks)



(x)



(y)

4.1.3 List **one** pharmaceutical or cosmeceutical use each of the above two compounds (x and y). (10 marks)

4.2

4.2.1 Solid phase micro extraction (SPME) is one of the useful techniques for the isolation of analytes from a sample matrix. Briefly discuss the advantages of this technique over other conventional techniques. (20 marks)

4.2.2 Draw a labeled diagram of soxhlet extraction apparatus. (20 marks)

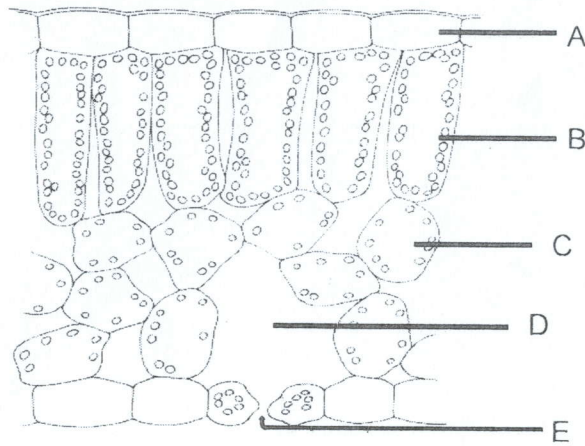
4.3 Complete the following table on fibers. (30 marks)

	Type of fiber	Source	Pharmaceutical use
4.3.1	Silk		
4.3.2	Jute		
4.3.3	Wool		
4.3.4	Cotton		
4.3.5	Rayon		

PART D

05.

5.1 The drawing represents a vertical section of a leaf.



5.1.1 Name the parts indicated by the letters A - E.

(15 marks)

5.1.2 State differences between the B and the C cell types.

(15 marks)

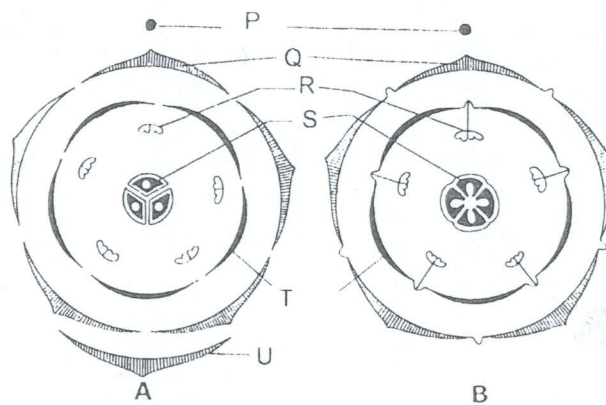
5.1.3 Give reason/s for the above differences.

(10 marks)

5.1.4 What is the function of D?

(10 marks)

5.2 Use the diagram given below to answer questions 5.2.1 to 5.2.4.



5.2.1 Label components P to U.

(15 marks)

5.2.2 Mention the main function of each of the following.

(20 marks)

Q, R, S, T

5.2.3 State the main difference between A and B with respect to the following floral parts.

(15 marks)

Q, R, S, T

06.

6.1 Distinguish between.

6.1.1 Even pinnate leaf and odd pinnate leaf

(15 marks)

6.1.2 Racemose inflorescence and cymose inflorescence

(15 marks)

6.1.3 Berry fruit and legume fruit

(15 marks)