KENYATTA UNIVERSITY

SUPPLEMENTARY/SPECIAL EXAMINATION 2021/2022

EXAMINATION FOR THE DEGREE OF BACHELOR OF BACHELOR OF PHARMACY

LEVEL V

PPC 510: PHARMACEUTICAL CHEMISTRY V

AUGUST, 2022 **TIME: 3HOURS**

INSTRUCTIONS:

1. **The paper consists of three sections; A, B and C**
2. **Answer all questions**
3. **Answer sections A, B and C in separate booklets**

SECTION A: CENTRAL NERVOUS SYSTEM AGENTS

1. With regard to opioid analgesics:
   (a). Outline four structural features of the lead compound. (4marks)
   (b). Explain the serendipitous discovery of the opioid pharmacophore with a description of its structural features (4 marks)
2. Outline structural features associated with each of the following class of drugs,
   (a). Morphine analogues (3marks)
   (b). Tricyclic antidepressants (3marks)
   (c). Phenothiazine derivatives (3marks)
3. The general structure of several classes of antiepileptic agents is shown in figure 1:

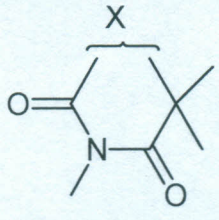

Fig.1

Draw the structure of X when the class represented is:

(a). Barbiturates (2 marks)
(b). Succinimides (2 marks)
(c). Oxazolinediones (2 marks)
(d). Hydantoins (2 marks)

4. Discuss the structures shown in figure 2 below, in relation to the treatment of Parkinson's disease (6 marks)

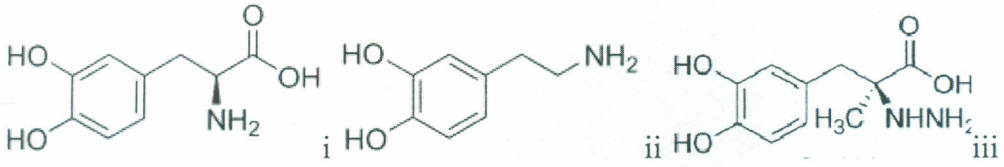

Fig. 2

5. Identify the class of drugs represented by figure 3.

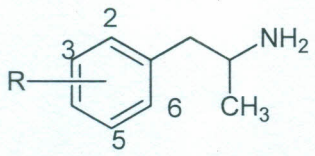

Fig. 3

(a). State the clinical use of one drug in the class named. (1 mark)

(b). Illustrate two metabolic reactions undergone by drugs in this class. (2 marks)

(c). Outline three structure activity relationships (SAR) for this class of drugs. (6 marks)

SECTION B: AUTONOMIC DRUGS

1. Name four drug examples of β-adrenoceptor antagonists that are formulated as ophthalmic solutions for management of glaucoma. (4 marks)
2. State one clinical use of each of the following drugs: (4 marks)
   (a). Darifenacin
   (b). Trospium
   (c). Carbachol
   (d). Donepezil
3. Explain the mechanism of actionpralidoxime. (5marks)
4. Regarding cholinergic transmission, state whether each of the following statements is ***true*** or ***false***. (5 marks)
   (a). Acetylcholine is a critical neurotransmitter in sympathetic and somatic nerve fibers
   (b). Hemicholinium-3 is an agent that inhibits reuptake of acetylcholine in storage vesicles
   (c). Stimulation of M1, M3, and M5 muscarinic receptors activates phospholipase C, while activation of M2 and M4 inhibits adenylyl cyclase

(d). Acetylcholinesterase receptoris associated with a second messenger and is classified as a GPCR

(e). In bethanechol, the carbamate functional group is more lipophilic than an ester allowing for faster absorption from the gastrointestinal tract

5. Discuss fiveSARs associated with muscarinic receptor antagonists (figure 1). (10 marks)

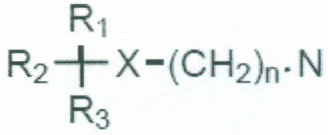

Figure 1: General chemical structure of muscarinic receptor antagonists

6. Discuss adrenaline (figure **2**) under the following:

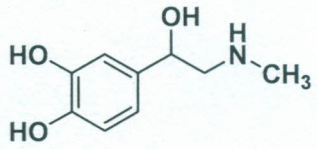

Figure 2: Chemical structure of adrenaline

(a). Its chemical degradation to red-coloured products. (4 marks)

(b). Its metabolism using chemical structures of metabolites and naming the enzymes involved. (8 marks)

SECTION C: CARDIOVASCULAR DRUGS

1. Describe the strategy that was used in the design of the following drugs:
   (a). Indanedione from coumarins (2 marks)
   (b). Tocainidefromlidocaine (2 marks)
2. Describe three structural features of the following:
   (a). β - Adrenoceptor antagonists (3 marks)
   (b). Cardiac glycosides (3 marks)
   (c). Angiotensin converting enzyme inhibitors (3 marks)
3. Outline three physicochemical properties of propranolol (3 marks)
4. Explain the importance of *para*-substitution of aryl group in aryoxypropanolamines (4 marks)
5. Using appropriate drug examples, discuss three SARs of:
   (a). Angiotensin converting enzyme inhibitors (10 marks)
   (b). Thiazide diuretics (10 marks)