Technical University of Mombasa

Faculty of Applied and Health Sciences

DEPARTMENT OF PURE AND APPLIED SCIENCES
UNIVERSITY EXAMINATION FOR THE DEGREE OF BACHELOR OF
TECHNOLOGY IN APPLIED CHEMISTRY (ANALYTICAL OPTION)
BTAC Y3 S1

ACH 4309 : DRUG ANALYSIS

SEMESTER EXAMINATION

DECEMBER 2013 SERIES   2 HOURS

Instructions to candidates:

This paper consists of **FIVE** questions
Answer question **ONE** (compulsory) and any other **TWO** questions

QUESTION ONE

a) Explain the following terms;

    (i)   Bioavailability   **(2marks)**
    (ii)   Emulsion   **(2marks)**
    (iii)   Synergism   **(2marks)**

b) List FOUR factors to be considered while choosing a proper adsorbent in TLC.
    (4marks)

c) In a hospital laboratory, a 10.0ml sample of gastric juice, obtained several hours after a meal, was titrated with 0.1M NaOH to neutrality: 7.2ml of NaOH was required. The patient's stomach contained no ingested food or drinks, thus assume that no buffers were present. Determine the pH of the gastric juice.   **(4marks)**

d) Explain how the following substances lead to slow coalescence (breaking) of an emulsion during an extraction process.

(i)	Finely divided powders	**(2marks)**
(ii)	Ionic substances	**(2marks)**
(iii)	Surfactants	**(2marks)**

e) Outline FOUR applications of UV-Vis spectroscopy in pharmaceutical drug analysis.
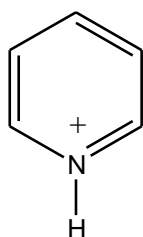
(4marks)

f) Explain the principle behind mass spectroscopy **(4marks)**

g) Differentiate between mass spectroscopy and NMR: **(2marks)**
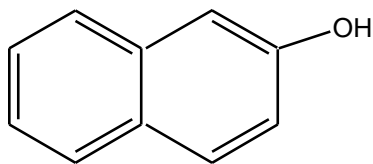
QUESTION TWO

a) Explain THREE ways of breaking an emulsion prior to extraction process. **(6marks)**

b) State with reasons whether the following compounds are more soluble in an aqueous solution of 0.1NaOH or 0.M HCl. (The dissociate proton in (c) is that of the –OH group.)
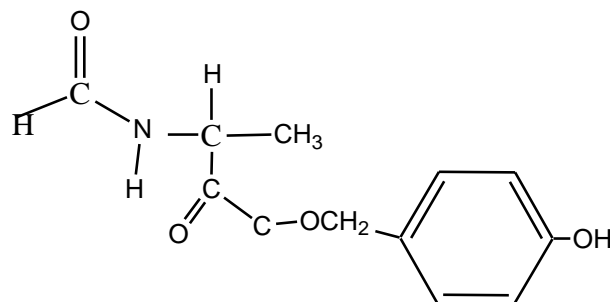

pyridine ion
pKa = 5

B-Naphthol
pKa 10

N-Acetyltyrosine methylester
pKa = 10

(a)   (b)

(c)

(6marks)

c) State FOUR applications of NMR in pharmaceutical drug analysis. **(4marks)**

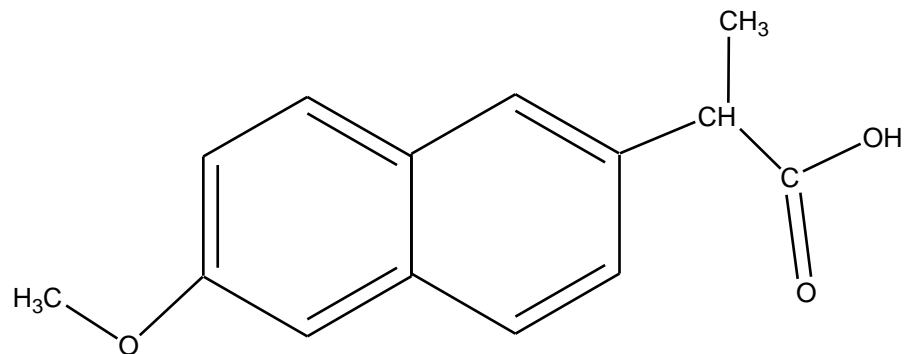d) Explain the principle behind diazotization titration **(4marks)**

QUESTION THREE

a) Using suitable equations explain how the end-point is determined visually, in diazotization titration. **(6marks)**

b) Consider the drug Naproxen below.

| (i)	Draw the structure of the ionized form at pH 6.15.	**(2marks)**
(ii)	Calculate its % ionization at pH 6.15.	**(4marks)**

$$pKa = 4.15$$

c) Outline FOUR applications of HPLC in pharmaceutical drug analysis. **(4marks)**
d) List FOUR factors that affect the R_f (Retention factor) value of a component in chromatographic analysis. **(4marks)**

QUESTION FOUR

a) Explain the principle behind Kirl Fisher titration **(4marks)**
b) Write a chemical equation for the complexation of manganese(II) ions in the synergistic extraction of $Mn^{2+.}$ **(4marks)**
c) In a chromatographic analysis of a certain drug , the standard solution was found to be 4cm, 2.7cm and 3.2cm.

   (i)   Calculate the R_f value in relation to the standard. **(4marks)**
   (ii)   Outline FOUR advantages of using GLC. **(4marks)**

d) The mass spectrum for flaroxate drug, given below, showed a base peak at M/Z 98. Account for the fragment giving that mass unit. **(4marks)**
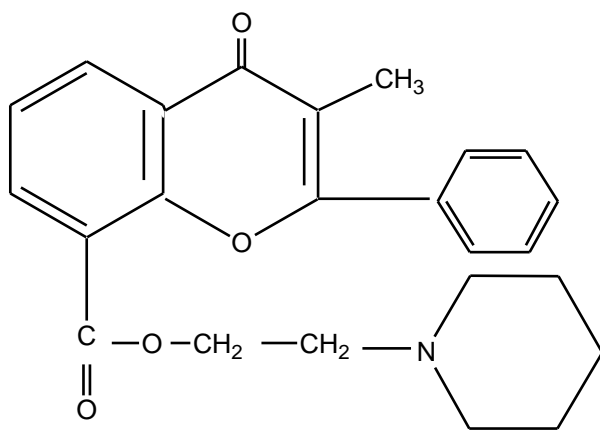
QUESTION FIVE

a) Explain the principle behind NMR. **(5marks)**

b) Predict the multiplicity of protons A,B,C,D &E in the drug structure below. **(5marks)**
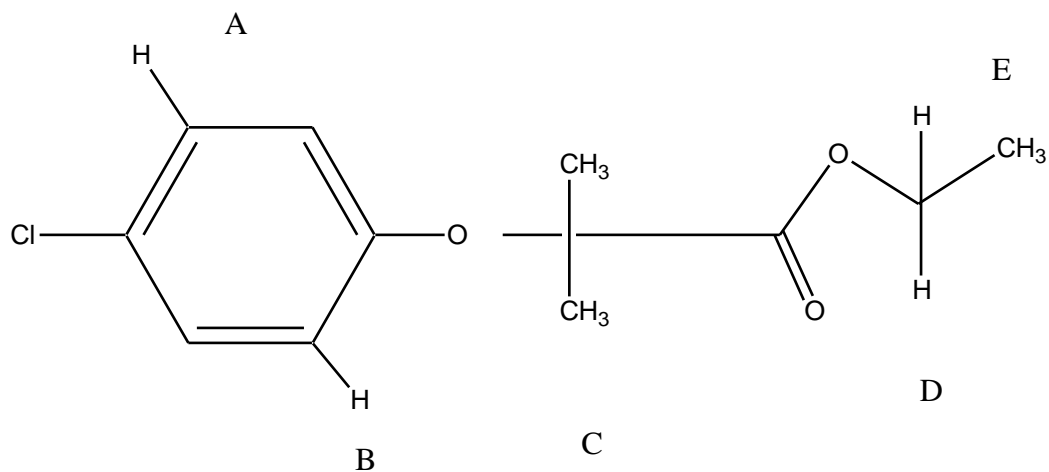
c) List FIVE guidelines to consider inorder to prevent emulsion formation during extraction process. **(5marks)**

d) 1ml of a sample was diluted to 50ml and then 3ml of the clotution was further diluted to 150mls. The diluted sample was measured by UV-VIS and was found to contain 0.311mg /100ml of the drug. Calculate the % w/v of the drug in the sample. **(5marks)**