BACHELOR OF PHARMACY HONOURS
FMU4307 – PHARMACEUTICAL ANALYSIS I - LEVEL 4
ACADEMIC YEAR 2018/2019 – SEMESTER II
FINAL EXAMINATION
DURATION: THREE HOURS

(21)

DATE: 27TH NOVEMBER 2019 TIME: 01.30 P.M. – 04.30 P.M.

Part B – SAQs (20 marks)

01.

1.1 State why carrier gas (mobile phase) used in gas chromatography must be free of hydrocarbon and moisture. (02 marks)

.....

.....

1.2 State how band broadening occurs in chromatographic separations. (03 marks)

.....

.....

1.3 State how plate theory describes the column efficiency. (02 marks)

.....

.....

.....

1.4 List three (03) types of open tubular columns used in gas chromatography. (03 marks)

I. .....

II. .....

III. .....

Index No .....

02.

2.1 List three (03) atomization methods used in atomic absorption spectroscopy. (03 marks)

I. .....

II. .....

III. .....

2.2 State four (04) types of sample conversions occur inside the flame in atomic absorption spectroscopy. (04 marks)

I. .....

II. .....

III. .....

IV. .....

2.3 Write one (01) role of each of the followings that used in atomic absorption spectroscopy. (03 marks)

a. Hollow cathode lamp - .....

.....

b. Argon gas used in graphite furnace - .....

.....

c. Nebulizer - .....

.....

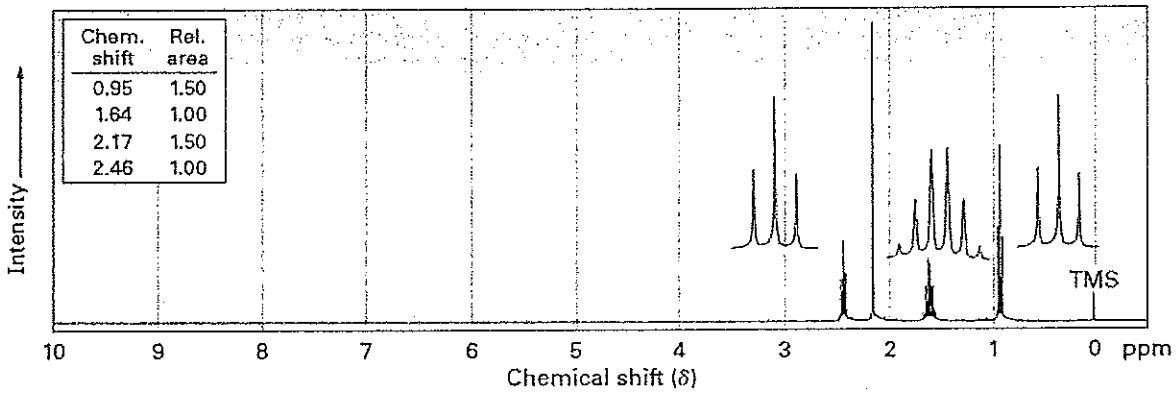
Index No .....

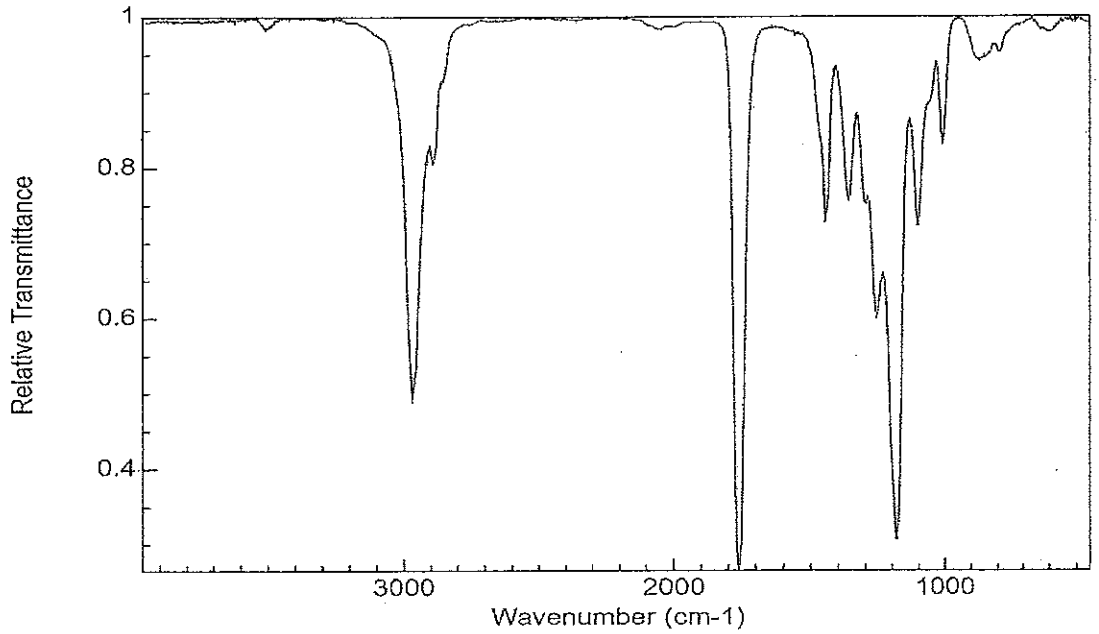
Part C – SEQs (60 marks)

(Each SEQ has 35 marks and total marks for Part C will be converted into 60 marks)

01.

Given below are the ^1H NMR spectrum and the IR spectra of the molecule with the formula $C_5H_{10}O$.





1.1 Which Spectrum (FTIR or ^1H NMR) is the best one for the identification of functional group? (02 marks)

1.2 What are the major functional group/s present in this molecule? (03 marks)

1.3 Explain how did you identified the functional group/s using your choice (in a) of the spectrum. (05 marks)

1.4 If a particular proton is surrounded by n number of protons the respective signal is splitted by n+1 multiplets, explain the splitting pattern observed in ^1H NMR spectrum. (12 marks)

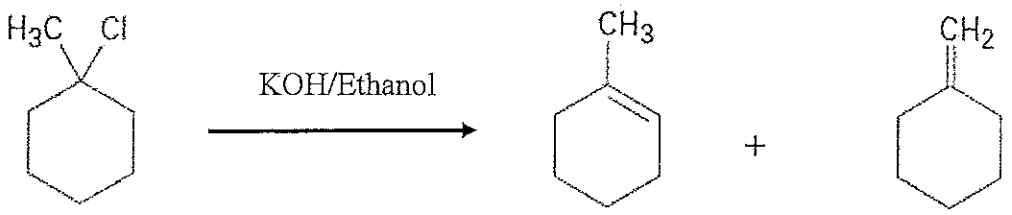
Index No .....

1.5 Using both spectra, give the most possible structure of the molecule for the formula $C_5H_{10}O$. (06 marks)

1.6 Sketch the ^{13}C NMR spectra of the molecule structure you proposed in 1.5. (07 marks)

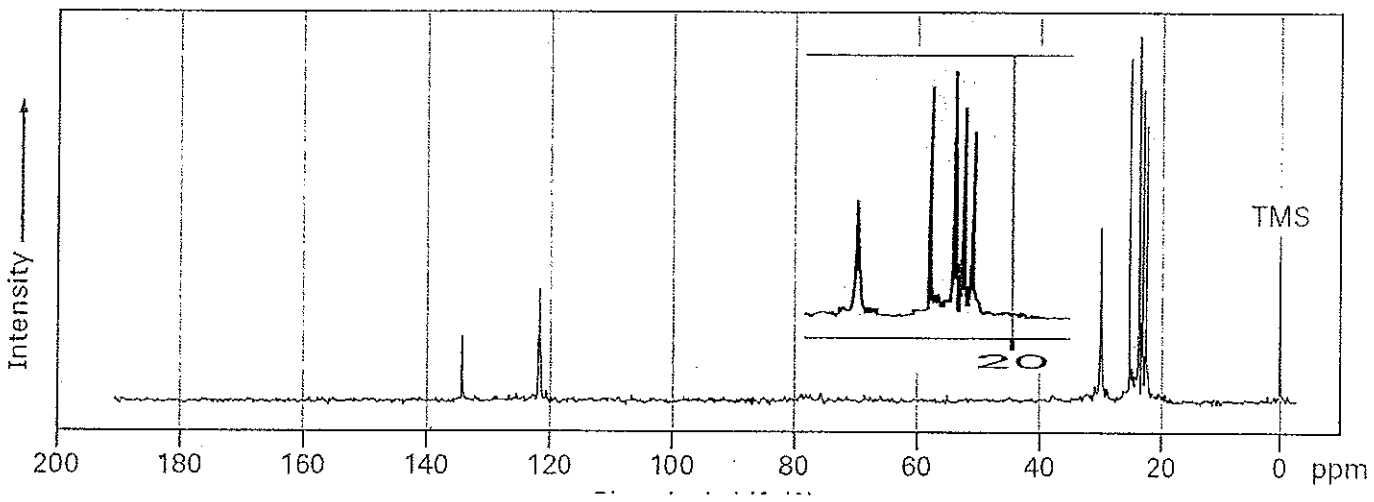
02.

When 1-chloro-1-methylcyclohexane is treated with a strong base it is possible to produce two alkenes, 1-methylcyclohexene and methylenecyclohexane.



1-chloro-1-methylcyclohexane 1-Methylcyclohexene Methylenecyclohexan

The ^{13}C spectrum of the product is given below (insert is the expanded region of δ 20 – 40 ppm).



2.1 Using the given ^{13}C spectrum, identify which product is formed. (10 marks)

2.2 Briefly explain your answer in 2.1. (15 marks)

2.3 Can IR spectroscopy be used to identify the final product? Briefly explain your answer. (10 marks)

Index No .....

03.

Given below is the data obtained from a chromatographic experiment

Compound	Retention time (t_R) /min	Peak width (W) /min
X	0.3	0.15
Y	1.4	0.18
Z	3.2	0.24

Retention time (t_M) of the mobile phase is 0.17

3.1 Calculate the capacity factor (k') for compound X and Z. (10 marks)

3.2 Using the capacity factor (k') values you obtained in 3.1, explain the efficiency of this separation for compounds X and Y. (06 marks)

3.3 Calculate the resolution between compounds 'X and Y' and 'Y and Z'. (12 marks)

3.4 Explain the status of separation (well separated, over separated of under separated) of compounds 'X and Y' and 'Y and Z'. (07 marks)

04.

4.1 State what happened to a molecule when infrared (IR) radiation and Ultraviolet (UV) radiation is absorbed. (03 marks)

4.2 Sketch the basic components of absorption spectroscopic instrument. (08 marks)

4.3 Briefly explain the role of following parts of atomic absorption spectroscopic instrument. (06 marks)

a. Electrode less discharge lamp
b. Graphite furnance

4.4 Briefly explain how followings effect the sensitivity of atomic absorption spectroscopic signal. (06 marks)

a. Ionization occur in flame
b. Formation of refractory compounds in flame

4.5 Iron in a water sample is analyzed in atomic absorption spectroscopy. When a standard containing 12.5 ppm Fe^{3+} is subjected to flame atomic absorption spectroscopic analysis, the % transmittance found to be 35.4 %. A water sample also runs under same conditions shows the absorbance of 0.75.

a. Calculate the absorbance of the Fe^{3+} standard solution. (02 marks)
b. Determine the Fe^{3+} level (in ppm) in the water sample. (10 marks)