

THE OPEN UNIVERSITY OF SRI LANKA
FACULTY OF HEALTH SCIENCES
DEPARTMENT OF PHARMACY
ACADEMIC YEAR 2018/2019 – SEMESTER II



BACHELOR OF PHARMACY HONOURS
BPU3231 – PHARMACEUTICAL ANALYSIS – LEVEL 5
FINAL EXAMINATION
DURATION: THREE HOURS

DATE: 27TH NOVEMBER 2019

TIME: 01.30 P.M. – 04.30 P.M.

Part B – SAQs (40 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.

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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)

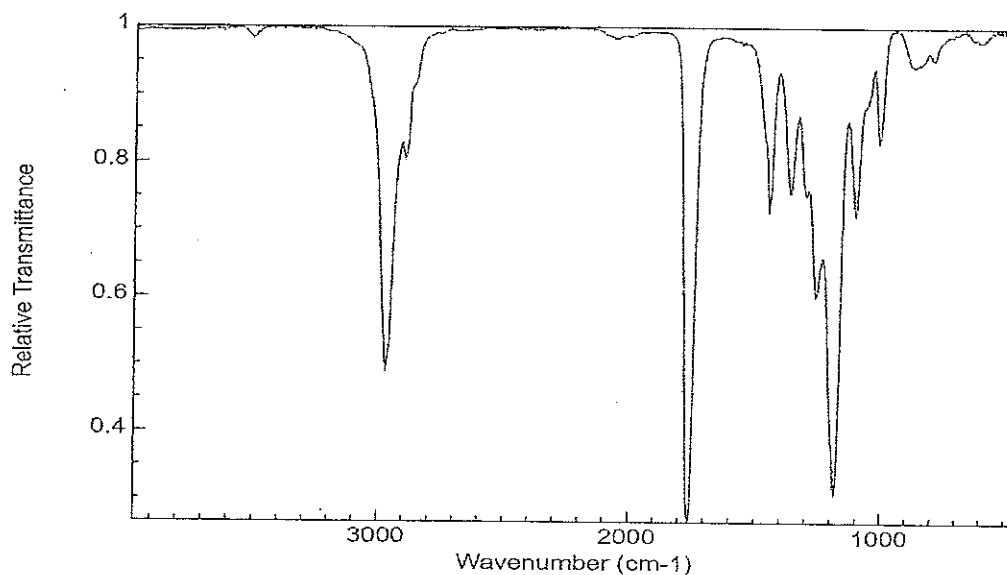
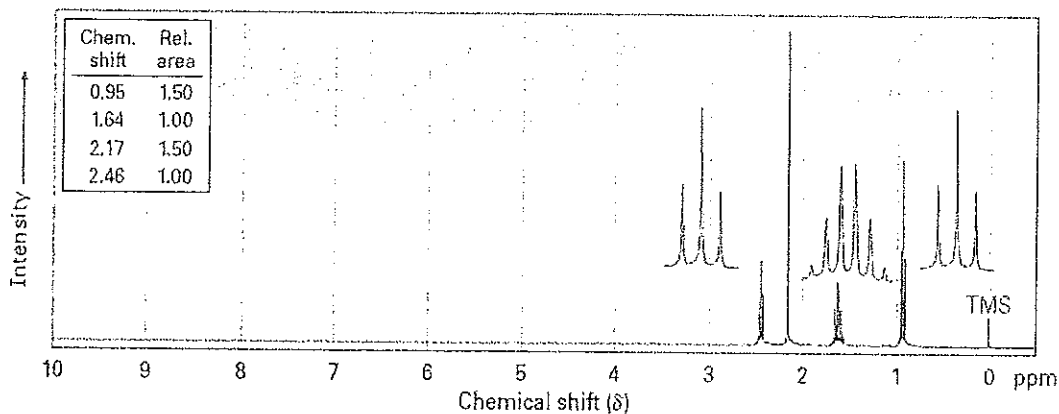
- I.
- II.
- III.
- IV.

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 -

03.

Given below are the ^1H NMR spectrum and the IR spectra of the molecule with the formula $\text{C}_5\text{H}_{10}\text{O}$.



3.1 Which Spectrum (FTIR or ^1H NMR) is the best one for the identification of functional group/s. (02 marks)

.....

3.2 What are the major functional group/s present in this molecule? (02 marks)

.....

3.3 Explain how did you identified the functional group/s using your choice (in a) of the spectrum. (02 marks)

.....

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3.4 Using both spectra, give the most possible structure of the molecule for the formula $C_5H_{10}O$. (04 marks)

04.

4.1 State what happened to a molecule when infrared (IR) radiation and Ultraviolet (UV) radiation is absorbed. (02 marks)

4.2 Sketch the basic components of absorption spectroscopic instrument. (03 marks)

4.3 State role of graphite furnace of atomic absorption spectroscopic instrument. (02 marks)

4.4 Briefly explain how ionization occur in flame effect the sensitivity of atomic absorption spectroscopic signal. (03 marks)

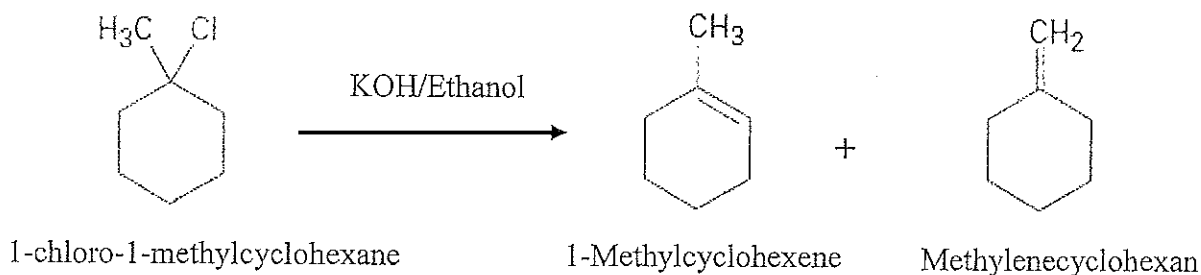
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Part C – SEQs (30 marks)

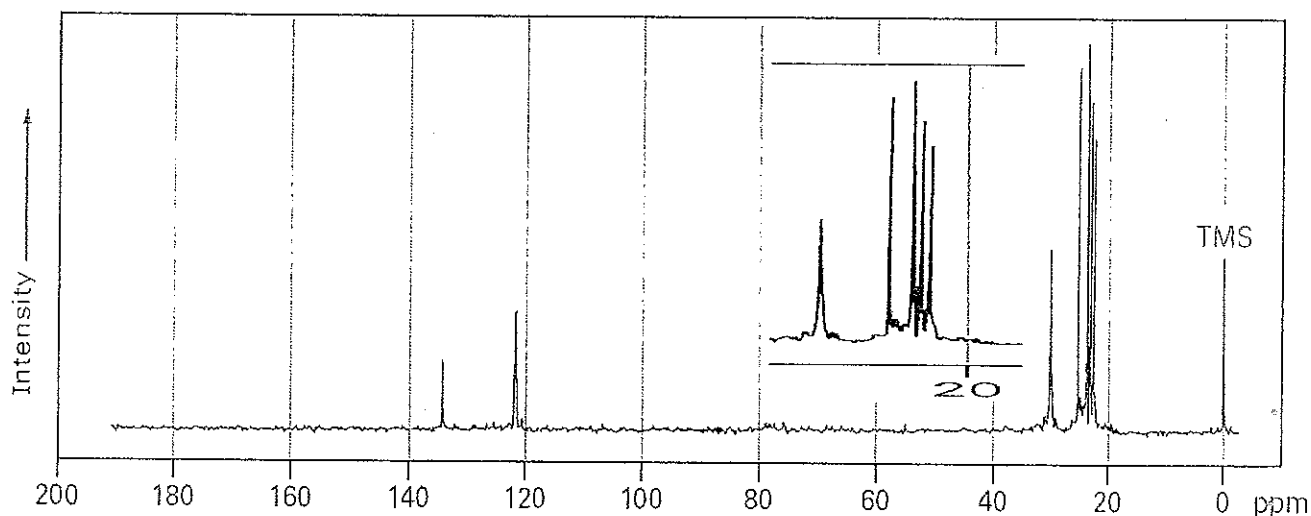
(Each SEQ has 35 marks and total marks for Part C will be converted into 30 marks)

01.

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



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



- 1.1 Using the given ^{13}C spectrum, identify which product is formed. (10 marks)
- 1.2 Briefly explain your answer in 1.1. (15 marks)
- 1.3 Can IR spectroscopy be used to identify the final product? Briefly explain your answer. (10 marks)

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02.

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

- 2.1 Calculate the capacity factor (k') for compound X and Z. (10 marks)
- 2.2 Using the capacity factor (k') values you obtained in 2.1, explain the efficiency of this separation for compounds X and Y. (06 marks)
- 2.3 Calculate the resolution between compounds 'X and Y' and 'Y and Z'. (12 marks)
- 2.4 Explain the status of separation (well separated, over separated or under separated) of compounds 'X and Y' and 'Y and Z'. (07 marks)

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