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UNIVERSITY OF JAFFNA, SRI LANKA
BACHELOR OF PHARMACY
FOURTH YEAR FIRST SEMESTER EXAMINATION – FEBRUARY 2017
PHAPA 4101 PHARMACEUTICAL ANALYSIS
PAPER II

Date: 13/02/2017 **Time: 02 Hours**

Answer all six questions

1 1.1 Give the principle of the High Performance Liquid Chromatography (HPLC) and the applications. (20 Marks)

1.2 Draw the schematic diagram of the working part of a HPLC and describe its major components. (40 Marks)

1.3 Briefly describe diode array and electrothemal (chemical) detectors which are used in the HPLC. (40 Marks)

2 2.1 List five (05) applications of Gas Chromatography (GC). (20 Marks)

2.2 2.2.1 What is meant by split and splitless injection. (10 Marks)

2.2.2 Briefly describe the mode of split and splitless injection. (20 Marks)

2.3 2.3.1 What are the different types of column used in the GC. (10 Marks)

2.3.2 Describe the columns that is mentioned in 2.3.1 (40 Marks)

3. 3.1 Draw the schematic diagram of quadrupole mass spectrometer and describe it's parts. (40 Marks)

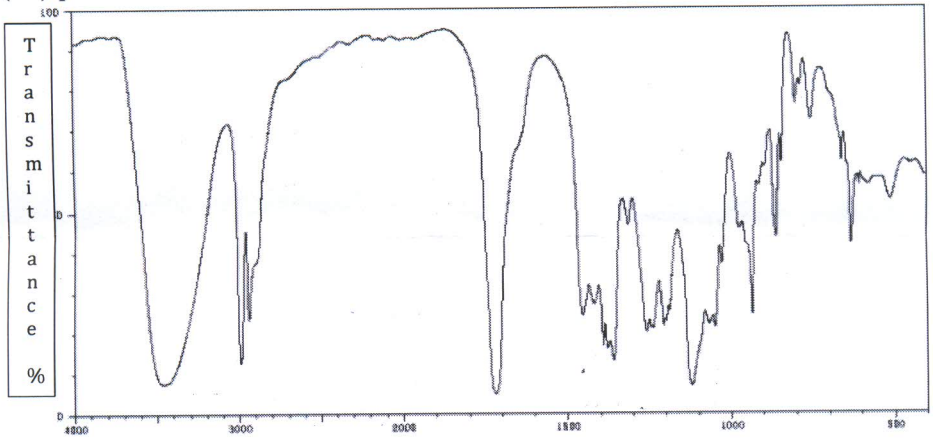
3.2 Describe one ionization technique each for volatile and non-volatile samples. (30 Marks)

3.3 Draw the structure of the molecular ion and the fragmentation patterns of primary and secondary alcohols. (30 Marks)

4. 4.1 Explain the two (02) types of bond vibrations in Infrared (IR) Spectroscopy. (20 Marks)

4.2 What are advantages and disadvantages of the IR spectroscopy? (30 Marks)

4.3 The diagram shows the IR spectrum of $C_4H_8O_2$. Identify and describe four (04) peaks that are consistenet with the molecular formula. (30 Marks)



4.4 Treatment of benzaldehyde (C_6H_5CHO) with Zn(Hg) in aqueous HCl gives a product "Z", which has the IR absorbance at 3150-2950, 1605, and 1496cm^{-1}. Draw the structure of Z. (20 Marks)

5 5.1 Draw a schematic diagram to illustrate the electron transition that occurs in the atomic emission spectroscopy (AES). (20 Marks)

5.2 Explain the interferences in Atomic Absorption Spectroscopy analysis? (30 Marks)

5.3 A strontium chloride ($SrCl_2$) storage tank in a factory has bursted and the materials in the tank is believed to be contaminated to the nearest carbonated water storage tank. A 5ml sample was taken from the contaminated water and labeled as X. Staff members of the laboratory prepared a set of $SrCl_2$ standards and meassured the Sr emission using Flame Emission Spectroscopy (FES). Obtained data is shown in table 1.

Table 1: Concentration of $SrCl_2$ and AES data

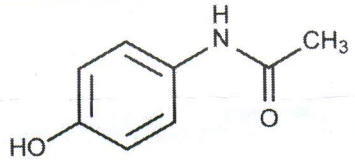
Solution	$SrCl_2$ Conentration (mg/L)	Sr Emission
Blank	0.00	0.0
Standard 1	1.00	0.7693
Standard 2	2.00	1.5427
Standard 3	3.00	2.3161
Standard 4	4.00	3.0895
Standard 5	5.00	3.8629

Draw the appropriate graph and determine the concentration of $SrCl_2$ in sample A. (50 Marks)

Samplex 3.2948

6 6.1 How can you obtain structural informations from ^1H NMR? (20 Marks)

6.2



The above structure represent the acetaminophen. Draw the detailed ^1H NMR spectrum and assign protons to the spectrum. (40 Marks)

6.3 The two isomers of C_2H_6O are CH_3CH_2OH and CH_3OCH_3. How many peaks will be observed in the C-13 NMR for each of the above moleculecules and indicate their positions. (20 Marks)

6.4 Explain the reason for observing a doublet in $BrCH_2CHBr_2$ molecule. (20 Marks)