91

RAJARATA UNIVERSITY OF SRI LANKA

FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences

Second Year – Semester II Examination – November / December 2016

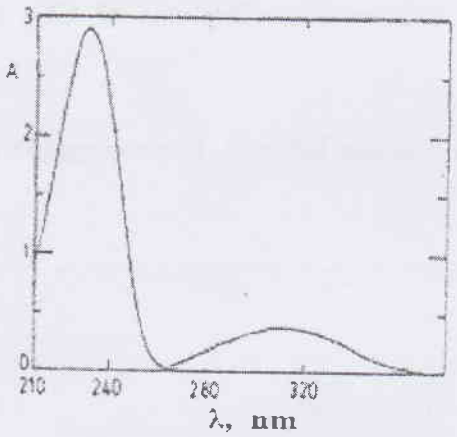
CHE 2106 SPECTROSCOPIC METHODS IN ORGANIC CHEMISTRY

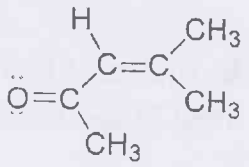
Answer ALL Questions **Time: One (01) hour.**

1. (a). Briefly describe the UV-Visible, Infrared and Nuclear Magnetic Resonance Spectroscopy techniques and their relationship with electromagnetic spectrum (15 marks)

(b). Given below the UV spectrum of 4-methyl-3-penten-2-one. Discuss the electronic transitions of the compound

(10 marks)

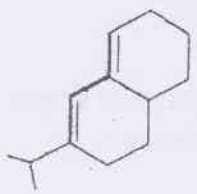




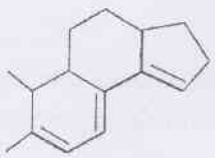
4-methyl-3-penten-2-one

λ max = ~235nm, ~310nm

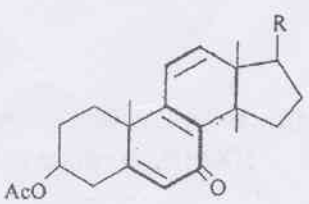
(c). Calculate the UV λ_{max} of the following structures using Woodward-Fischer rule. (Basic value for acyclic conjugated enone : 215 nm, heteroannular conjugated system: 214 nm, homoannular conjugated system 253 nm, homodiene component : 39 nm, extended conjugation: 30 nm, Alkyl substitution: 5 nm, Exocyclic double bond: 5 nm, α-substitution: 10 nm, β-substitution: 12 nm, γ -substitution: 18 nm) (15 marks)



(i)



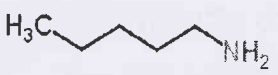
(ii)



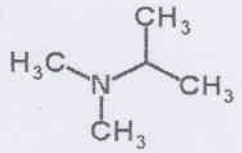
(iii)

2. (a). Describe the ionization of 2-chloropropane and suggest a mass spectrum for the molecule. (10 marks)

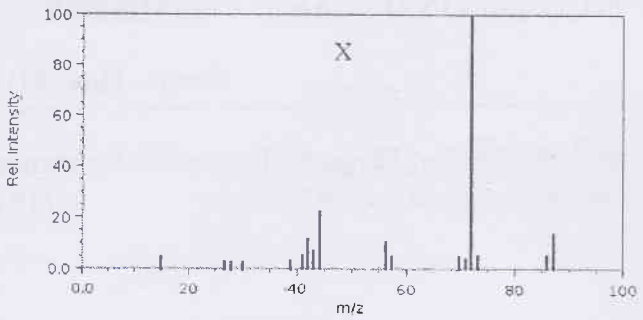
(b). Mass spectrums of 1-Pentylamine (A) and Dimethylisopropylamine (B) are given below. Discuss the fragmentation and identify the relevant spectra. (15 marks)

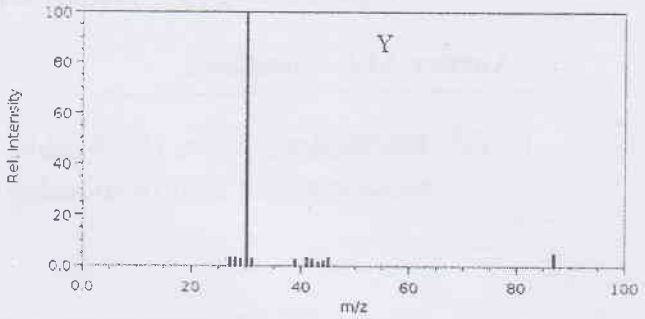


1-Pentylamine
(A)



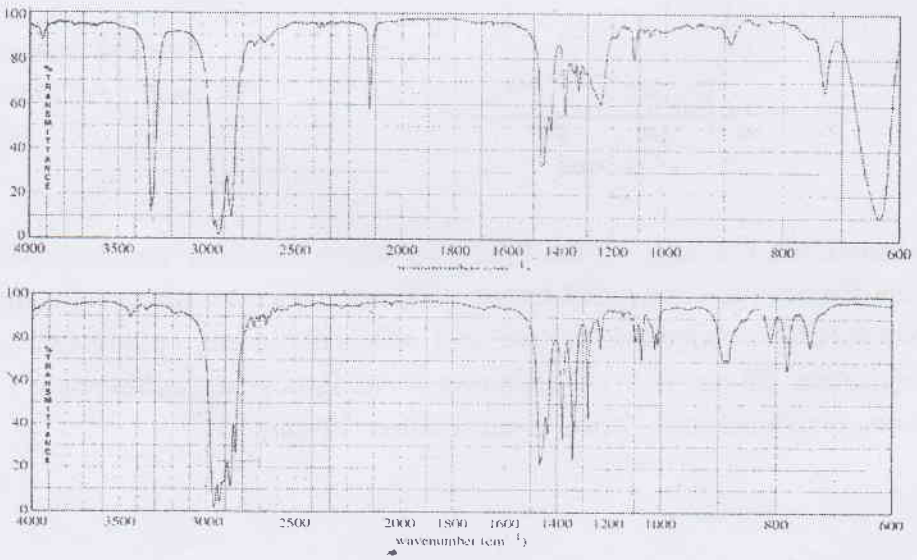
Dimethylisopropylamine
(B)





3. (a). Write a short note on stretching and bending vibrations of CO_2 molecule used in IR spectroscopy. (10 marks)

(b). IR spectra of two isomers of C_6H_{10} given below. Draw possible structures of isomers using IR spectrums. (10 marks)



(c). Even though cylcopropane shows only one signal, chlorocyclopropane shows three signals in HNMR. Explain the above with relevant spectra of both compounds. (15 marks)

=======//=======