GALGOTIAS UNIVERSITY

ADMISSION NUMBER												

School of Basic Sciences

Master of Science in Chemistry
Semester End Examination - Jun 2024

Duration : 180 Minutes
Max Marks : 100

Sem II - C1PK201T - Organic Spectroscopy

General Instructions
Answer to the specific question asked
Draw neat, labelled diagrams wherever necessary
Approved data hand books are allowed subject to verification by the Invigilator

1)	What are hyperchromism and hypochromism.	K1	(3)
2)	Illustrate finger print region in IR and its importance.	K2	(4)
3)	Explain and write a note on functional group region in IR and its importance.	K2	(6)
4)	Utilize NMR in Magnetic resonance imaging	K3	(6)
5)	Utilze Nuclear Overhauser effect.	K3	(6)
6)	Identify the vibrations in water and carbon dioxide.	K3	(9)
7)	A C8H4N2 compound shows a sharp infrared absorption at 2230 cm-1. It's 1H NMR spectrum has a singlet at δ 7.6 ppm. The 13C NMR spectrum shows three signals at δ132, 119 and 117 ppm. Apply the data and suggest a structure for this compound.	K3	(9)
8)	Compare the biphenyls show following UV absorption data. In its 2,2'-dimethyl derivative however absorption pattern becomes almost similar to o-xylene, Explain. Biphenyl (ʎmax= 252nm, ε=19000); o-xylene (ʎmax= 262nm, ε= 270).	K4	(8)
9)	Analyse a structure for this compound. A C10H14 compound. The 1H NMR spectrum has two singlets at δ 2.45 and 7.0 ppm (ratio = 6:1). The 13C NMR spectrum shows three signals at δ132.9, 130.5 and 18.9 ppm.	K4	(12)
10)	Conclude a structure for this compound. A C9H12O3 compound has strong infrared absorption near 1100 cm-1. Its 1H NMR spectrum has sharp singlet peaks at δ 3.6 and 6.6 ppm (intensity ratio 3:1). Its 13C NMR spectrum shows three lines at δ 165, 115 and 55 ppm.	K5	(10)

11) Justify the important feature of mass spectrum of aliphatic aldehydes and ketones. Give hydrogen ion transfer rearrangement. K5 (15)

OR

Justify Mc lafferty rearrangement. The IR and EI-mass spectra of a para disubstituted aromatic compound are given. IR spectrum gives clue for one of the substituents and the clue for the other substituent is amply evident from the MS. Deduce the structure of the compound and then make sure that the molecular weight of the deduced structure matches with the m/z of the molecular ion peaks in the MS. K5 (15)

(i)Intense peaks at 1530 and 1345 cm-1
(ii) Peaks at 1600 and 1610 cm-1
(iii) In the Mass spectrum doublets at m/z 215/217 (1:1)
and at m/z 169/171 (1:1)
(iv) Disubstituted phenyl (76 mass), bromine (79/81) and
NO2 (46) add upto 201, 14 mass units less than
Molecular ion.
gives base peak
at m/z 136.

12) The IR and EI-mass spectra of a para disubstituted aromatic compound are given. IR spectrum gives clue for one of the substituents and the clue for the other substituent is amply evident from the MS. Deduce the structure of the compound and then make sure that the molecular weight of the deduced structure matches with the m/z of the molecular ion peaks in the MS. Discuss K6 (12)

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OR

Discuss the importance of g-factor for determining ESR spectrum. The g factor for the benzene radical anion, C6H6- is 2.0025. At what magnetic field intensity would you search for its ESR spectrum in spectrometer operating at 9.302 GHz? K6 (12)