SARDAR PATEL UNIVERSITY

M. Sc. (Industrial Chemistry), Third (3rd) Semester Examination October - 2016

PS03CICH02—Spectroscopy & Instrumental Techniques Saturday, 22nd October, 2016

Tim	ie: 0	2:0J p.m. to 05:00 p.m.	ly, 22 th October, 2016	Total Marks: 70
Note	ii)	Attempt all the questions. Figures to right indicate full marks.) Draw neat diagrams wherever it req		
Q-1		Answer the following Multiple Choice Questions.		(0
	1.	ion can be detected in ma	, ,	
		a) M	c) M'+	
	^	b) MX	d) none of these	
	2.	Intechnique sample is co	nverted in to gaseous state.	
		a) IR	c) Mass spectrometer	
		b) FT-IR	d) HPLC	
	3.	NMR spectroscopy is used to find to	the presence of	•
		a) ³ H	c) ¹⁴ N	
		b) ¹² C	d) None of these	
	4.	band arises when a mole	ecule in a lowest vibration ener	ray level directly goes to
	••	second vibration energy level.	odio ili di lotto del Vibrationi di Ci	gy level directly goes to
		a) Combination	c) Fermi	
		b) Overtone	d) All of these	
	5.	Compound absorbs IR frequency if	•	
		a) dipole moment	c) structure	
		b) negative charge	d) None of these	
	6.	The rate of change of mass, dm/dt		mple present, and the
		·		
		a) reaction rate constant	c) pressure constant	
		b) temperature constant	d) concentration constant	
	7.	In ideal case, the partition ratio is _	•	lute concentration in
. ,		chromatographic system.		
		a) constant	c) decreasing	en e
		b) variable	d) increasing	
	8.	All emissions above are col		electrons.
· j		a) 50 eV	c) 70 eV	en egyett maka
		b) 20 eV	d) 35 eV	,

Q-2	1. 2. 3. 4. 5. 6. 7. 8.	Answer the following short questions. Each question carries equal mark. (Any Seven) What is lambert's law for absorption? Give possible band and vibration frequency of amide and amines for IR spectra. What is the basic condition for NMR spectroscopy? Define spin-spin relaxation process. Give the classification of chromatography. What is peak asymmetry? Which types of samples will give TGA? What is moseley's law? What is the application of EDX analysis?	(14)			
Q-3	(a)	Discuss the sampling techniques for solid and liquid sample for IR spectroscopy.	(06)			
Q-3	(b)	Explain with figure various modes of vibration in IR spectroscopy.				
		OR .	(03)			
Q-3	(b)	 i) Interpret the spectral data and deduce the structure of following compound: Molecular formula: C₉H₁₁NO₂ 				
		IR Data (in cm ⁻¹): 3020, 2965, 2872, 1745, 1620, 1410, 1375, 1050,				
		NMR Data:				
		δ Multiplicity No. of Protons				
		1.22 Triplet 3H				
		3.25 Singlet 2H				
		4.10 Quartet 2H 6.92-7.75 Multiplet 4H				
		ii) Explain with example van der Waals de-shielding effect on chemical shift.	(03)			
Q-4	(a)	Explain the cleavage of n-hexanol and show its possible peaks.				
Q-4	(b)	Write a note on i) Quadra pole mass filter ii) Time of flight mass spectrometer.	(06)			
		OR				
Q-4	(b)	 i) Briefly explain the method of determining resolution in mass spectrogram. ii) Explain with example Mc-Lafferty rearrangement. 	(03) (03)			
Q-5	(a)	Draw a schematic diagram of HPLC instrument and explain different parts of it.	(06)			
Q-5	(b)	Write a note on i) Analytical Column and Guard Column ii) plate height & plate no's				
		OR				
Q-5	(b)	Write a note on effect of hydrogen bonding on chemical shift of proton.	(06)			
Q-6	(a)	Describe various factors affecting DSC and DTA.	(06)			
Q-6	(b)	Explain in detail effect of high energy radiation on electron in various energy shells.				
_		OR				
Q-6	(b)	Write a note on strengths and limitations of scanning electron microscope (SEM).	(06)			
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-----All the Best-----