CHE 513

M.Sc. (IIIrd SEMESTER) EXAMINATION, 2023

(CBCS MODE)

CHEMISTRY

Spectroscopy - I

Time : Three Hours]   [Maximum Marks : 75

Note: There are **three** sections (**A, B** and **C**) and Candidate has to attempt all questions. Marks are indicated against each section.

Section-A

1. Answer all questions :   3×5=15

    (a) Define bathochromic shift and hypsochromic shift with suitable examples.

    (b) Why are overtones weak in intensity in comparison to the fundamental absorption line ?

    (c) How X-rays are produced and get diffracted ?

    (d) Find out the IR and Raman active modes of water molecule.

    (e) Write down wierl equation and mention the significance of all terms involved in it.

Section-B

2. (a) Using energy level diagram, explain different types of electronic transitions. $5 \times 4 = 20$

Or

(b) Derive Lambert-Beer's Law and mention its applications.

3. (a) Discuss 'Anhornenicity' and significance of mosse potential energy diagram.

Or

(b) Explain the principle of rototienal spectroscopy.

4. (a) How X-ray diffraction techniques is used in elucidation of crystal structure of NaCl.

Or

(b) Discuss the advantages and applications of neutron diffraction.

5. (a) Describe the application of Raman spectroscopy with reference to :
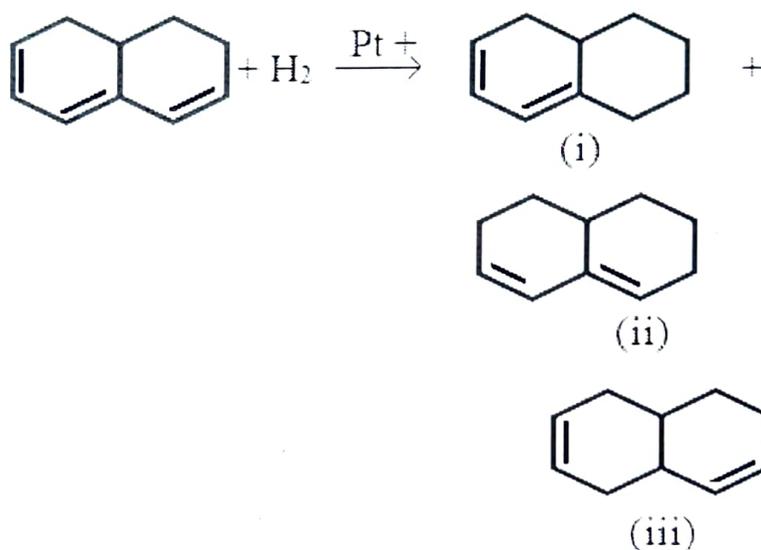
(i) N_2O and (ii) CO_2

Or

(b) What is Raman Effect ? What are the conditions for Raman active vibrations ?

Section-C

6. Discuss Wood-Fieser rule for calculating absorption maximum in α, β- unsaturated carbonyl compounds with suitable examples. $20 \times 2 = 40$

7. Find out an expression for the force constant and on its basis show that :

(i) Force constant increases with bond order and :

(ii) Force constant decreases with increase in bond length :

8. What are solarized and depolarized Raman lines ? Discuss various theories of Raman effect.

9. The following trieve on portiol hydrogenation gives three products, which are separated by chromatography. How can you identify the products by the application of wood word-Fieser rules.

(i)

(ii)

(iii)

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