21CHE2C8L

Sl. No.

M.Sc. II Semester Degree Examination, October - 2023
CHEMISTRY
Spectroscopy and Thermal Methods
(NEP)

Time : 3 Hours

Maximum Marks : 70

Note : Answer **any five** of the following questions.

5x14=70

1. (a) Represent a schematic procedure for the classification of molecules into different point groups. **5+5+4=14**

(b) Construct a Character table for C_2V point group.

(c) Discuss the method for construction of group multiplication table for NH_3.

2. (a) Write a note on Beers Lambert law and its limitations. **5+5+4=14**

(b) Discuss the factors affecting the intensity and width of spectral lines.

(c) Explain the interaction of electromagnetic radiation with matter.

3. (a) Discuss the qualitative applications of UV-Visible spectroscopy. **5+5+4=14**

(b) Explain the theory of chromophores and auxochromes.

(c) Sketch the single beam UV-Visible spectrometer and explain its working.

4. (a) Discuss the types of burners used in flame photometry. **5+5+4=14**

(b) Explain the principle and working of flame photometry.

(c) List the principle and limitations of atomic emission spectroscopy.

5. (a) Explain the principle and working of TGA. **5+5+4=14**

(b) Draw and explain the DTA and TGA curves for decomposition of $CaCO_3H_2O$.

(c) Discuss the factors affecting on the Thermogram of sample.

6.   (a)   Explain the procedure involved in the spectroscopic determination of Fe.

                                                                  5+5+4=14

      (b)   Discuss the various modes of electronic transitions.

      (c)   Explain the binary mixture analysis of (Cr and Mn) in a sample.

7.   (a)   Discuss the principle, instrumentation and applications of nephelometry.

                                                                    5+5+4=14

      (b)   Mention the differences between DTA and DSC. Explain their applications.

      (c)   How does concentration, size and wavelength effects the determination of sample by turbidometry.

8.   (a)   Calculate the ratio, N1/N0, of molecules in $\nu =1$ and $\nu = 0$ vibrational states for carbon monoxide, CO, at 25.0°C. Assume a harmonic oscillator with $\nu {\sim} e = 2169.8$ cm^{-1}.   **5+5+4=14**

      (b)   Explain the principle and applications of direct injection enthalpimetry.

      (c)   Write a note on Photometric titrations.

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