

National Institute of Technology, Hamirpur, H.P

M.ScFinal Examination

Department of Chemistry

Year 2nd semester 3rd

Course: Interpretive molecular spectroscopy

Course code: CY-632

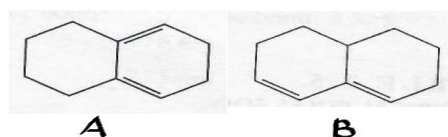
Dated 10-12-2020

Time 2-4pm

Total marks 50

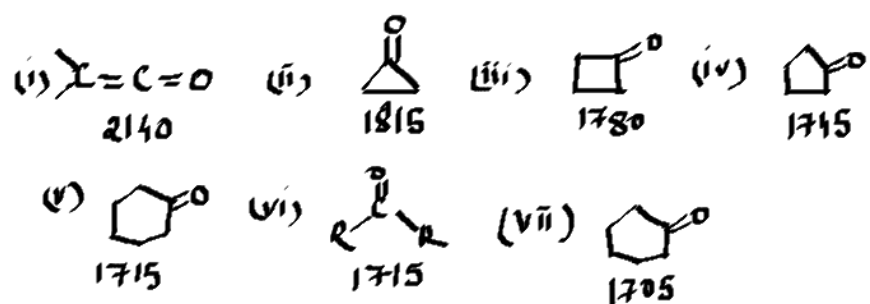
Q. 1. 2.5×4=10

- Explain hypsochromic effect for n- π^* transition in amides and red shift when C=O is in conjugation? 2.5
- Write down the Woodward's rules for enones with suitable example. 2.5
- Why solvent selection is important in UV visible spectroscopy? 2.5
- How will you distinguish following by UV-Visible spectroscopy? 2.5

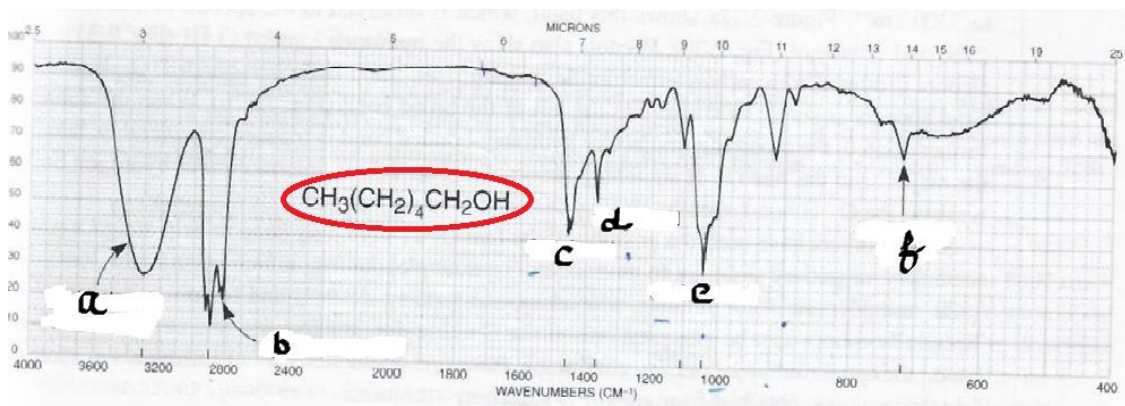


Q.2. 2.5×4=10

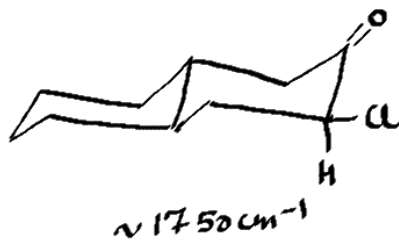
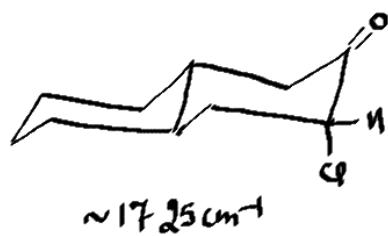
- Explain the decreasing order wave number (cm^{-1}) of C=O function group. 2.5



- Mark the a, b, c, d, e, f peaks of IR spectra of 1-hexanol. 2.5

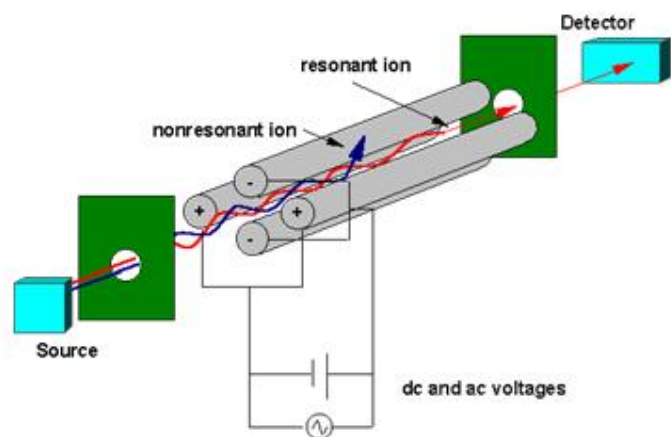


- O-H band is centred at about 3200cm^{-1} in pure methyl salicylate while it is centred around 3350cm^{-1} in normal phenol. How? 2.5
- Explain the shift in absorption band of C=O in the following compounds. 2.5

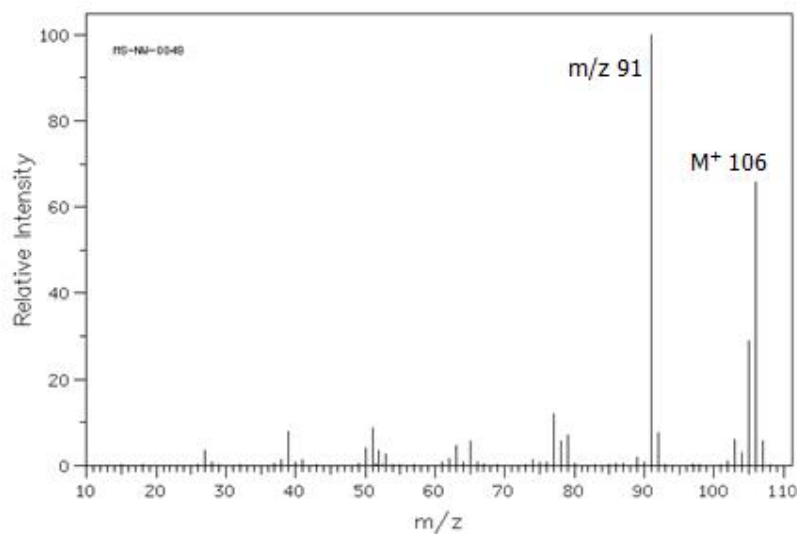


Q.3. $2.5 \times 4 = 10$

a) Comment on following layout diagram of mass spectrometer-2.5

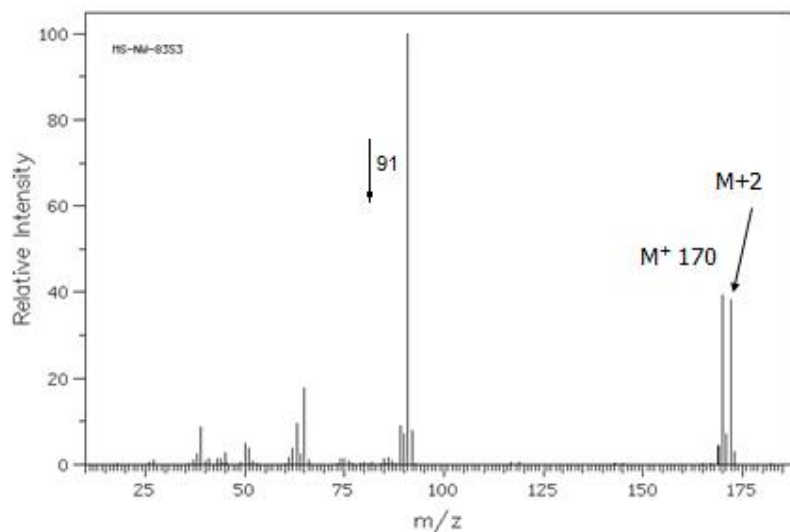


b) Following is the mass spectrogram of p-xylene. Write down the fragmentation path ways- 2.5



c) Write down the fragmentation pattern of aldehyde. 2.5

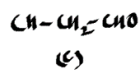
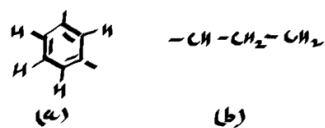
d) Identify the compound. 2.5



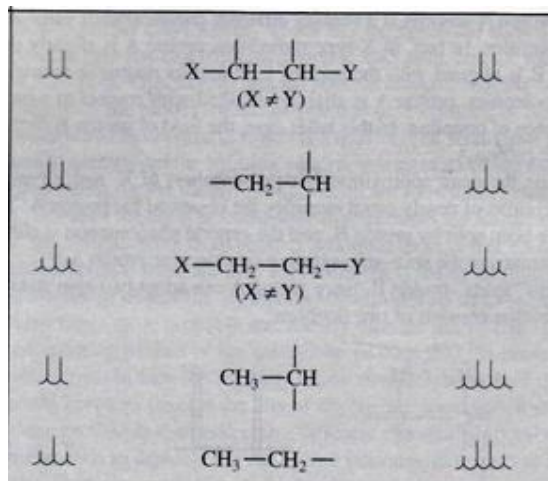
Q. 4. 2.5×4=10

a) Differentiate between CW-NMR and FT-NMR. 2.5

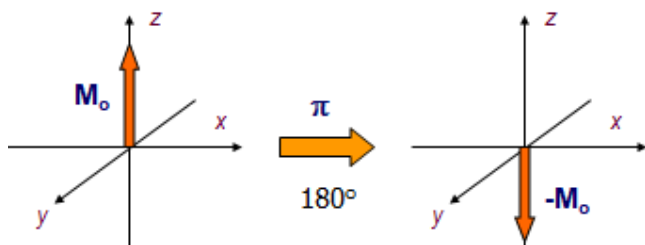
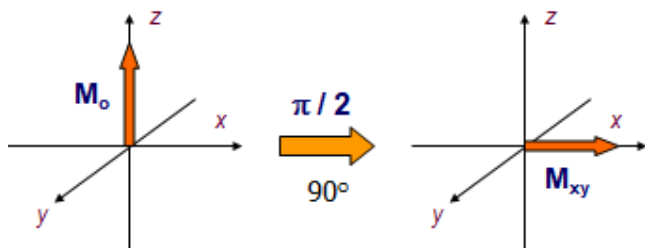
b) Construct the tree diagram for calculating the J values in the compounds given below 2.5



c) Explain the following splitting pattern. 2.5

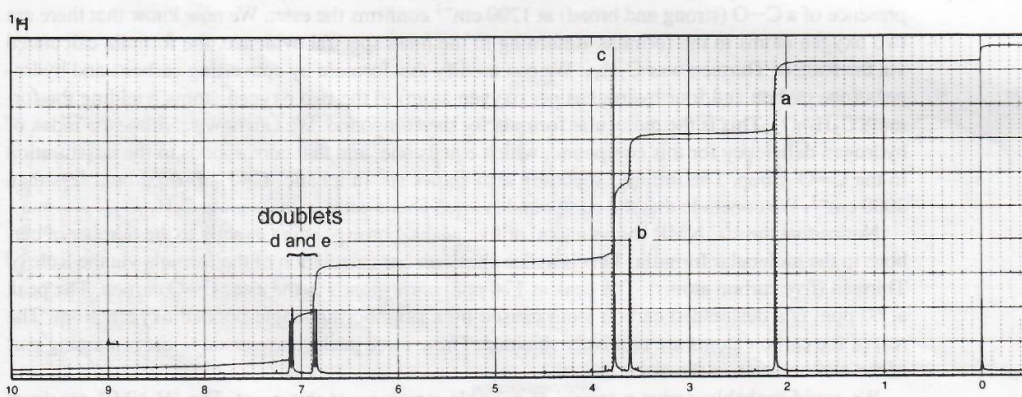
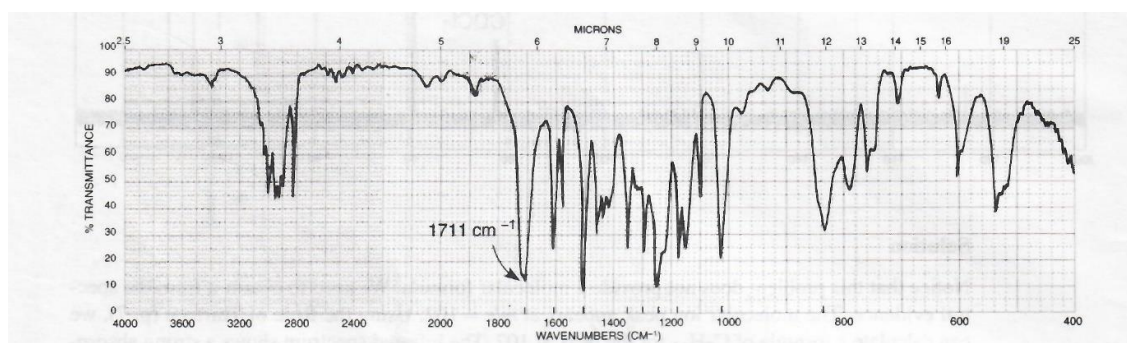


d) What do you understand by following – 2.5



Q.5. (5+5=10)

a) Deduce the structure of compound with molecular formulae $C_{10}H_{12}O_2$ from given FT-IR, NMR, DEPT 135 and 90 data - 5



Normal Carbon	DEPT-135	DEPT-90
29 ppm	Positive	No peak
50	Negative	No peak
55	Positive	No peak
114	Positive	Positive
126	No peak	No peak
130	Positive	Positive
159	No peak	No peak
207	No peak	No peak

b) What do you understand by NMR pulse sequence in 2D NMR? What is the difference in pulse sequence of COSY and HSQC? 5