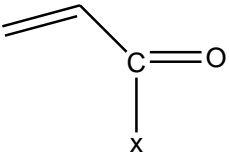


Organic Spectroscopy

Sample Test

Duration: 90 minutes

Attempt ALL questions. If you require correlation chart use the tabulated hereunder.

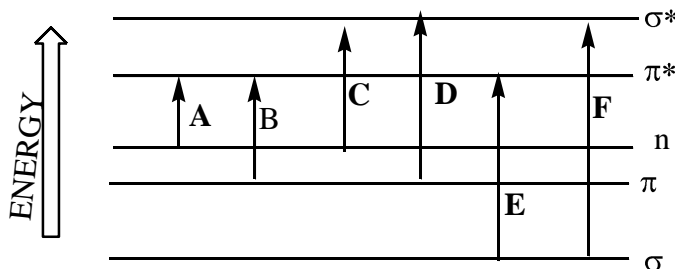
 λ_{\max} Base value x=H:207 nm x=R: 215 nm x=OH, OR :193 nm	Increments	IR values (cm^{-1})
	$\alpha \quad \beta \quad \gamma$ 10 12 18 : Alkyl group or ring residue 35 30 - : -OH 35 30 17 : OR 30 Extra conjugated double bond 5 Exocyclic nature of double bond	C=O 1750-1715 C-O 1300-1000 Alkanes (stretch) 3000-2850 CH ₃ (bend) 1450 and 1375 CH ₂ (bend) 1465 C-Cl 800- 600 O-H 3500-3200, br, s

Qn.1

- Dissect the word "Spectroscopy" to its *Latin* and *Greek* meaning.
- What is this technique for, to an organic chemist?
- List FOUR spectroscopic techniques based on their order (either way) on electromagnetic spectrum and give their basic application(s) in compound identification. What kind of spectrum (Emission or Absorption) do you expect from them?

Qn.2

- Study the figure below. Which among the transitions usually occur at wavelength greater than 200 nm?



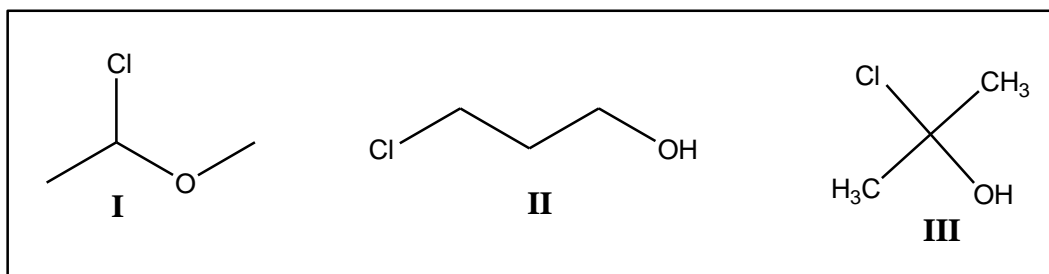
- The figure above represents typical vibrational transitions for an IR spectroscopy. Comment
- It is not necessary for a compound to have a permanent dipole moment to be infrared active. Explain briefly

Qn.3

- Predict the λ_{\max} for $\text{C}_2\text{H}_2\text{C}(\text{O})\text{CH}_3$. Calculate the frequency at that wavelength.
- What would be the chemical shift of a peak that occurs at 655.2 Hz downfield of TMS on a spectrum recorded using a 300 MHz spectrometer?

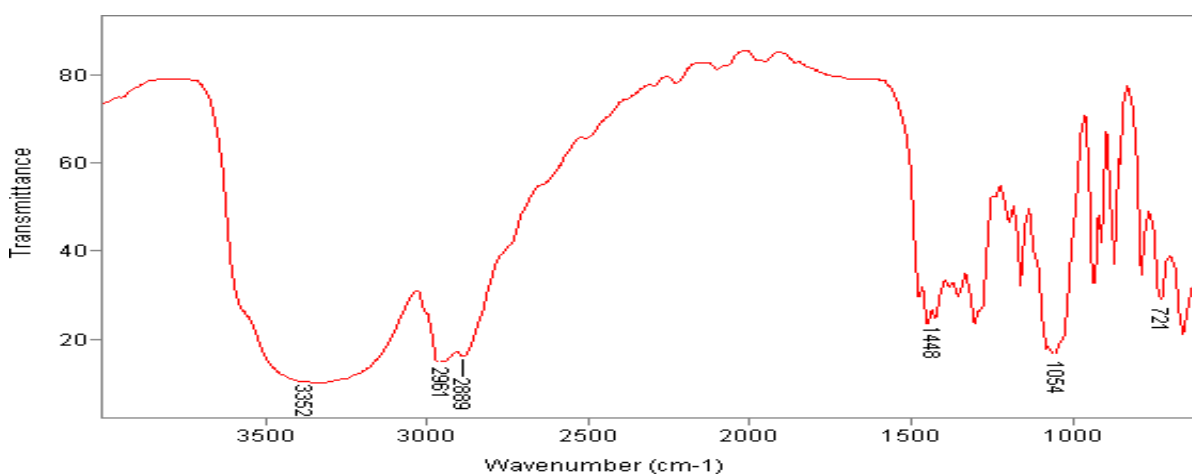
Qn.4

You are provided with isomers **I**, **II** and **III** of molecular formula $\text{C}_3\text{H}_7\text{OCl}$, and MW = 94 whose structures are as shown in page 2.



- Predict the number of signals in the $^1\text{H-NMR}$ spectrum of each isomer
- Which among these is UV active? Give reason.
- Which isomer best fit the IR and $^1\text{H-NMR}$ spectra given below?
- What is the ratio of areas of the signals in $^1\text{H-NMR}$ spectrum given?

IR spectrum



$^1\text{H NMR}$ spectrum, 400MHz, CDCl_3

