Course Chem 345 Lecturer Gellman

Day Wed Date 1/21/15

Notes Taken By C. Weatherly Total # of Pages 2

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- See handout for detailed course info.

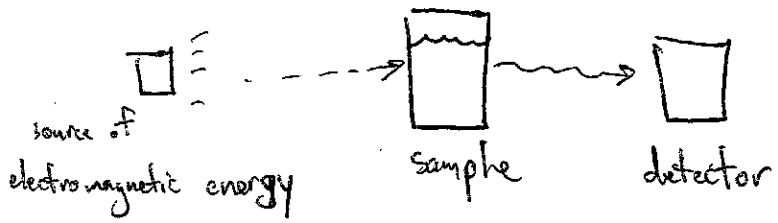
Chapter 12 (Partial: IR spectroscopy) : rec. problems: 7, 9-14, 22-27, 28a, 29, 31, 32

- Old methods for determining structure of organic molecules: elemental analysis, reactivity tests, compare to authentic samples → very difficult task!

- 20th century - spectroscopic methods simplify this task greatly! - Course focus: IR, NMR

## Infrared Spectroscopy (IR)

general spectroscopy:




Question: Which parts of the irradiating spectrum are absorbed?

→ insight into molecular structure

Different regions of EM spectrum provide different types of info about molecular structure

Visible light: $\lambda$ = 400 - 700 nm (violet - red)

UV light: $\lambda$ = 10 - 400 nm

IR light: $\lambda$ = 700nm − $10^6$ nm

(larger $\lambda$ → lower energy)

Note: UV-vis spectroscopy → electronic transitions in conjugated π-systems

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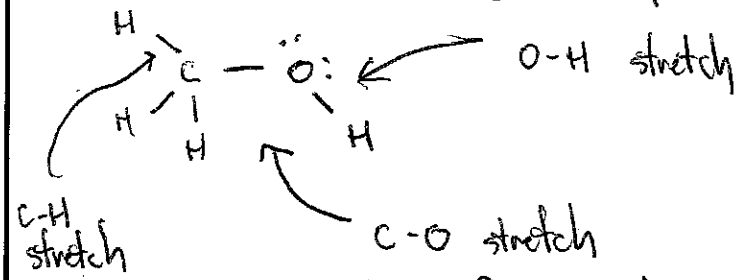
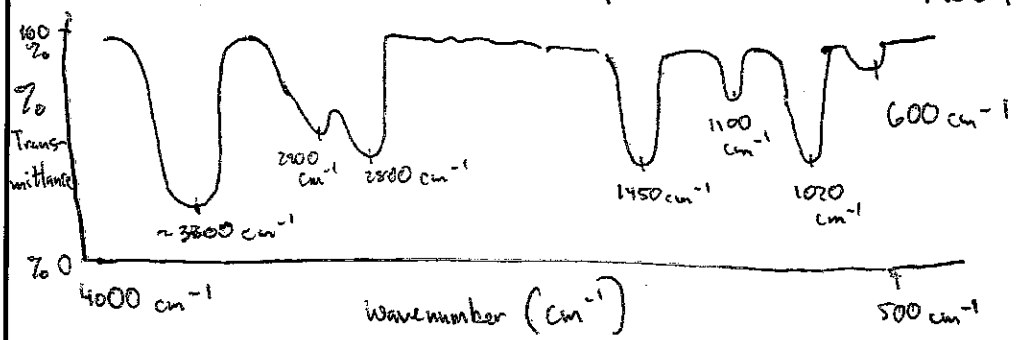
IR: molecular vibrations (internal motions of atoms within molecules)

Ex: methanol ($CH_3OH$); expect to see in IR




Also: more complex motions, see fig 12.8 in text

Sketch of IR spectrum for MeOH




Note: $\tilde{\nu}$ ≡ wavenumbers ($\tilde{\nu} = 1/\lambda$)

Interpretation of spectrum:

~3300 $cm^{-1}$ ⇒ O-H stretch

~2900 " ⇒ C-H "

~1020 " ⇒ C-O "

- Appendix 2 in text → IR "assignments" (Table 12.2)
  - learn to use table (included on exam)