

Course 345

Instructor Gellman

Day Wed

Date 1/22/2014

Notes Taken By Adams

Total # of Pages _____

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Chemistry 345 - Prof. Gellman

① 2 handouts (1 green, 1 white)

② Ch 12

Chapter 12: (Partial) - Infrared (IR) spectroscopy

Rec. problems: 7, 9-14, 22-27, 28a, 29, 31, 32

• Perspective: 2 major themes in this course

- structure of organic molecules
- reactivity of organic molecules

• Historical progression of structure-elucidation methods in organic chemistry:

① 19th/1st 1/2 of 20th century:

- elemental analysis (molecular formula)
- reactivity (ex: does molecule react with D_2/H_2 ?)
- comparison to authentic sample (m.p., b.p.)
- LOGIC

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② Mid 20th century: spectroscopic methods

- spectroscopy: absorption of EM radiation by a sample

Also: (a) Mass spectrometry ("weighing the molecule")

(b) Crystallography

③ future...?

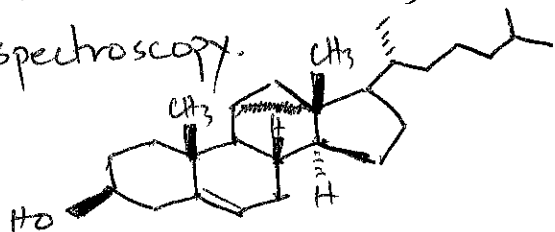
- Direct observation by atomic force microscopy?

• 2 most important spectroscopic methods for organic chemists:

- IR (chapter 12)

- NMR (chapter 13)

• Illustration: challenge of structure elucidation before spectroscopy.



cholesterol (a steroid)

1928 Nobel Prize Chemistry

- A. Windhaus

(originally misassigned the structure, didn't know the stereochemistry)

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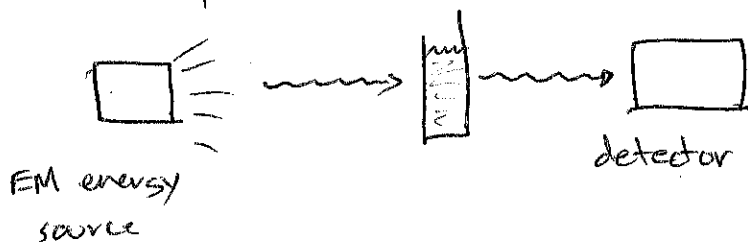
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- Spectroscopic measurement: which components (wavelengths) of the radiation pass through and which are absorbed?



- EM energy: classify by wavelength (λ)



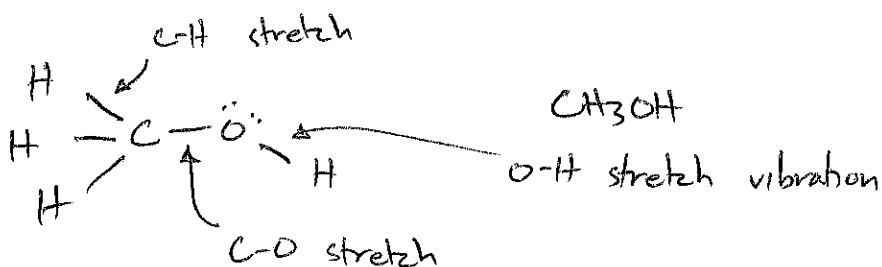
visible light: 400-700 nm

violet ← → red

IR: longer wavelength

- the IR range of EM radiation gives insight on molecular vibrations (types of bonds in a molecule)

Example:



see fig. 12.8 for more complex stretches

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