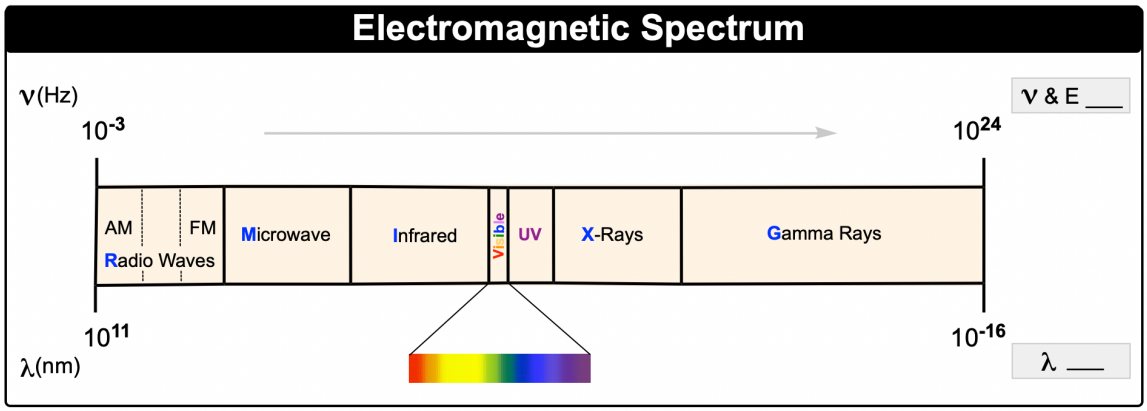
CONCEPT: THE UV-VIS SPECTROSCOPY

Electromagnetic Spectrum

- **Recall**: It represents a continuum of electromagnetic radiation containing _____ wavelengths and frequencies.
  - □ **Visible Light Region:** _____ nm to _____ nm
  - □ **UV Region:** _____ nm to _____ nm



MEMORY TOOL

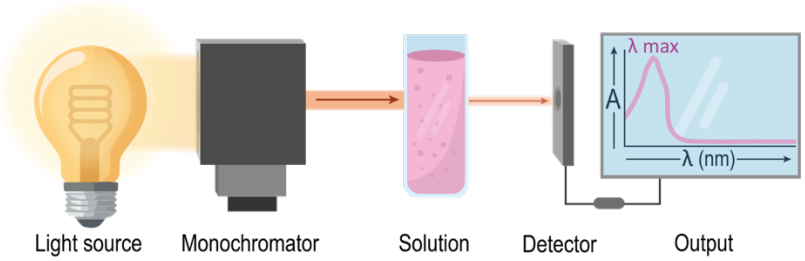
Rude Martians Invented Very Unusual X-Ray Guns

EXAMPLE: From the choices provided, which kind of electromagnetic radiation contains the lowest amount of energy?

a) Microwave b) X-Ray c) Gamma Rays d) Ultraviolet e) Infrared

UV-Vis Spectrum

- **UV Spectroscopy** is used to examine the electronic transitions of compounds with _____ pi bonds.
  - □ A spectrophotometer uses a **light source** that emits UV light at all wavelengths.
  - □ A **monochromator** **filters** the desired wavelength needed by the **solution** for absorption.
  - □ The absorption (A) is determined and plotted onto a **UV-Vis spectrum**.
    - Its prominent feature is _____ which is the wavelength of maximum absorption.



EXAMPLE: Which of the following compounds would produce a UV-Vis spectrum via spectrophotometer?

a) 1,4-cyclohexadiene b) 1,3-cyclobutadiene c) 1,4-cycloheptadiene d) cyclooctene

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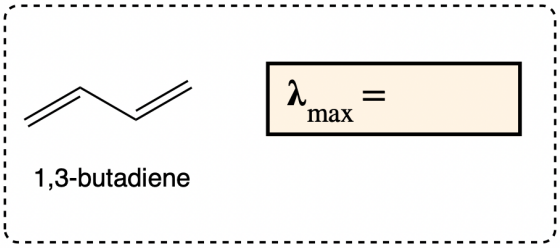
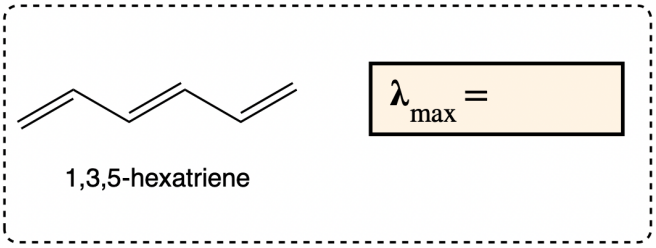
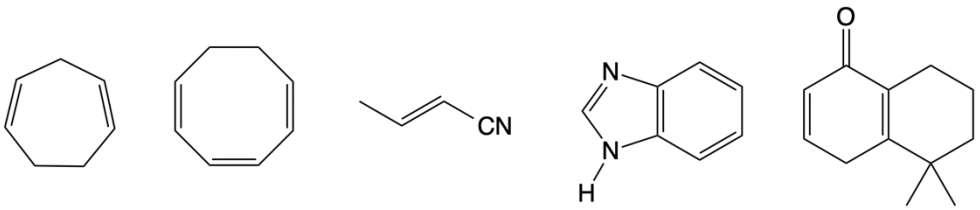
Conjugation and Lambda Max

- Only organic molecules with _____ ____ bonds will absorb on a UV-Vis spectrum.
  - □ ____ conjugation, ____ lambda max.





EXAMPLE: Which of the following compounds would you expect to show UV absorptions in the 200 to 400 nm range?



I II III IV V

a) I, II, IV b) I only c) II, IV, V d) II, III, IV e) II, III, IV, V

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PRACTICE: Which of the following compounds would you expect to show absorption in the portion of the electromagnetic spectrum that we can be visually seen without the use of equipment?

a) 1,3,5-hexatriene (λ_{max} = 256 nm)

b) Quinoline (λ_{max} = 313 nm)

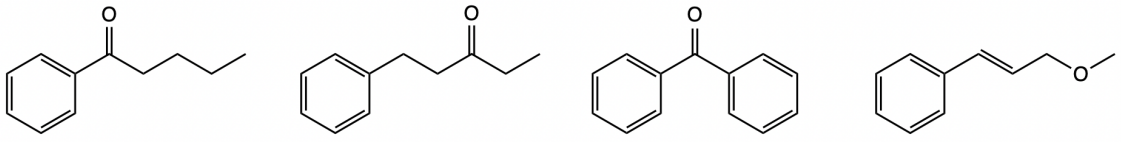
c) Lycopene (λ_{max} = 476 nm)

d) Acetone (λ_{max} = 274 nm)

e) 3-methylene-1-cyclohexene (λ_{max} = 230 nm)

PRACTICE: A compound with the formula $C_{11}H_{14}O$ has a λ_{max} of approximately 244 nm. Based on the given information, which of the following compounds is the likely identity of the compound?

1. IR Spectroscopy revealed a signal of 1710 cm^{-1}.
2. Reduction of the functional group at 1710 cm^{-1} created a chiral molecule.
3. Reduction of the functional group at 1710 cm^{-1} caused no change in the λ_{max} of the compound.



I II III IV

a) I only b) II and III c) I and III d) III and IV e) II only