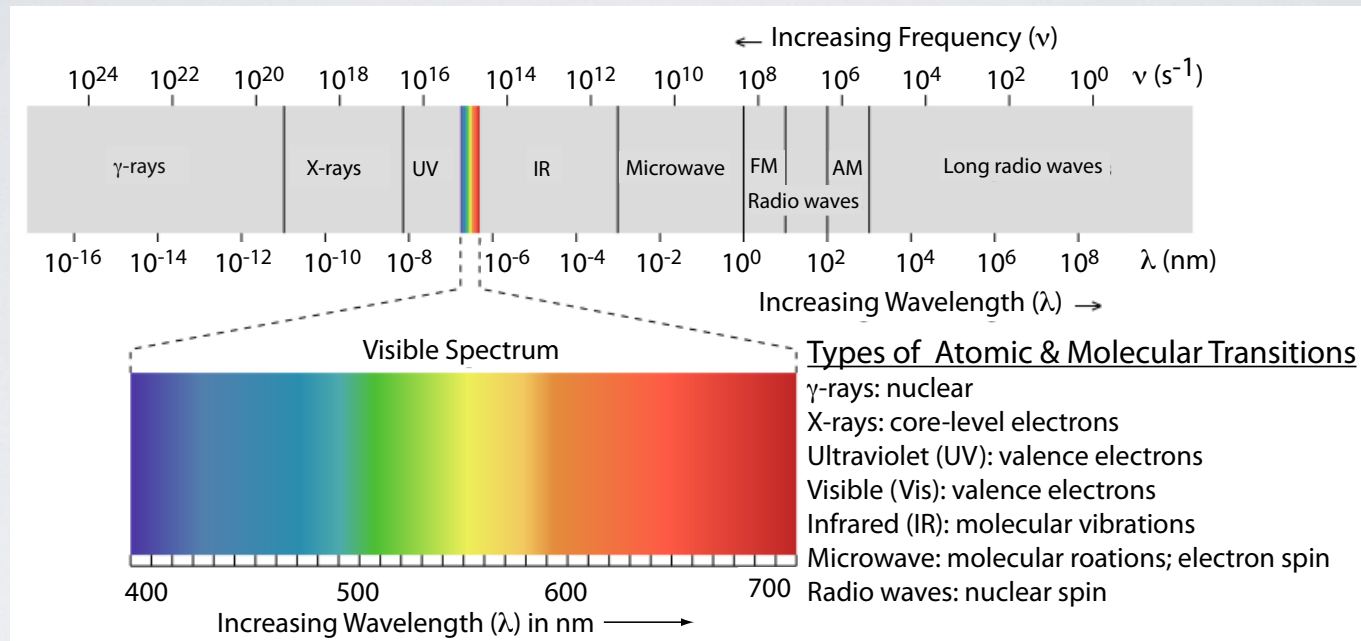


SPECTROSCOPY BASICS

SDSU CHEM 251

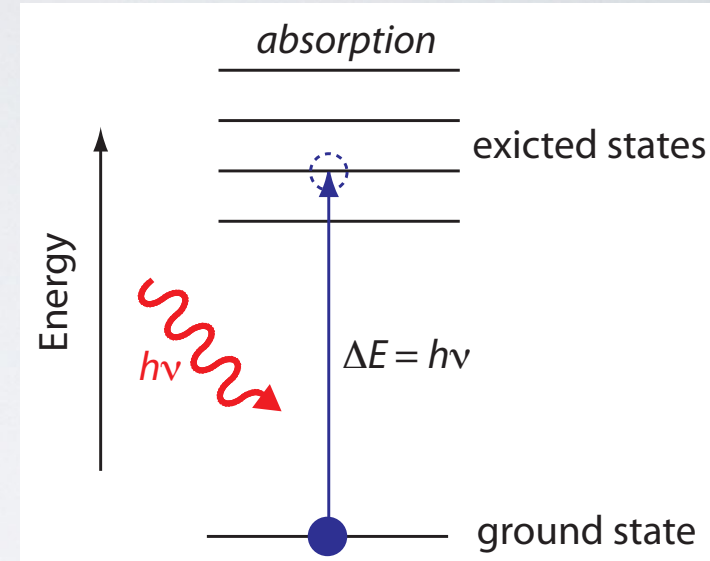
LIGHT AND MATTER



- Radiation is very capable of interacting with the electrons of atoms and molecules.
- Absorption of light is why some compounds have colors.
- Microwaves heat food by causing water molecules to rotate.

ABSORBANCE

- **Absorbance** occurs when the atom or molecule is capable of **intercepting a photon** of light and using the energy to **excite an electron**.
- Absorbance is limited by the need for an excited state with a corresponding energy level.
- Absorbance limits the number of photons of light (of a given wavelength) passing through, or reflecting off of a substance.



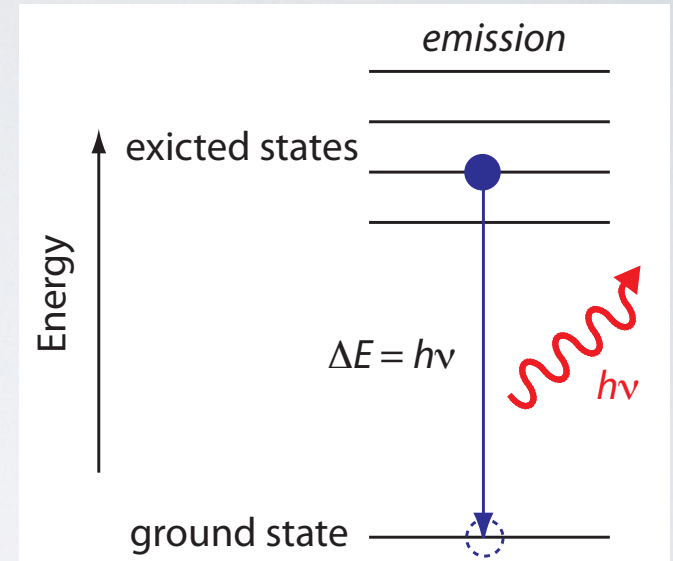
$$c = \lambda\nu$$

$$E = h\nu = \frac{hc}{\lambda}$$

$$h = 6.626 \times 10^{-32} \text{ J}\cdot\text{s}$$

EMMISSION

- **Emission** occurs when an atom or molecule with an electron in an excited state **emits a photon of light** as the electron relaxes to the ground state.
- The process generates light at a **wavelength corresponding to the energy difference** between the excited and ground states.
- Substances can have their electrons excited in a number of ways. The more excited electrons, the more light is given off by the substance.



$$c = \lambda\nu$$

$$E = h\nu = \frac{hc}{\lambda}$$

$$h = 6.626 \times 10^{-32} \text{ J}\cdot\text{s}$$

SPECTROSCOPY

- Spectroscopy aims to use changes in the intensity of light (either by absorption or emission) to quantify the amount of an analyte present.
- As the signal change is proportional to the concentration of the analyte, the system can be very effective at determining the amount of an analyte present.