

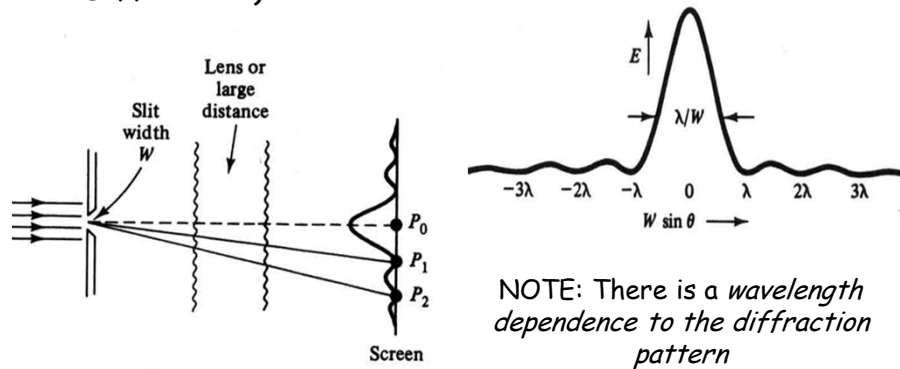
# February 10, 2012

➤ Solutions to old Exam #1 now online . . .

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## Fun with Diffraction!

■ Consider the following experiment (Fraunhofer Diffraction):

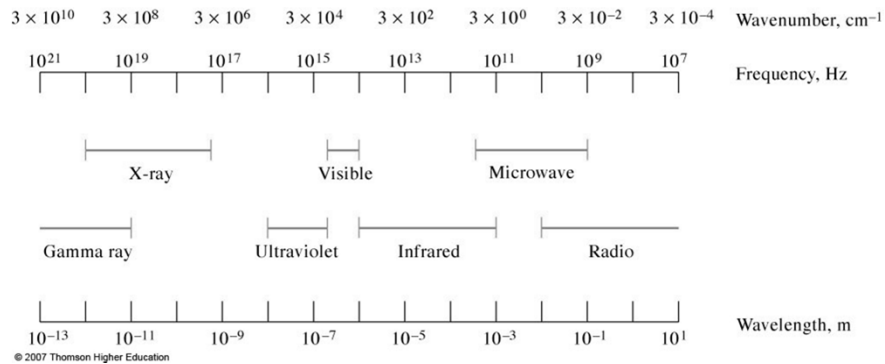


See: <http://hyperphysics.phy-astr.gsu.edu/hbase/phyopt/sinlit.html#c1>

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# The Electromagnetic Spectrum

- EMR covers a very *wide* range of wavelengths and frequencies:



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# EMR: Particle Properties

- Energy of a *photon* can be related to its frequency:

$$E = h\nu$$

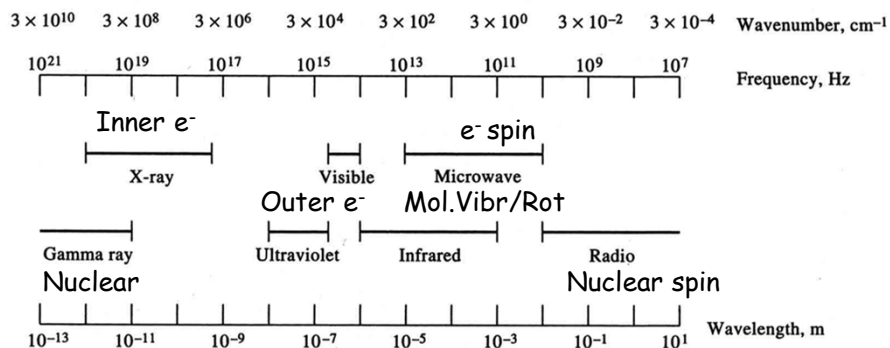
- Where  $h$  = Planck's Constant =  $6.626 \times 10^{-34}$  Joule-sec
- The photon energy is *inversely proportional* to the wavelength of the EMR:

$$E = hc/\lambda$$

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# Photon Energy: Absorption/Emission of EMR

- The EMR *ENERGY* determines which atomic/molecular properties can be probed via spectroscopy:



## Units

- Varies with the spectral region:

- UV/Visible

Wavelength:  $\text{\AA} = 10^{-8} \text{ cm} = 10^{-10} \text{ m}$   
 $\text{nm} = 10^{-7} \text{ cm} = 10 \text{ \AA}$   
 $\mu\text{m} = 10^{-4} \text{ cm} = 10^4 \text{ \AA}$

- Infrared (IR)

Wavelength:  $\mu\text{m}$

Wavenumber( $\bar{\nu}$ ):  $\bar{\nu} = \lambda^{-1}$  ( $\lambda$  in cm gives cm<sup>-1</sup>)

NOTE:  $\bar{\nu} \propto \text{Energy}$

# Jablonski Diagram

