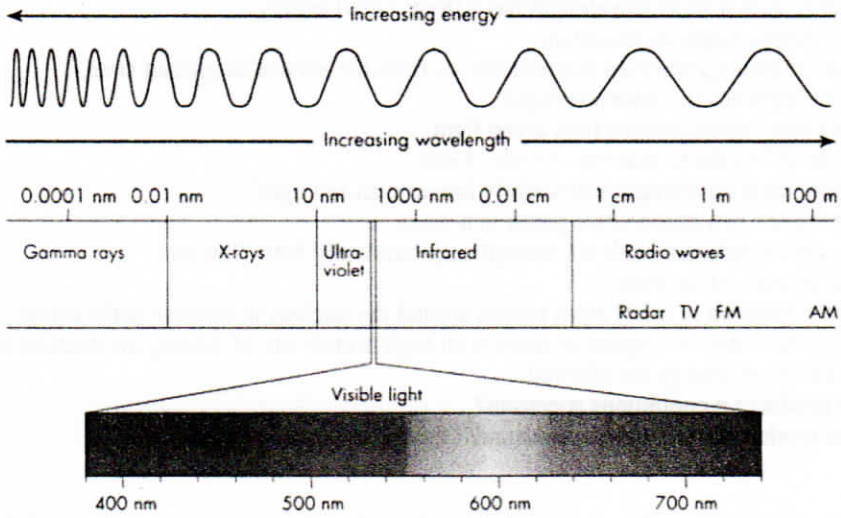
$c = \lambda\nu$ $\quad c = 3.00 \times 10^8$ m/s

$E = h\nu$ $\quad h = 6.626 \times 10^{-34}$ J·s

Rydberg Formula $\quad \frac{1}{\lambda} = R\left(\frac{1}{n_f^2} - \frac{1}{n_i^2}\right)$ $\quad R = 1.0974 \times 10^7\ m^{-1}$



1) Green light has a wavelength of about 522 nm. What is the frequency of green light?

$c = \lambda \cdot \nu$

$3.0\times10^8 \frac{m}{s} = 522\times10^{-9} m \cdot \nu$

$\nu = 5.75\times10^{14}$ Hz

2) What is the frequency of an AM radio wave?

$3.0\times10^8 \frac{m}{s} = 100\ m \cdot \nu$

$\nu = 3\times10^6$ Hz $= 3$ MHz

3) A photon has a frequency of 2.10×10^{14} Hz, what type of radiation is it?

$3.0\times10^8 \frac{m}{s} = \lambda \cdot 2.10\times10^{14}$ Hz, $\quad \lambda = 1.4\times10^{-6} m = 1400$ nm = INFRARED

4) How much energy is associated with the photon in question 3?

$E = h \cdot \nu = 6.626\times10^{-34} \frac{J}{Hz} \cdot 2.10\times10^{14}$ Hz $= 1.4\times10^{-19}$ J

5) A Columbus radio station broadcasts at a frequency of 99.7 MHz. (remember M = 10^6)

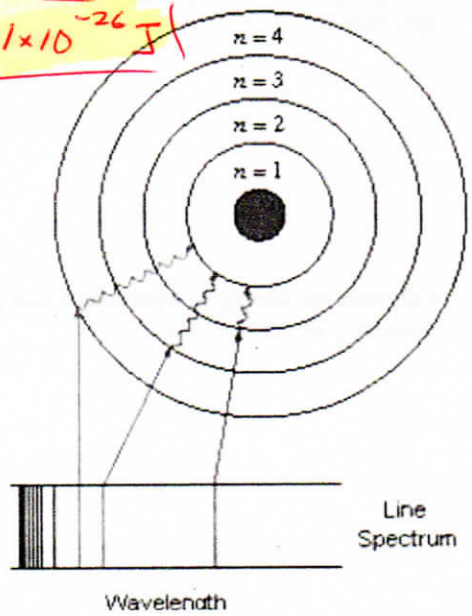
a.) What is its wavelength (in meters)?

$3.0\times10^8 \frac{m}{s} = \lambda \cdot 99.7\times10^6$ Hz, $\quad \lambda = 3.01$ m

b.) What is the energy of the wave?

$E = 6.626\times10^{-34}$ J/Hz $\cdot 99.7\times10^6$ Hz $= 6.61\times10^{-26}$ J

6) The diagram at right shows the first four energy levels associated with the hydrogen atom.



a) What color of light would be produced by an electron as it falls from the 4th to the 1st energy level? How much energy is released?

$\frac{1}{\lambda} = 1.0974\times10^7 \frac{1}{m}\left(\frac{1}{1^2} - \frac{1}{4^2}\right) = 1.03\times10^7\ m^{-1}$

$\frac{1}{\lambda} = 1.03\times10^7\ m^{-1}$, $\quad \lambda = 9.72\times10^{-8} m = 97.2$ nm

ULTRAVIOLET