

## EM Spectrum Calculations – Day 1

### Relationship between wavelength and frequency:

1. Ultraviolet radiation has a frequency of  $6.8 \times 10^{15}$  Hz. Calculate the wavelength.
2. A certain substance strongly absorbs infrared light having a wavelength of 6,500 nm. Calculate the frequency in Hz of this light?
3. The frequency of light is known to be  $4.8 \times 10^{14}$  Hz. Is this light visible?
4. What part of the EM spectrum would a wave with a frequency of  $9.1 \times 10^{12}$  Hz be a part of?
5. If a photon had a wavelength of  $5.1 \times 10^{-7}$  m would it have a color?

### Writing:

In your own words describe how frequency and wavelength relate to each other and if we are given one how do we calculate the other? Be sure to address the different units we may see for wavelength.

### Relationship between Energy and frequency:

1. Calculate the energy (E), in J/photon of a beam of light with a frequency of 20 Hz. (Use the equation:  $E = h\nu$ ) Planck's constant =  $6.626 \times 10^{-34}$  J\*s
2. Find the energy of microwave radiation with a frequency of  $7.91 \times 10^{10}$  Hz.
3. Calculate the frequency of a beam of light if the energy level is  $4.32 \times 10^{-4}$  J.
4. What is the frequency of UV light that has an energy of  $2.39 \times 10^{-18}$  J?

### Writing:

Energy and frequency are directly related. If we are given one of the variables how do we mathematically solve for the other?

### Relationship between energy and wavelength:

1. If one photon of visible light has  $3.616 \times 10^{-19}$  J of energy, what color is it?
2. If the energy of a photon of light is  $5.35 \times 10^{-13}$  J calculate the wavelength of the particle of light?
3. A ruby laser produces red light that has a wavelength of  $50.0 \times 10^{-7}$  m. Calculate its energy in joules.
4. Calculate the energy of a photon of radiation with a wavelength of  $6.4 \times 10^{-7}$  nm.

### Writing:

In your own words describe how energy and wavelength relate to each other and if we are given one how do we calculate the other? Be sure to address the different units we may see for wavelength.



EM Spectrum Calcs with Writing - Key  
<http://tinyurl.com/doolan213>