

Electromagnetic Spectrum Practice – Level 2

Please answer the questions below. These questions will test your understanding of the mathematical relationships between energy, frequency, and the wavelength of light.

1. Two chemical are burning in a fire. One chemical is emitting a green flame and the second chemical is emitting a blue flame.
 - a. Which chemical absorbed more energy from the flame?
 - b. Which color flame contains the greatest amount of energy?
 - c. Which flame has the lowest wavelength?
2. You are studying two light emitting chemicals. You would like to know which chemical emits light at the highest energy. You have determined the wavelengths to be 567nm and 750nm.
 - a. Which wavelength of light has the highest energy?
 - b. Which wavelength has the highest frequency?

Please calculate the wavelength, frequency, and energy of light using Planck's constant and the speed of light for the following problems. You must show all of your work to get credit!

A. $c = \lambda f$

B. $E = h f$

C. $E = \frac{h c}{\lambda}$

Constants: Planck's constant = $6.63 \times 10^{-34} \text{ J} \cdot \text{s}$

Speed of light (c) = $3.00 \times 10^8 \text{ m/s}$

1. Ultraviolet radiation has a frequency of $6.8 \times 10^{15} \text{ Hz}$. Calculate the wavelength.
2. Find the energy of microwave radiation with a frequency of $7.91 \times 10^{10} \text{ Hz}$.
3. A sodium vapor lamp emits light photons with a wavelength of $5.89 \times 10^{-7} \text{ m}$. What is the energy of the light?
4. A ruby laser produces red light that has a wavelength of $50.0 \times 10^{-7} \text{ m}$. Calculate its energy in joules.
5. What is the frequency of UV light that has an energy of $2.39 \times 10^{-18} \text{ J}$?
6. What is the wavelength of light with an energy of $1.4 \times 10^{-21} \text{ J}$?