

General Chemistry
Mr. MacGillivray
Worksheet:
Light and Quantum Theory

1. Arrange the seven types of electromagnetic radiation that we discussed in class in order of **DECREASING** energy:
 - a. _____ (highest E)
 - b. _____
 - c. _____
 - d. _____
 - e. _____
 - f. _____
 - g. _____ (lowest E)

2. In the list above, use words and arrows to indicate how the wavelength and frequency are changing.

3. Repeat #1 and #2 with the colors of the visible spectrum.
 - a. _____ (highest E)
 - b. _____
 - c. _____
 - d. _____
 - e. _____
 - f. _____
 - g. _____ (lowest E)

4. "If the wavelength of light is very short, then the energy is very _____ and the frequency is very _____."

5. "If the wavelength of light is very long, then the energy is very _____ and the frequency is very _____."

6. Wavelength and frequency are _____ly related. Energy and frequency are _____ly related.

7. Energy is measured in these units: _____.
8. Wavelength is measured in these units: _____.
9. Frequency is measured in these units: _____, also written as _____ or _____.
10. Convert the following wavelengths to nm:
 - a. $\lambda = 513 \text{ m}$

 - b. $\lambda = 8.03 \times 10^{-6} \text{ m}$

11. Convert the following wavelengths to m:
 - a. $\lambda = 755 \text{ nm}$
 - b. $\lambda = 0.272 \text{ nm}$
12. Find the energy of a photon of light with a frequency of $5.22 \times 10^{21} \text{ 1/s}$.
13. Find the energy of a photon of light with a wavelength of 425 nm .
14. Find the wavelength of light with a frequency of $5.28 \times 10^{15} \text{ s}^{-1}$.
15. Using p. 299, answer these questions:
 - a. Is the light in question #9 visible?
 - b. How did you know?
 - c. Is it too high in energy or too low in energy to be seen?
 - d. What type of light is it (what region of the electromagnetic spectrum)?