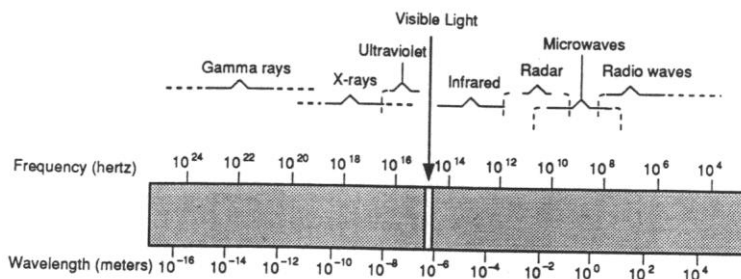


Name: _____

Hour: _____ Date: _____

Chemistry: *Light Problems*



Directions: Solve the following problems. Show proper set-up, work, and units for full credit. Box in your final answer.

1. A wave has a frequency of 22 Hz and a wavelength of 4.0 m. What is its velocity?
2. What is the frequency of a wave if its wavelength is 3.6×10^{-9} m and its velocity is 3.0×10^8 m/s?
3. As you move across the continuous spectrum from red to violet, what happens to...
 - a. wavelength?
 - b. frequency?
4. A beam of microwaves has a frequency of 1.0×10^9 Hz. A radar beam has a frequency of 5×10^{11} Hz. Which type of radiation...
 - a. has the longer wavelength?
 - b. is nearer to visible light in the electromagnetic spectrum?
 - c. is closer to X-rays in frequency value?
5. A bright line spectrum contains a line with a wavelength of 518 nm. Determine...
 - a. the wavelength, in meters. (Hint: 1×10^9 nm = 1 m)
 - b. the frequency.
 - c. the energy.
 - d. the color of the line.

6. A photon has an energy of 4.00×10^{-19} J. Find...
- the frequency of the radiation.
 - the wavelength of the radiation.
 - the region of the electromagnetic spectrum that this radiation represents.
7. A photon of light has a wavelength of 3.20×10^5 m. Find...
- the frequency of the radiation.
 - the energy of the photon.
 - the region of the electromagnetic spectrum that this radiation represents.
8. Determine the frequency of light with a wavelength of 4.257×10^{-7} cm.
9. How many minutes would it take a radio wave with a frequency of 7.25×10^5 Hz to travel from Mars to Earth if the distance between the two planets is approximately 8.0×10^7 km?
10. Cobalt-60 is an artificial radioisotope that is produced in a nuclear reactor for use as a gamma-ray source in the treatment of certain types of cancer. If the wavelength of the gamma radiation from a cobalt-60 source is 1.00×10^{-3} nm, calculate the energy of a photon of this radiation.

Selected Answers: 1. 88 m/s 5a. 5.18×10^{-7} m 5c. 3.84×10^{-19} J 6b. 4.97×10^{-7} m 7b. 6.21×10^{-31} J 9. 4.4 minutes
 2. 8.3×10^{16} Hz 5b. 5.79×10^{14} Hz 6a. 6.03×10^{14} Hz 7a. 938 Hz 8. 7.047×10^{16} Hz 10. 1.99×10^{-13} J