

Chemistry – Unit 11 Worksheet 1

The Electromagnetic Spectrum

$$c = \lambda f$$

$$E = h f$$

λ = wavelength

f = frequency (cycles per second)

$1/s$, s^{-1} or Hertz (Hz),

c = speed of light (and all electromagnetic radiation)

$$c = 3.00 \times 10^8 \text{ m / s}$$

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

1nm (nanometer) = $1 \times 10^{-9} \text{ m}$

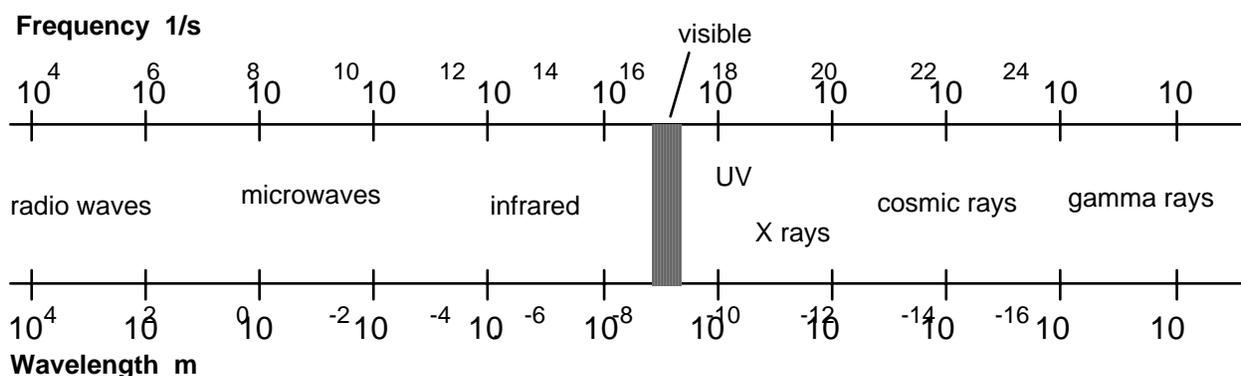
1. The wavelength of the green light from a traffic signal is 5.22×10^{-7} meters. What is the frequency of this radiation?
2. The blue color of the sky results from the scattering of sunlight by air molecules. The blue light has a frequency of about 7.5×10^{14} Hz. What is the wavelength of this radiation?
3. FM radio station KDKB broadcasts at 93.3 MHz (1 megaHertz = 10^6 Hz). What is the length of waves broadcast by this station?
4. Radio waves in the AM region of the spectrum have frequencies in the range of 550 to 1400 kilocycles per second (kHz). What frequency on your tuner would you find a station that broadcasts a signal with a wavelength of 229 meters?

5. Microwaves have frequencies in the range 10^9 to 10^{12} /s (cycles per second.) What is the wavelength of radiation in your microwave oven whose frequency is 2.40×10^{10} /s.?

6. Yellow colors in fireworks are due to the 589 nm (5.89×10^{-7} m) radiation of sodium ions. How much energy is given off by one photon of sodium? By one mole of photons?

7. What is the relationship between frequency and wavelength of electromagnetic radiation?

8. What do we mean when we say that energy of light is quantized?



1. The speed of light is _____ meters per second.
2. All waves can be described in terms of their amplitude, wavelength, and _____.
3. A beam of blue light has a wavelength of 475 nm. Its frequency is _____.
4. Early in the twentieth century, scientists found that light has the characteristics of both waves and _____.
5. The _____ of a wave is the number of complete waves passing a fixed point in a given time.
6. The wavelength of microwave radiation is (greater, less than) the wavelength of visible light.
7. The color of visible light that has the longest wavelength is _____.
8. A heat lamp produces _____ radiation.
9. A wave with a high frequency has a (short, long) wavelength.
10. The brightness of light depends on the _____ of the light wave.

	Type of Radiation	Description of Wave
----->Increasing Wavelength	_____	These waves have a long wavelength, low frequency and low energy.

	_____	These are colors of the visible spectrum; wavelengths are between 700 and 400 nm

	_____	These waves have a short wavelength, a high frequency and high energy

