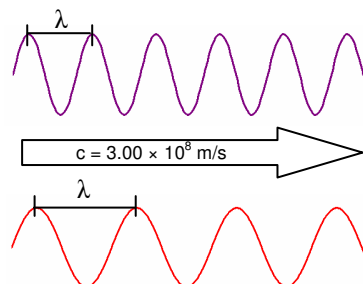


# Light Waves

## Chem Worksheet 5-1

Name \_\_\_\_\_

The behavior of light indicates that it is comprised of waves. The distance between successive waves is called the **wavelength** ( $\lambda$ ) and the wavelength determines the type of light. The size of the waves determines the type of light. All of the various light waves move with the same speed, a value abbreviated ( $c$ ) equal to  $3.00 \times 10^8$  m/s. The **frequency** ( $\nu$ ) that light waves pass a given point is measured in waves/second or simply 'per second' (1/s). The unit 1/s is also given the name hertz (Hz).



**Violet Light**  
Shorter wavelength ( $\lambda$ )  
and higher frequency ( $\nu$ )

**Red Light**  
Longer wavelength ( $\lambda$ )  
and lower frequency ( $\nu$ )

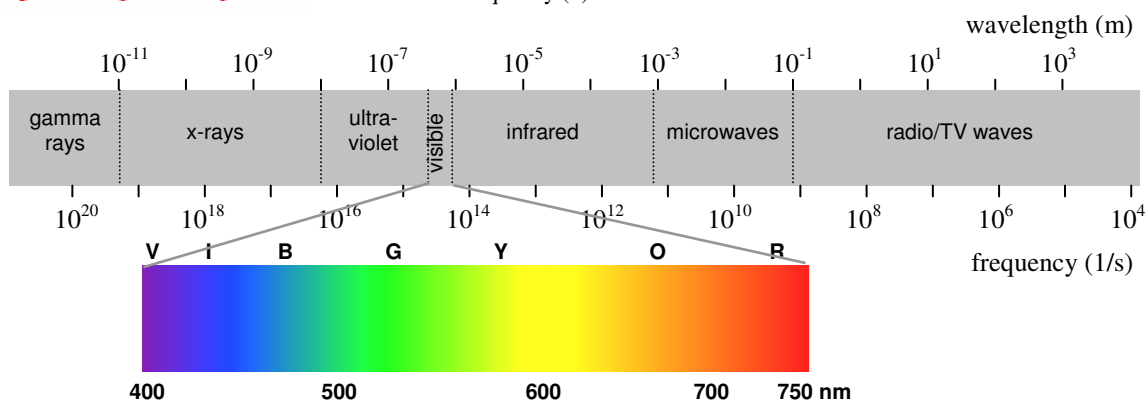
### useful equations

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

$$1 \text{ m} = 1 \times 10^3 \text{ mm} \quad 1 \text{ m} = 1 \times 10^9 \text{ nm}$$

$$1 \text{ m} = 1 \times 10^6 \text{ } \mu\text{m} \quad 1 \text{ m} = 1 \times 10^{10} \text{ } \text{\AA}$$

$$1 \text{ MHz} = 1 \times 10^6 \text{ Hz} \quad 1 \text{ GHz} = 1 \times 10^9$$



### Answer the following questions about light waves. Show all work

- What type of light has a wavelength of: a)  $5.0 \times 10^{-4}$  m? b)  $2.4 \times 10^{-8}$  m? c) 12 mm?
- An ultraviolet light wave is used to kill bacterial. It has a frequency of  $1.2 \times 10^{15}$  1/s. Find the wavelength.
- An x-ray has a wavelength of  $1.54 \times 10^{-10}$  m. Find the frequency of this light.
- A visible light wave has a frequency of  $7.5 \times 10^{14}$  1/s. Find the wavelength in nanometers (nm) and determine the color of the light.
- One of the light waves produced when hydrogen is energized has a wavelength of 410.5 nm. What is the frequency of this light?
- The frequency of light used to heat food in a microwave oven is 2.45 GHz ( $2.45 \times 10^9$  1/s). What is the wavelength of this light?
- A radio wave broadcast on the AM dial has a wavelength of 280.4 m. Find the frequency of this radio wave in hertz. Convert the frequency to kilohertz.
- What is the wavelength of a radio wave broadcast with a frequency of 99.5 MHz (FM 99.5)?
- Pilots often use waves of about 2.340 m to communicate. What is the frequency of this wave?
- The light used in night vision devices has a wavelength of about 25 micrometers ( $\mu\text{m}$ ). What is the frequency of this light? In what part of the electromagnetic spectrum are these waves?