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## Worksheet

1. A photon has a frequency (ν) of 2.68 x 106 Hz. Calculate its energy.

Ans: E = 1.78 x 10-27 J

1. Calculate the energy (E) and wavelength (λ) of a photon of light with a frequency (ν)

of 6.165 x 1014 Hz. Ans: E = 4.1 x 10-19 J λ = 4.87 x 10-7 m

1. Calculate the frequency and the energy of blue light that has a wavelength of 400 nm

(h = 6.62 x 10-34 J-s). Ans: ν = 7.5 x 1014 Hz E = 4.97 x 10-19 J

1. Calculate the wavelength and energy of light that has a frequency of 1.5 x 1015 Hz.

Ans: λ = 2.0 x 10-7 m E = 9.95 x 10-19 J

1. A photon of light has a wavelength of 0.050 cm. Calculate its energy.

Ans: E = 3.98 x 10-22 J

1. Calculate the number of photons having a wavelength of 10.0 μm required to produce 1.0 kJ of energy. Ans: 5.0 x 1022 photons
2. Calculate the total energy in 1.5 x 1013 photons of gamma radiation having λ = 3.0 x 10-12 m.

Ans: 1.0 J

1. Calculate the energy and frequency of red light having a wavelength of 6.80 x 10-5 cm.

Ans: E = 2.92 x 10-19 J ν = 4.4 x 1014 Hz

1. The wavelength of green light from a traffic signal is centered at 5.20 x 10-5 cm. Calculate the frequency.

Ans:λ = 5.77 x 1014 Hz.

1. Calculate the frequency of light that has a wavelength of 4.25 x 10-9m. Identify the type of electromagnetic radiation. Ans:ν = 7.1 x 1016 Hz. UV radiation

Equations and constants:

E = hν and E = hc/λ E = energy of one photon with a frequency of ν

c = λν c/λ = ν c = speed of light = 3.0 x 108 m/s (meters per second)

h = Planck’s constant = 6.63 x 10-34 J-s

λ = wavelength in meters

ν = frequency in Hz (waves/s or 1/s or s-1)