

Practice with Light

1. Rank the following photons in order of increasing energy.
 - a. Blue (475 nm)
 - b. Radio (0.50 m)
 - c. X-ray (1.50 nm)
 - d. Radio (106.3 MHz)
 - e. Yellow (584 nm)
 - f. Red (720 nm)

2. The human eye has a peak sensitivity at 555 nm. General Electric wants to design a light bulb that will produce thermal radiation that peaks at this wavelength. How hot will the light bulb's filament need to be heated?

Ans:

3. The heating element on an electric stove can reach a maximum temperature of about 500 degrees Fahrenheit (530 K). What peak wavelength of light does this temperature correspond to? Can you see the thermal radiation that is produced?

Ans:

Ans:

4. At Uncle Jim's cookout, a coal falls out of the grill and is glowing red. You predict the peak wavelength of the thermal radiation to be about 700 nm. How hot is the coal?

Ans:

5. An ice cube has a temperature of about 32 degrees Fahrenheit (273 K). Does the ice cube emit thermal radiation? If so, what is the peak wavelength of this radiation? What kind of electromagnetic radiation is this?

Ans:

Ans:

Ans:

6. In a green glow stick, electrons in fluorescent molecules are excited by chemical reactions, and then fall back down to the ground state. In the process, a green photon may be emitted. If the wavelength of the green photon is 502 nm, what is the difference in energy levels that the electron fell through?

Ans:

7. In the neon sign displayed in front of her bike shop, excited electrons fall from a high energy level of 18.3 eV to a lower energy level of 16.57 eV.
(a) What is the energy of the photon produced by this transition?

(b) What is the wavelength of the photon?

(c) Is it visible to human eyes? If so, what color is it?

(d) Other possible energy levels for the electron to be in are 19.5 eV and 16.79 eV. What is another possible energy and wavelength of a photon emitted by the neon sign? (Show your work.)