Ch 7: Electromagnetic Radiation

November 10, 2022

Electromagnetic Radiation

1) An electron in a hydrogen atom is excited with electrical energy to an excited state with n = 2. The atom then emits a photon. What is the value of n for the electron following the emission?

2) Calculate the frequency and energy of each wavelength of electromagnetic radiation. For each, what is the energy for 1 mole of photon? ($N_A = 6.022 \times 10^{23}$ photon/mol)

a) 632.8 nm (wavelength of red light from helium–neon laser)

b) 503 nm (wavelength of maximum solar radiation)

c) 0.052 nm (wavelength contained in medical X-rays)

d) 2.97 m (wavelength for FM radio station)

3) What is the frequency of light that is composed of photons that each has a nenergy of 1.99×10^{-25} J? What type of electromagnetic radiation is this?

4) Which transition in the hydrogen atom results in emitted light with the longest wavelength? Explain. Sketch the relative energy levels in the hydrogen atom.

a) $n = 2 \rightarrow n = 1$

b) $n = 4 \rightarrow n = 3$

c) $n = 3 \rightarrow n = 2$

Electron Configurations

5) Write the electron configuration for the following atoms: As, Se, Mg, Na, Ba, Sb, I

6) Write the electron configuration for each ion: O^{2-}, Br^{-}, Sr^{2+}, Co^{3+}. Cu^{2+}, Cl^{-}, P^{3-}, K^{+}, Mo^{3+}, and V^{3+}