Extra Problems for Chapter 3

Given information:

1 amu = 1.66×10^{-24} grams
speed of light (c) = 3.00×10^{8} m/sec
h = 6.63×10^{-34} J·sec

1. What is the mass of the average potassium atom in grams?

2. A specific isotope of silicon has a mass of 4.814×10^{-23} g. What is its mass in amu? Is this the most abundant isotope of silicon?

3. How many protons, neutrons, and electrons are in an ^{40}Ar atom?

4. An atom has 35 protons, 45 neutrons, and 35 electrons. What is its symbol (including the mass number)?

5. Light has a wavelength of 34.4 nm. What is its wavelength (in meters) and its frequency?

6. Yellow light has a frequency of 5.1×10^{14} Hz. What is its wavelength?

7. A photon has a frequency of 5.94×10^{19} Hz. What is its energy?

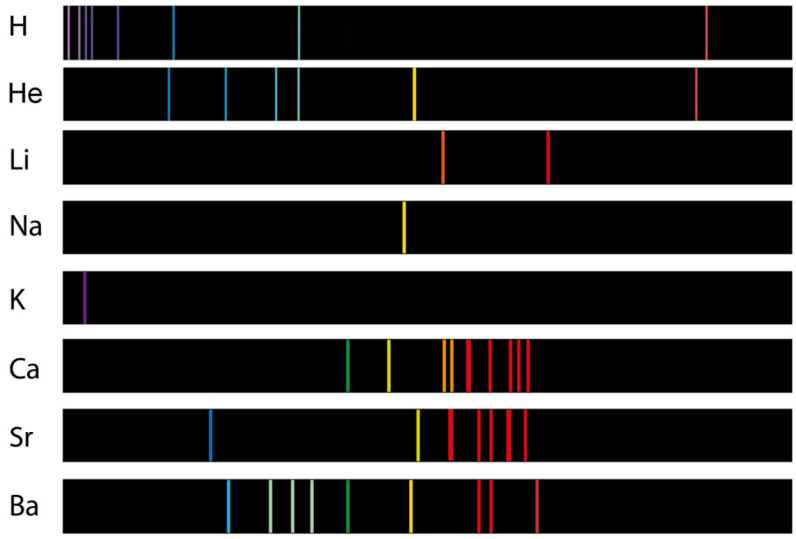
8. A photon has an energy of 4.9×10^{-15} J. What is its frequency?

9. A photon has a wavelength of 94 nm. What energy does the photon have?

10. The electron of a hydrogen atom is in the n = 1 orbit. It absorbs light with a wavelength of 103 nm and jumps to the n=3 orbit. If the electron of another hydrogen atom is in the n = 3 orbit, what wavelength of light must it emit to get to its ground state?

11. The electron of one hydrogen atom moves from the n = 4 orbit directly to its ground state. The electron in another hydrogen atom moves from the n = 6 orbit directly to its ground state. Which electron released a photon with the longer wavelength? Which released a photon with the higher frequency?

12. Consider the emission spectra shown below:



If a mixture of two elements has the following emission spectrum:

What two elements are in the mixture?