AT Chemistry

Name

Atomic Spectroscopy Prelab

1. Name the colors of visible light, beginning with that of highest energy.

2. Distinguish between absorption and emission of energy in the hydrogen atom.

3. A system proposed by the U.S. Navy for underwater submarine communication called ELF (for extremely low frequency") operates with a frequency of 76 Hz. What is the wavelength of this radiation in meters? In miles? (1 mile = 1.61 km)

4. What is the energy in joules of the frequency in question 3?

5. Red and green light have wavelengths of about 650 nm and 490 nm, respectively. Which light has the higher frequency, red or green? Which light has the higher energy, red or green?

6. Copper emits radiation at 324 nm. Could a spectroscope be used to detect this emission? Explain.

- 7. If boron emits radiation at 518 nm, what color will boron impart to a flame?
- 8. From the wavelengths and colors given for the mercury emission spectrum in this experiment, draw a representation of the mercury emission spectrum as it would appear on the scale of a spectroscope.

9. Use the Rydberg equation to calculate the wavelength, in nm, for the following hydrogen atom electronic transitions:

(a) n = 4 to n = 1

(b) n = 4 to n = 2

(c) n = 4 to n = 3

- 10. Based on the calculated wavelengths in question 9 and the wavelength ranges of the electromagnetic spectrum illustrated in the lab (page 1), in which region of the spectrum would each of these transitions occur?
 - (a) n = 4 to n = 1
 - (b) n = 4 to n = 2
 - (c) n = 4 to n = 3

State two additional electronic transitions for hydrogen atoms that produce emissions in the visible region.

Wavelengths of Visible Spectrum

Wavelength (nm)	Color
400 - 420	violet
420 - 490	blue
490 - 570	green
570 - 590	yellow
590 - 650	orange
650 - 700	red