STATION # 1

$$\lambda \nu = c$$

1. Use the equation above to solve the following problems. Each member of the group take one problem, then walk the others through your solution step by step.

a) What is the frequency of ultraviolet light with a wavelength of 2.64 x 10*-8m?

b) What is the wavelength of gamma ray electromagnetic radiation with a frequency of 2.93 x 10*20 Hz?

c) Calculate the wavelength of yellow light emitted by a sodium lamp with a frequency of 5.15 x 10*14 Hz.

d) What is the wavelength of radiation with a frequency of 1.50 x 10 *13 Hz?

STATION # 2

$$\Delta E = hc/\lambda$$

1. Use the equation above to calculate the energy change involved when light is emitted at the following wavelengths:

a) 510 nm

b) 400 nm

c) 570 nm

d) 660 nm

2. Each member of the group should solve one of the problems above and then walk the others through your solution step by step.

STATION # 3

1. Which principal quantum number describes the electron's spin? What is the symbol for it? What are the possible values?

2. Write the quantum numbers for the first electron in the 4s orbital of a calcium atom.

3. Write the electron configuration for the element whose last electron has the following quantum numbers:

   (3, 1, 0, +1/2)

4. When L = 3, what are the possible values of m_l ?

STATION # 4

1. When writing the electron configuration for an element, identify the following:

a) the "coefficient"
b) the "letter(s)"
c) the "superscript"

2. Write the complete electron configuration for the first 18 elements. Use one piece of scrap paper for the group and each person in the group take a turn writing a configuration while the others monitor and guide.

STATION # 5

1. What is an "orbital box diagram"?

2. What are the basic rules that must be followed when constructing one, and when filling with electrons?

3. What symbols do we use for electrons when filling an Orbital Box diagrams?

4. On one piece of scrap paper for the group, take turns constructing orbital box diagrams for elements # 1, 3, 5, 6, 9, 11, 13, and 15.

STATION # 6

1. As a group, construct a definition of the following:
   a) Hund's Rule

   b) Heisenberg Uncertainty Principle

   c) Pauli Exclusion Principle

2. As a group, construct an explanation of the primary differences between the Bohr Model of atomic structure and the Quantum Mechanical Model of atomic structure.

3. Be sure to include the difference an "orbit" and an "orbital".

STATION # 7

1. **What is represented by the "Principal Quantum Number"?**

2. **What are the four letters which correspond to the four possible "shapes" of orbitals?**

3. **What orbitals are in the following energy levels:**

   1st Level:
   2nd Level:
   3rd Level:
   4th Level:

4. **How can we use "Noble Gas shorthand/abbreviation" to write the electron configurations of the following elements:**

a) Mg
b) F
c) Ca
d) Ti

5. **What is the "Aufbau" method, what does it loosely translate to, and why are Chromium and Copper exceptions to it? Are they the only exceptions?**

STATION #8

1. Following Aufbau, Pauli, and Hund, write the electron configuration that you would EXPECT for chromium.
2. Now—write what the electron configuration for chromium ACTUALLY is.
3. Explain why chemists believe this exception to Aufbau occurs.

4. Repeat #1-3 above for Copper.