I. Electron Configuration

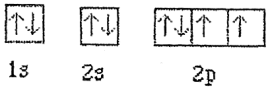
II. Prelab

In 1911 Rutherford proposed our present view of the nuclear atom. His model described the atom as having a very small nucleus containing most of the mass and all of the atom's positive charge. Bohr proposed that negatively charged electrons were distributed around the nucleus at great distances giving an atom a volume which was mostly empty space.

Schrodinger developed a theory describing the most likely location of electrons around the atom. Using the results of this theory, a method was developed for writing electron configurations. Whole numbers (1, 2, 3) are used to denote the main energy levels. Letters (s, p, d, f) denote energy sub levels. Superscripts above the sublevel letter indicate the number of electrons in the sublevel. For example, $2p^4$ indicates 4 electrons in the p sublevel of the second energy level. The electron configuration for oxygen would be

$$\mathbf{1s^2 2s^2 2p^4}.$$

Orbital filling diagrams also illustrated the distribution of electrons. For this method only the electrons in the highest energy levels are shown. For example oxygen would be:



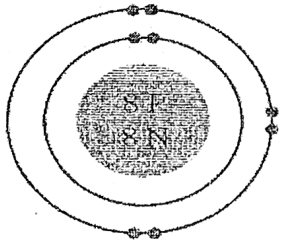
Orbital diagram for oxygen

Note that the electrons in the same energy level do not pair until each orbital is occupied with one electron (Hund's Rule).

A third method f used to show electron arrangements is the dot diagram. This notation uses only those s and p electrons in the highest energy level. The s and p orbitals are arranged around the symbol for the element. The electron diagram for oxygen is:

The fourth method of representing the atom is called the Bohr model. This method shows the nucleus in the center and the electrons in energy levels around the nucleus. The Bohr model for oxygen is:

O (#8)

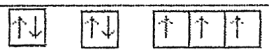
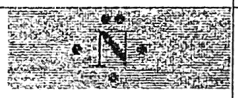
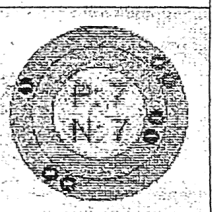


III. Purpose: Write electron configurations; write orbital filling diagrams; write electron dot diagrams; draw Bohr models

VI. Procedure: 1. Prepare a data table as shown in the analysis.
2. Write the electron configuration, orbital filling diagram, electron dot and Bohr model for the following elements:

Elements #1–25 (H to Mn)

VII. Data: organize the electron arrangements in the data table using nitrogen as a guide.

Element and Atomic Number	Electron Configuration	Orbital Filling Diagram	Electron Dot Diagram	Bohr Model
Nitrogen-7	$1s^2 2s^2 s2p^3$ $[He]2s^2 2p^3$	 Orbital diagram for nitrogen		

VIII. Conclusions:

1. Why are the outer-most electrons the only ones included in the orbital filling diagram and the electron dot diagram?
2. The orbital filling diagram has arrows pointing in opposite directions when two electrons occupy the same orbital. What do these arrows indicate?
3. How many electrons do the elements in Group II (2) of the periodic table have in their electron dot diagrams?
4. Element X has the following configuration: **.X:**

   Name at least two elements which could be X.
5. 5. Identify the follow Element by the orbital filling diagram.