CHEMISTRY LAB: ELECTRON DOT DIAGRAMS FOR ATOMS & IONS

WHAT TO TURN IN: Data Table Questions #1-5

Objectives

- To review element and ion names and symbols
- To review electron configurations
- To practice writing electron dot diagrams for atoms and ions
- To relate electron configurations to ion formation
- To relate electron dot diagrams to ion formation

Background Info (from Science Help Online)

"Electron dot diagrams, which are also called Lewis dot diagrams, are very useful tools in chemistry. They will give you the ability to determine the type(s) of covalent bonds that an element may make in certain situations. They can also be used to predict the type of ion that an atom might make when it forms an ion.

Each dot diagram consists of; an elemental symbol, which represents the *kernel* of the atom, and a group of 1-8 dots which shows the configuration of the outermost electron shell of the atom, also called the *valence shell*… To make a Lewis dot diagram, you need to know how many electrons are in the valence shell."

Materials

- Colored pencils or markers
- White paper
- Ruler
- Lab sheet

Procedure

1) Create a data table with fifteen rows and eight columns as shown below.
    - Turn the paper sideways for more room.
    - Use a ruler.
    - You may use more than one side or piece of paper if you need the room.

1	2	3	4	5	6	7	8
Element Symbol	**Element Name**	**Element Dot Diagram**	**Element Valence Config.**	**Ion Symbol**	**Ion Name**	**Ion Dot Diagram**	**Ion Valence Config.**
1							
2							
3							
4							
etc…							

2) For the electron dot diagrams, use one color per element and its dots.

ELEMENTS TO USE IN THE DATA TABLE:

1) **boron**
2) **silicon**
3) **sulfur**
4) **calcium**
5) **iodine**
6) **rubidium**
7) **argon**
8) **carbon**
9) **arsenic**
10) **chlorine**
11) **zinc**
12) **iridium** #77 – typical transition metal, no exception
13) **yttrium** #39 – typical transition metal, no exception
14) **californium** #98 – typical inner transition metal, no exception
15) **helium** – exception to the normal Noble Gas configuration

Questions

1) What do the "dots" represent?
2) How can you tell how many bonds can be formed by an element, using its dot diagram?
3) How many *bonds* can be formed by the elements in the data table?
    a) boron
    b) silicon
    c) sulfur
    d) calcium
    e) iodine
    f) rubidium
    g) argon
    h) carbon
    i) arsenic
    j) chlorine
    k) zinc
    l) iridium
    m) yttrium
    n) californium
    o) helium
4) How can you predict the type of ion an element will form (cation vs. anion), based on its electron dot diagram *only*?
5) Why is helium an exception to the rest of its group when it comes to its dot diagram?