Name: _____ *Date:* _____

Atomic Structure Simulation

IB Chemistry 11 Homework

Go to the website below and click on all the elements in order of increasing atomic number. Observe what happens in the spectrum (the black rectangle with the colored stripes of light), the 'shell view', the 'nucleus view', and the orbital diagram. Answer the questions.

http://www.colorado.edu/physics/2000/applets/a2.html

1. Click on the Period 1 elements (H, He) and answer these questions:
    a. What do you notice about the motion of the 2nd electron (He) as compared to the first (H)?

    b. In the "s-p-d" chart on the right, which column did these electrons go into?

2. Click on the Period 2 elements (Li, Be, B, C, N, O, F, Ne) and answer these questions:
    a. Why do you think the electrons in this period have been given a new color?

    b. How many electrons are added as you move across this period from Li to Ne? _____

    c. Which column did these electrons go into, and *in what order did they fill?*

    d. Looking at Neon, what do you notice about the direction of motion of all the period 2 electrons?

3. Click on the Period 3 elements (Na, Mg, Al, Si, P, S, Cl, Ar) and answer these questions:
    a. How is the *pattern **and** behavior* of the period 3 electrons similar to the period 2 electrons?

    b. How is it different?

4. Click on the Period 4 elements (K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, Ga, Ge, As, Se, Br, Kr):
    a. For the first 2 elements (K and Ca), which column of the "s-p-d" chart did the electrons go into?

    b. For the next 10 elements (Sc through Zn), which column did the electrons go into?

    c. For the last 6 elements (Ga through Kr), which column did the electrons go into?

5. Select the element Kr, which has the most electrons of the elements shown.
    a. What is holding the electrons in the atom? Why don't they just fly away?

    b. What do you notice about the *speeds* of the electrons that are nearest the nucleus vs. far away from the nucleus?

    c. Which electrons appear to have the most energy, the ones nearest or farthest from the nucleus?

    d. If we wanted to remove an electron from this atom, which electrons would be easiest to remove – the ones nearest or farthest from the nucleus? Why do you think so?

    e. What do you think is the significance of the color-coded electrons? In other words, what do you think the pink, yellow, green, and blue colors represent?

6. What have you noticed about each element's spectrum as you've been clicking on all of them?
    a. What do you notice about the order of the colors in the spectrum?

    b. Do any two elements have the same pattern in the spectrum? Explain why you think this is.

7. Ok, here's one to think about… Click on V and Cr… Why do you think the blue "s" electron disappeared and then reappeared for Mn? Click on Cu and Zn and you'll see the same thing. What do you think this means?