Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period \_\_\_\_\_\_\_\_\_\_\_

**Chapter 4
*Atoms and Elements: Electron Arrangement and Periodic Law***

**Electron Arrangement and Periodic Law**

1. Extremely small \_\_\_\_\_
2. Located outside the \_\_\_\_\_\_
3. Moving at extremely high \_\_\_\_\_\_\_ in a sphere
4. Have specific \_\_\_\_\_\_\_\_\_\_\_\_ levels
5. When atoms are heated, bright lines appear called \_\_\_\_\_\_\_\_\_\_\_\_\_
6. Electrons in atoms arranged in \_\_\_\_\_\_\_\_\_\_ levels.
7. An electron \_\_\_\_\_\_\_\_ energy to “jump” to a \_\_\_\_\_\_\_\_\_ energy level.
8. When an electron falls to a lower energy level, energy is \_\_\_\_\_\_\_

**Loss of Energy -ground state versus Gain of Energy excited state**

**Learning Check EA1**

Answer with

 1) Energy absorbed 2) Energy emitted

 3) No change in energy

 A. What energy change takes place when an electron in a hydrogen atom moves from the first (n=1) to the second shell (n=2)?

 B. What energy change takes place when the electron moves from the third shell to the second shell?

**Bohr Model**

* First model of the electron structure
* Gives levels where an electron is most likely to be found
* Incorrect today, but a key in understanding the atom

**Quantum Mechanics**

Describes the arrangement and space occupied by electrons in atoms

Electron Levels (Shells)

* Contain electrons that are similar in energy and distance from nucleus
* Low energy electrons are closest to the nucleus
* Identify by numbers n= 1, 2, 3, 4, 5, 6…..
* The first shell (1) is lowest in energy, 2nd level next and so on 1<2<3<4
* Maximum number of electrons in any electron level = 2n2
* n =1 2(1)2 = 2
* n =2 2(2)2 = 8
* n =3 2(3)2 = 18

**Order of Electron Filling**

All electrons in the same energy level have similar energy.

 Shell 1 2 electrons

 Shell 2 8 electrons

 Shell 3 18 electrons (8 first, later 10)

 Order of filling for the first 20 electrons

 Shell 1 2 3 4

 2e 8e 8e 2e

**Learning Check EA2**

A. The electron configuration for sulfur

 1) 2,6 2) 8,2,6 3) 2, 8, 6

B. The element in period 3 with two electrons in the outermost energy level

 1) Mg 2) Ca 3) Be

**Learning Check EA3**

Indicate the number of electrons in the final notation of the electron configuration for each:

 A. O 1) 4 2) 6 3) 8

 B. Al 1) 13 2) 3 3) 1

 C. Cl 1) 2 2) 5 3) 7

**Learning Check EA4**

For phosphorus, indicate if each configuration is (1) correct or (2) incorrect. Explain why or why not?

 A. 2, 2, 8, 5 1 or 2

 B. 2, 8, 3 1 or 2

 C. 2, 8, 5 1 or 2

 D. 2, 6, 7 1 or 2

**Periodic Law**

All the elements in a group have the same electron configuration in their outermost shells

Example: Group 2

 Be 2, 2

 Mg 2, 8, 2

 Ca 2, 2, 8, 2

**Learning Check EA5**

Specify if each pair has chemical properties that are similar (1) or not similar (2):

 A. Cl and Br

 B. 2 - 5 and 2 - 8 - 7

 C. 2 - 4 and 2 - 8 - 4

 D. P and S

 E. O and S