**Periodic Table of the Elements Activity—Answer Key**

*Earth Materials—Prof. Laura Wetzel*

What are the common characteristics of the orbital configurations between the rows and columns of the Periodic Table? Give examples using some of these 13 elements.

Rows:

*Each row has electrons up to a particular shell. For example, Na and Mg are in the same row, and each has electrons into the third shell (M): Na 3s1 and Mg 3s2. As you move across the Periodic Table, each column has elements with more electrons. Na to Mg is an increase of one electron.*

Columns:

*Each column has electrons into the same subshell. For example, Na and K are in the same column, and have electrons into s1: Na 3s1 and K 4s1. As you move down the Periodic Table, each row increases by one shell. Na to K is shell 3 to shell 4.*

Fe has three major isotopes, with masses of 54, 56, and 57. Fill in the following information for each:

|  |  |  |  |
| --- | --- | --- | --- |
| Atomic Mass | **54** | **56** | **57** |
| Atomic Number | 26 | 26 | 26 |
| # Protons | 26 | 26 | 26 |
| # Electrons | 26 | 26 | 26 |
| # Neutrons | 28 | 30 | 31 |
| Electron Configuration | 1s22s22p63s23p64s23d6 | 1s22s22p63s23p64s23d6 | 1s22s22p63s23p64s23d6 |

Look up information for these minerals and fill in the table:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Mineral | **Halite** | **Fluorite** | **Sphalerite** | **Cuprite** | **Quartz** |
| Formula | NaCl | CaF2 | ZnS | Cu2O | SiO2 |
| Min. Group | Halide | Halide | Sulfide | Oxide | Silicate |
| Cation | Na | Ca | Zn | Cu | Si |
|  Valence | +1 | +1 | +2 | +1 | +4 |
|  Class. | Alkali metal | Alkaline earth metal | Metal | Metal | Metal |
| Anion | Cl | F | S | O | O |
|  Valence | -1 | -1 | -2 | -2 | -2 |
|  Class. | Halogen | Halogen | Non-metal | Non-metal | Non-metal |
| Hardness | 2.5 | 4.0 | 6.0-6.5 | 3.5-4.0 | 7.0 |
| Bond Type | Ionic | Ionic | Covalent/ionic | Covalent/ionic | Covalent/ionic |

*Valence relates directly to electron orbital configuration, as each element wishes to have a full outer orbital. As a result, some elements donate electrons and others accept electrons to fill those orbitals. A valence of +1 means the element has an extra electron that it has given to another element, which then takes on a charge of -1.*