

# Color Coding the Periodic Table

Name: \_\_\_\_\_ Date: \_\_\_\_\_ Pd: \_\_\_\_\_

## Student Information Sheet

The Periodic Table is a list of all the *known* elements. It is organized by *increasing atomic number*. There are two main groups on the periodic table: *metals and nonmetals*. The left side of the table contains elements with the greatest metallic properties (metals). As you move from the left to the right, the elements become less metallic with the far right side of the table consisting of nonmetals. The elements in the middle of the table are called "*transition*" elements because they are changed from metallic properties to nonmetallic properties. A small group whose members touch the zig-zag line are called *metalloids* because they have both metallic and nonmetallic properties.

The table is also arranged in vertical columns called "*groups*" or "*families*" and horizontal rows called "*periods*." Each arrangement is significant. The elements in each vertical column or group have similar properties. Group 1 elements all have one (1) electron in their outer shells (*valence electrons*). This gives them similar properties. Group 2 elements all have two (2) electrons in their outer shells. This also gives them similar properties. Not all of the groups, however, hold true for this pattern. The elements in the first period or row all have one *energy level*. The elements in period 2 all have two (2) energy levels. The elements in period 3 all have three (3) energy levels, and so on.

There are a number of major groups with similar properties. They are as follows:

**Hydrogen:** This element does not match the properties of any other group so it stands alone. It is placed above group 1 but it is not part of that group. It is a very reactive, colorless, odorless gas at room temperature. (1 valence electron)

**Group 1:** *Alkali Metals* – These metals are extremely reactive and are never found in nature in their pure form. They are silver colored and shiny. Their density is extremely low so that they are soft enough to be cut with a knife. (1 valence electron)

**Group 2:** *Alkaline-Earth Metals* – Slightly less reactive than alkali metals. They are silver colored and denser than alkali metals. (2 valence electrons)

**Groups 3 – 12:** *Transition Metals* – These metals have a moderate range of reactivity and a wide range of properties. In general, they are shiny and good conductors of heat and electricity. They also have higher densities and melting points than groups 1 & 2. (varying range of valence electrons)

**Lanthanides and Actinides:** These are also transition metals that were taken out and placed at the bottom of the table ("f" block) so the table wouldn't be so wide. The elements in each of these two periods share many properties. The lanthanides are shiny and reactive. The actinides are *all* radioactive and are therefore unstable. Elements 95 through 103 do not exist in nature but have been manufactured in the lab.

**Group 13:** *Boron Group* – Contains one metalloid and 4 metals. Reactive. Aluminum is in this group. It is also the most abundant metal in the earth's crust. (3 valence electrons)

**Group 14:** *Carbon Group* – Contains one nonmetal, two metalloids, and two metals. Varied reactivity. (4 valence electrons)

**Group 15:** *Nitrogen Group* – Contains two nonmetals, two metalloids, and one metal. Varied reactivity. (5 valence electrons)

**Group 16:** *Oxygen Group* – Contains three nonmetals, one metalloid, and one metal. Reactive group. (6 valence electrons)

**Groups 17:** *Halogens* – All nonmetals. Very reactive. Poor conductors of heat and electricity. Tend to form salts with metals. Ex. NaCl, sodium chloride, also known as "table salt". (7 valence electrons)

**Groups 18:** *Noble Gases* – Unreactive (Inert) nonmetals. All are colorless, odorless gases at room temperature. All found in earth's atmosphere in small amounts. (8 valence electrons)

## **Color Coding the Periodic Table**

## Student Worksheet

Using colored pencils, color AND label each group on the periodic table as follows:

1. Write the element symbol AND atomic number in the square for Hydrogen **PINK**.
2. Color all metal elements **GREEN**.
  - a. Label (*write group name*) AND color the Alkali Metals group **GREEN**.
  - b. Label (*write group name*) AND color the Alkaline Earth Metals group **GREEN**.
  - c. Label (*write group name*) AND color the Transition Metals group **GREEN**.
  - d. Color all elements to the LEFT of each metalloid element **GREEN** (they are metals within “p-block”).
  - e. The LAST six (6) elements (Z = 113-118) of the “p-block” are ALL metals. Color EACH **GREEN**.
3. Label (*write group name*) AND trace (outline) the Metalloid staircase (zig-zag), starting at Boron, with a **BLACK MARKER**. This separates the metals from non-metals. *Be careful – Aluminum is NOT a metalloid!*
4. Write the element symbol AND atomic number in the square for EACH Metalloid element.
  - a. Color each Metalloid element **PURPLE**. (*Hint: There should be 8*)
5. Color all non-metal elements **ORANGE**.
  - a. Write the element symbol AND atomic number in the square for EACH Halogen element.
    - i. Label (*write group name*) AND color all Halogens **ORANGE** (they are still non-metals).
  - b. Write the element symbol AND atomic number in the square for each Noble Gas element.
    - i. Label (*write group name*) AND color all Noble Gases **ORANGE** (they are still non-metals).
6. Label (*write group name*) AND color all the Lanthanide Series elements **HALF GREEN/BLUE** (Green because they are a part of the Inner Transition Metals).
7. Label (*write group name*) AND color all the Actinide Series elements **HALF GREEN/RED** (Green because they are a part of the Inner Transition Metals).
8. **Make a KEY/LEGEND that indicates which color identifies which group (Ex: Alkali Metals = Green)**

## **Family Ties**

## Student Worksheet

Using your knowledge of the organization and classification of elements on the Periodic Table, answer the following:

1. The vertical columns on the periodic table are called \_\_\_\_\_ or \_\_\_\_\_.
2. The horizontal rows on the periodic table are called \_\_\_\_\_.
3. Most of the elements in the periodic table are classified as \_\_\_\_\_.
4. The elements that touch the zig-zag (staircase) line are classified as \_\_\_\_\_.
5. The elements above the metalloids are classified as \_\_\_\_\_.
6. Elements in the first group have one valence electron and are extremely reactive. They are called \_\_\_\_\_.
7. Elements in the second group have two valence electrons and are the second most reactive metals group. They are called \_\_\_\_\_.
8. Elements in groups 3-12 have many useful properties and are called \_\_\_\_\_.
9. Elements in group 17 are known as “salt formers”. They are called \_\_\_\_\_.
10. Elements in group 18 are very non-reactive (Inert). We call these the \_\_\_\_\_.
11. The elements at the bottom of the periodic table (“f-block”) were pulled out to keep the table from becoming too long. The first period at the bottom is called the \_\_\_\_\_.
12. The second period at the bottom of the periodic table is called the \_\_\_\_\_.