Name: Class Copy

Period: ____ Subject: Int Science

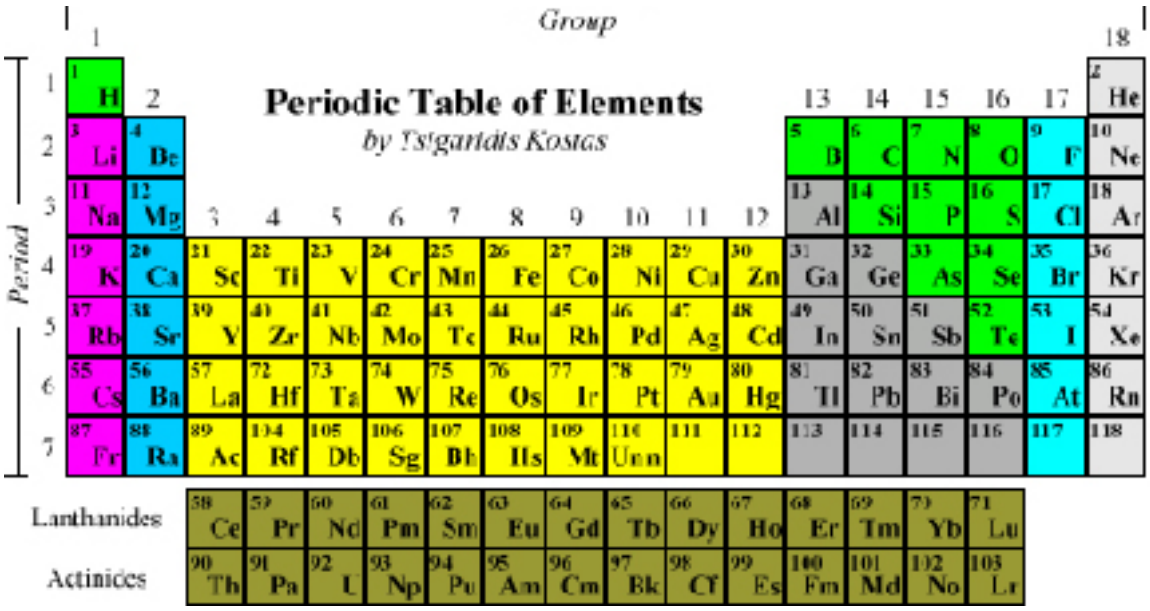
Activity 2 - Learning the Alphabet

Read

How to Read the Periodic Table

The Periodic table is designed to help you predict what an element's physical and chemical properties are. You can also predict what elements will bond with each other.

First, let's look at the columns and rows of the periodic table.



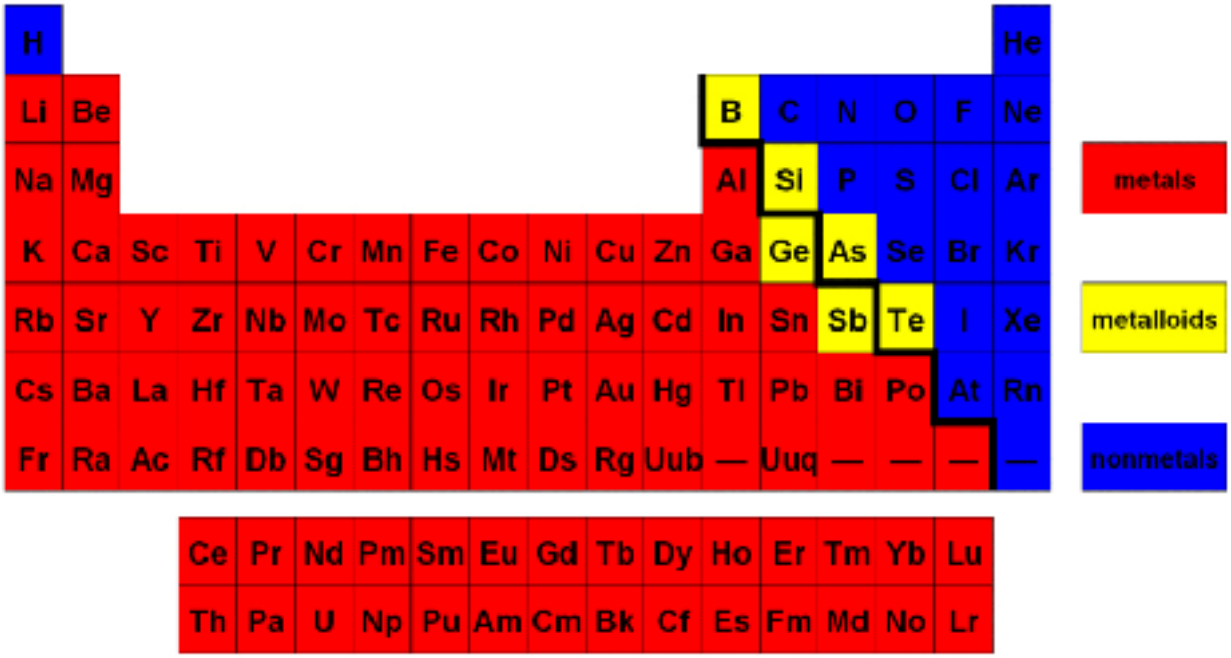
Groups or Families

The vertical columns of the periodic table (there are 18) are called groups or families. Elements in the same group or family have similar but not identical characteristics. You will learn more about the 18 groups in a later section. You can know properties of a certain element by knowing which group it belongs to.

Periods

The horizontal rows of the periodic table are called periods. Elements in a period are not alike in properties. As a rule, the first element in a period is usually an active solid, and the last element in a period is always an inactive gas. Atomic size decreases from left to right across a period, but atomic mass increases from left to right across a period. Atoms on the left of the period, therefore, are usually larger and more lightweight than the smaller, heavier atoms on the right of the period.

Metals, Nonmetals & Metalloids



Metals, Nonmetals, & Metalloids

Most periodic tables contain a stairstep line which allows you to identify which elements are metals, nonmetals, and metalloids. Following are descriptions of each of the three types of materials.

Metals

Most elements are metals. 88 elements to the left of the stairstep line are metals or metal like elements.

Physical Properties of Metals:

- Luster (shininess)
- Good conductors of heat and electricity
- High density (heavy for their size)
- High melting point
- Ductile (most metals can be drawn out into thin wires)
- Malleable (most metals can be hammered into thin sheets)

Chemical Properties of Metals:

- Easily lose electrons
- Corrode easily. Corrosion is a gradual wearing away. (Example: silver tarnishing and iron rusting)

Nonmetals

Nonmetals are found to the right of the stairstep line. Their characteristics are opposite those of metals.

Physical Properties of Nonmetals:

- No luster (dull appearance)
- Poor conductor of heat and electricity
- Brittle (breaks easily)
- Not ductile
- Not malleable
- Low density
- Low melting point

Chemical Properties of Nonmetals:

- Tend to gain electrons

Since metals tend to lose electrons and nonmetals tend to gain electrons, metals and nonmetals like to form compounds with each other. These compounds are called ionic compounds. When two or more nonmetals bond with each other, they form a covalent compound.

Metalloids

Elements on both sides of the zigzag line have properties of both metals and nonmetals. These elements are called metalloids.

Physical Properties of Metalloids:

- Solids
- Can be shiny or dull
- Ductile
- Malleable
- Conduct heat and electricity better than nonmetals but not as well as metals

Trends of the Periodic Table

Note: These are general periodic trends of the elements. There are many exceptions to these general rules.

Atomic Radius - Atomic radius is simply the radius of the atom, an indication of the atom's volume.

Period - atomic radius decreases as you go from left to right across a period.

> *Why?* Stronger attractive forces in atoms (as you go from left to right) between the opposite charges in the nucleus and electron cloud cause the atom to be 'sucked' together a little tighter.

Group - atomic radius increases as you go down a group.

> *Why?* There is a significant jump in the size of the nucleus (protons + neutrons) each time you move from period to period down a group. Additionally, new energy levels of electron clouds are added to the atom as you move from period to period down a group, making the each atom significantly more massive, both is mass and volume.

Electronegativity - Electronegativity is an atom's 'desire' to grab another atom's electrons.

Period - electronegativity increases as you go from left to right across a period.

> *Why?* Elements on the left of the period table have 1 -2 valence electrons and would rather give those few valence electrons away (to achieve the octet in a lower energy level) than grab another atom's electrons. As a result, they have low electronegativity. Elements on the right side of the period table only need a few electrons to complete the octet, so they have strong desire to grab another atom's electrons.

Group - electronegativity decreases as you go down a group.

> *Why?* Elements near the top of the period table have few electrons to begin with; every electron is a big deal. They have a stronger desire to acquire more electrons. Elements near the bottom of the chart have so many electrons that loosing or acquiring an electron is not as big a deal. This is due to the shielding affect where electrons in lower energy levels shield the positive charge of the nucleus from outer electrons resulting in those outer electrons not being as tightly bound to the atom.

Questions – Activity 2 Read

How to Read the Periodic Table:

1. What are the vertical columns of the Periodic Table called?
2. What are the horizontal rows of the Periodic Table called?
3. How many groups/families are there on the Periodic Table?
4. How many periods are there on the Periodic Table?
5. Describe a trend in the Periodic Table as you go across the Periodic Table.

Metals, Nonmetals & Metalloids:

6. What is the most common type of element on the Periodic Table? (metals, nonmetals, metalloids)
7. What are the physical properties of metals?
8. What are the physical properties of nonmetals?
9. What kind of element would best make a coffee cup that would not burn your hand?
10. What kind of element conducts electricity the best?
11. Describe the physical properties of metalloids.

Trends in the Periodic Table:

12. What is electronegativity?
13. Describe the trend on the periodic table (both going across and down) for electronegativity.
14. Describe the trend on the periodic table for atomic radius.