

2 ec pts for printing

In 1914 _____ determined that the elements should be arranged by the number of _____ - the _____ - and the periodic table was rearranged using this method, which greatly improved the arrangement of elements. So, we arrive at the modern version of the periodic table which looks like...

[illegible]

Group Labels: Labeling the groups can be confusing because the rules change with the middle transition elements. The transition elements get grouped together as the “B” elements, or groups #1B - 8B. All of the other elements are “A” elements, with groups #1A -8A. Using this labeling system will tell you exactly how many valence electrons are in the atoms. However, sometimes the groups are just labeled #1-18.

3 classes of elements:

Metals

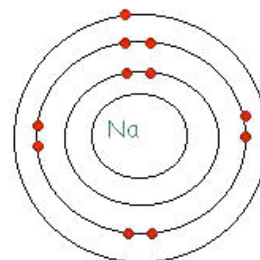
Metals are elements that are shiny and are good conductors of thermal energy and electric current. They are easily shaped into different forms because they are *malleable* (they can be hammered into thin sheets) and *ductile* (they can be drawn into thin wires). Iron has many uses in building and automobile construction. Copper is used in wires and coins.



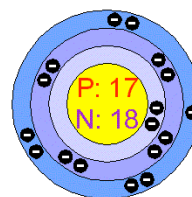
Atoms of most metals have few electrons in their outer energy level

• electron

Sodium has 1 extra electron in its outer shell



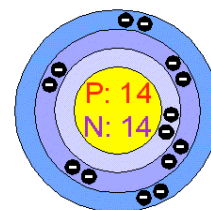
Atoms of most nonmetals have an almost complete set of electrons in their outer level



Chlorine only needs 1 electron to have a full outer energy shell

Atoms of metalloids have about a half-complete set of electrons in their outer energy level

Silicon:
In need of 4 electrons

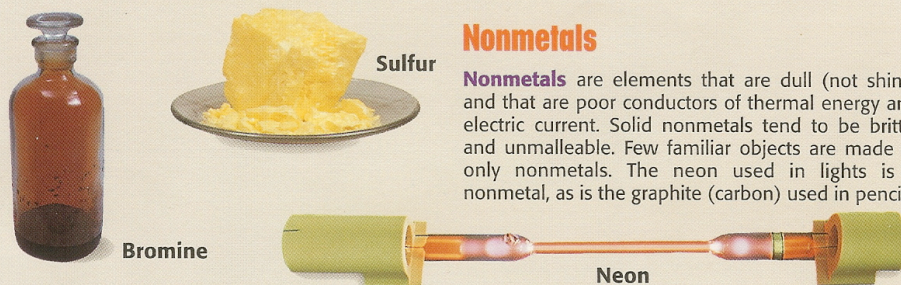


Metalloids

Metalloids, also called semiconductors, are elements that have properties of both metals and nonmetals. Some metalloids are shiny, while others are dull. Metalloids are somewhat malleable and ductile. Some metalloids conduct thermal energy and electric current well. Other metalloids can become good conductors when they are mixed with other elements. Silicon is used to make computer chips. However, other elements must be mixed with silicon to make a working chip.

Nonmetals

Nonmetals are elements that are dull (not shiny) and that are poor conductors of thermal energy and electric current. Solid nonmetals tend to be brittle and unmalleable. Few familiar objects are made of only nonmetals. The neon used in lights is a nonmetal, as is the graphite (carbon) used in pencils.

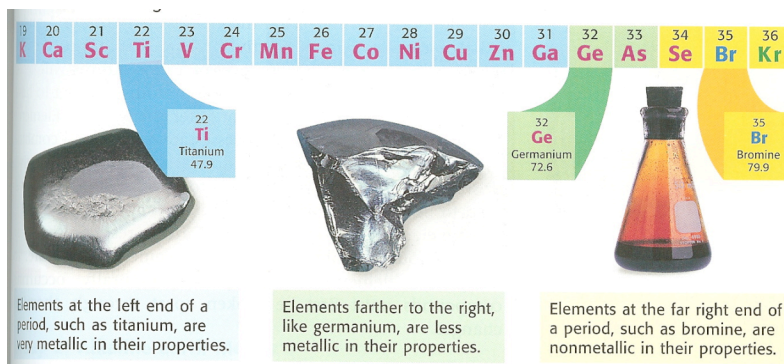


Metals, Metalloids, & Nonmetals: Another pattern on the periodic table is that all of the metals are grouped together on the left & the nonmetals are on the right. The metalloids fall in between, near the zigzag line. This trend isn't a coincidence. The number of

_____ or electrons in the outer shell, determines how an element acts. For example, metals have _____ valence electrons. This causes them to possess metallic properties such as, conductivity & reactivity. Conversely,

the nonmetals on the right of the periodic table have _____ complete sets of electrons in their outer level. Therefore, they possess nonmetallic traits such as dullness, poor conductivity, and brittleness. We can summarize all of this just by saying: Elements get _____ metallic as you move from left to right

Families Stick Together: Scientists group families of elements by their _____. Each family reacts a different way with the outside world. BUT, elements within a family are similar to one another. Metals behave differently than gases and there are even different types of metals. Some don't react, others are very reactive, and some are metallic. Let's go over the periodic table families...



Family 1: _____ Metals

Li, Na, K, Rb, Cs, Fr : Metals

_____ Reactive

_____ electron in outer energy level available for bonding. All have ONE outer electron to lose. This makes them highly reactive, since they are looking to combine with another element to become stable and have that outer level filled and complete (or happy!). Most reactive of all metals Soft and can be cut with a knife.

Family 2: _____ Metals

Be, Mg, Ca, Sr, Ba, Ra : Metals

_____ reactive, but less than alkali metals

_____ electrons (e-) in outer energy level available for bonding. Not as reactive as the Alkali metals because it is harder to give two electrons away than just one. These elements are typically what are lost in perspiration which is why people buy special sport drinks that contain these elements !

Family 3-12: Transition Metals

_____ electrons in outer energy level

_____ reactive than alkaline earth metals because they don't give away their electrons as easily

In these "_____" the properties are very much alike. Most have high melting points and are hard.

They all have 1 or 2 properties like the alkali or alkaline earth families.

Group 11 = The _____ Family: are the coinage metals (Cu, Ag, Au) used to make currency.

In periods (rows) 6 & 7, notice how the periodic table skips and goes into the two rows referred to as series:

_____ Series:

15 elements that start with lanthanum (La) at atomic number 57 and finishing up with lutetium (Lu) at number 71.

shiny reactive metals, Most found in nature

_____ Series:

15 elements that start with actinium (Ac) at atomic number 89 and finishing up with lawrencium (Lr) at number 103.

Radioactive and unstable. Most are man-made & not stable in nature

13: _____ Family

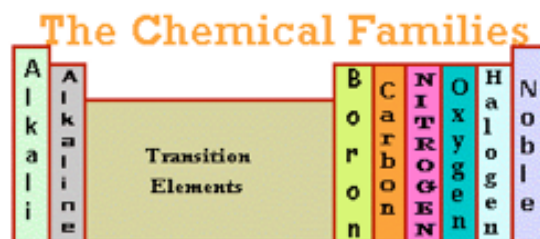
One metalloid and 4 metals B, Al, Ga, In, Tl

_____ in the outer energy level

Reactive _____ at room temperature

Most common element in this group is _____

Boron is most commonly found as borax and boric acid, which are used in cleaning compounds. Aluminum is the third most common element in the earth's crust. It is used as a coating agent, to prevent oxidation. It is an excellent conductor of electricity and heat and can be found in many cooking utensils.



The Lanthanoid Series
The Actinoid Series

14: _____ Family C, Si, Ge, Sn, Pb

1 metal, 1 metalloid, and 2 nonmetals.

_____ electrons in its outer energy shell. No other group has a greater range of properties. They have the unique ability to form _____ compounds. This family is incredibly important in the field of _____.

15: _____ Family N, P, As, Sb, Bi

2 nonmetals, 2 metalloids, 1 metal

_____ electrons in outer energy level

Reactivity varies

16: _____ Family O, S, Se, Te, Po

3 nonmetals, 1 metalloid, 1 metal

_____ electrons in outer energy level reactive. Most

members form _____ compounds,

Each atom has 6 electrons in its outer energy level. Therefore it must share 2 electrons with other elements to form compounds

Oxygen is one of the most reactive nonmetallic elements.

Family 17: _____ F, Cl, Br, I, At

These are _____ reactive nonmetals

_____ electrons in the outermost energy level.

They are very reactive because have 7 valence electrons, this means they are ALMOST full and can combine with many elements.

Halogen elements combine with metals to form compounds called **salts**.

Halogen means "salt-producer".

They combine with a metal by **ionic** bonding.

They are the most reactive of the nonmetals families.

As you move down the column, the elements get **less** reactive.

A _____ is when a halogen combines with another element (NaCl)

Family 18: _____

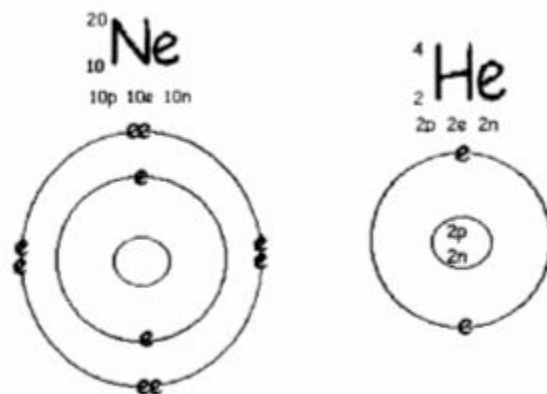
He, Ne, Ar, Kr, Xe Nonmetals
_____ gases

NO bonding with other elements

_____ valence electrons (except He which only has 2)

With the exception of He, these elements have 8 electrons in their outer energy level. Very stable

They are _____, meaning they don't react with anything. Why? Because they're happy! All of these elements have full outer shells. Colorless, odorless gases at room temperature. Often used in neon products/neon lights. All are found in Earth's atmosphere. Only in laboratories can scientists force these to bond with other elements.



Using the Periodic Table

Complete the following chart from your Periodic Table.

Element symbol	Name of Element	atomic number	# of protons	# of electrons	# of neutrons	Metal or Nonmetal	Solid, Liquid or Gas	# of electrons in outer shell (valence electrons)
Rn								
Li								
Fe								
Hg								
Xe								
Mg								
V								
Br								
Cr								
H								
K								
Sn								
Cu								
W								
Bi								
Fe								
Ba								
Sb								
P								
S								
Ti								
Ni								
Au								
Ar								
Cs								