

The Periodic Table

H																		He
Li	Be											B	C	N	O	F	Ne	
Na	Mg											Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr	
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe	
Cs	Ba	La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn	
Fr	Ra	Ac	Rf	Ha	Sg	Uns	Uno	Une										
		Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
		Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

1. The elements in periods 2 through 7 that are to the left of the zigzagged line are metals. List five metals. *(no chemical symbols)*

2. The elements in periods 1 through 6 that are to the right of the zigzagged line are nonmetals. List five nonmetals. *(no chemical symbols)*

3. The elements that border either side of the zigzagged line are metalloids. Metalloids have properties of both metals and nonmetals. Name two metalloids. *(no chemical symbols)*

4. The alkali metals are in group 1. They have only one electron in their outer shell. They are very reactive and have a low melting point. Shade the alkali metals blue.
5. The noble gases are found in group 18. Their outer energy level is filled, and they are very nonreactive, colorless gases. Shade the noble gases red.
6. Halogens have seven electrons in the outer shell. They are located in group 17 on the periodic table. Halogens react with metals to form salts. Shade the halogens green.
7. The transition elements are found in groups 3 through 12 and periods 4 through 7. These elements have either one or two electrons in the outer energy level. They are often used to form alloys because they are hard and have high melting points. Shade the transition elements orange.
8. Alkaline earth metals are located in group 2. They have two electrons in their outer energy level. Shade the alkaline metals purple.

Arranging the Elements

Dmitri Mendeleev designed the first periodic table in 1869. He organized the 63 elements that were known at that time into rows according to their atomic mass. The elements were grouped into columns. All elements in a column had similar physical and chemical properties.

In the modern periodic table, the 109 known elements are arranged in order of increasing atomic number. When the elements were arranged by their atomic number, it was found that the elements periodically had the same properties. This is called the **periodic law**.

Each vertical column of the periodic table is called a **group** or **family**. All of the elements in a vertical column have similar chemical properties because they have the same number of electrons in their outer electron shell.

Each horizontal row of the periodic table is called a **period**. All of the elements in a period have the same number of energy levels.

Chemists use the periodic table to predict how elements will react with one another and to find out information about each element. Each square on the periodic table contains information about the element in it. The following information may be included:

Atomic Number	8	2	Number of Electrons in Each Shell
	O	6	Chemical Symbol
Name of Element	Oxygen		
	15.9994		Atomic Weight

Use the periodic table of the elements to answer the following questions.

- ① How many periods are there in the main body of the periodic table? _____
2. How many groups are there in the periodic table? _____
3. What is the chemical symbol for molybdenum? _____
- ④ What is the atomic number of silver? _____
- ⑤ What is the atomic weight of gold? _____
6. Oxygen has six electrons in its outer shell. How many electrons do you predict sulfur, selenium, tellurium, and polonium will have in their outer shell? _____ Why? _____

7. Potassium has four energy levels. How many energy levels do you predict calcium, iron, nickel, and zinc will have? _____ Why? _____

Formulas Name Compounds

A **chemical formula** is a group of chemical symbols and numbers that shows what is in a compound. The chemical formula for water is H_2O . The 2 is a subscript. A **subscript** tells the number of atoms of an element that are present. Subscripts are always written to the right of the elements they represent. The subscript 2 in the formula H_2O indicates that there are two atoms of hydrogen in water. Note that the O in the formula does not have a subscript. When only one atom of an element is present, no subscript is written. There is one atom of oxygen in water.

Parentheses are used to represent groups of atoms. The chemical formula for a solution called barium hydroxide is $\text{Ba}(\text{OH})_2$. The subscript 2 after the parentheses indicates that there are two (OH) or hydroxide ions in barium hydroxide. Multiply the number of each of the atoms inside the parentheses by the subscript to find the total number of atoms.

$(\text{OH})_2 = \text{O}_{1 \times 2} \text{H}_{1 \times 2}$ There are 2 atoms of oxygen and 2 atoms of hydrogen.

Names for compounds formed from a metal and a nonmetal end in *ide*. For example, a compound whose chemical formula is CaCl is formed from the elements calcium and chlorine. The compound is called calcium chloride. Here are other examples:

NaS	sodium sulfide
____ OH	____ hydroxide
____ O	____ oxide
____ I	____ iodide
____ F	____ fluoride
____ Br	____ bromide

When two nonmetal elements form a compound, the following prefixes are used:

<i>mono</i> (one)	<i>di</i> (two)
<i>tri</i> (three)	<i>tetra</i> (four)
<i>penta</i> (five)	<i>hexa</i> (six)

Tell how many atoms of each element are in the molecules listed below.

1. $\text{Fe}_2(\text{SO}_4)_3$ _____

(2) $\text{Mg}_3(\text{AsO}_4)_2$ _____

3. AgI _____

Write the name of the following compounds.

4. CuCl _____

(5) CuS _____

It All Adds Up

You can use the periodic table to find the number of protons, neutrons, and electrons that the atoms of an element have.

Atomic number = number of protons

Number of protons = number of electrons

Mass number = number of protons + number of neutrons
so

Mass number – atomic number = number of neutrons

All atoms of a particular element have the same number of protons and electrons, but the atoms may differ in the number of neutrons they have. Atoms of the same element with different numbers of neutrons are called **isotopes**. Isotopes have the same atomic number but different atomic masses. In nature, an element is found as a mixture of different isotopes. The atomic masses or weights in the periodic table are the average for an element's isotopes.

Isotopes can be written in two ways:

Carbon-12

or



12 is the mass number of carbon.

6 is the atomic number of carbon.

C is the chemical symbol for carbon.

Use the periodic table to fill in information about the isotopes in the chart below.

Substance	Mass Number	Number of		
		Protons	Neutrons	Electrons
1. carbon-14				
2. lead-208				
3. uranium-239				
4. uranium-238				
5. tin-118				

2pts

2pts