

# PERIODIC TABLE

## Pure Matter

**Elements** are the purest form of matter and can not be broken down into any other substance by either a physical or chemical change. There are about 114 elements and they are organized on a modern **Periodic Table of the Elements**.

**Periodic Table of the Elements**

1 H Hydrogen																	18 He Helium														
2 Li Lithium	3 Be Beryllium											13 B Boron	14 C Carbon	15 N Nitrogen	16 O Oxygen	17 F Fluorine	18 Ne Neon														
3 Na Sodium	12 Mg Magnesium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton														
4 K Potassium	20 Ca Calcium											37 Rb Rubidium	38 Sr Strontium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon										
5 Rb Rubidium	38 Sr Strontium											55 Cs Cesium	56 Ba Barium	63 La Lanthanum	64 Ce Cerium	65 Pr Praseodymium	66 Nd Neodymium	67 Pm Promethium	68 Sm Samarium	69 Eu Europium	70 Gd Gadolinium	71 Tb Terbium	72 Dy Dysprosium	73 Ho Holmium	74 Er Erbium	75 Tm Thulium	76 Yb Ytterbium	77 Lu Lutetium			
6 Cs Cesium	56 Ba Barium											81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon														
7 Fr Francium	88 Ra Radium											87 Fr Francium	88 Ra Radium																		
																		101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium											
																		90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

**Chemical Symbol**

Ni solid    H gas

Hg liquid    Tc unknown


**Background**

metal    nonmetal

metalloid    unknown

**period** A period is a horizontal row of elements

**column** A column of elements is known as a group or family.



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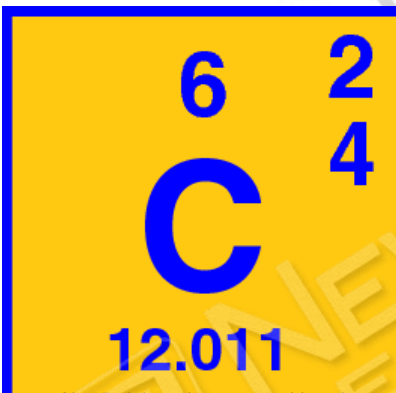
As you look at the table you will notice that the elements are organized by their atomic numbers from top to bottom and left to right. On the table shown above, the first element is H for hydrogen and one atom of H has an atomic number of 1. The element with the highest atomic number is the last one on the bottom right of chart, Uuq.

### Lesson Checkpoint:

**What is used to organize the elements on the Periodic Table?**

## Chart Represents an Atom of Each Element

Up toward the top left hand side of the table, the element C or carbon has been taken out and shown separately. To the right of the symbol, labels are given to the various pieces of information that are available for each element. Remember that in each case the information is for one atom of that element.



Notice in the chart and the atom symbol includes the following information:


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the symbol information for one atom.

## Isotopes

The Periodic Table of Elements shows the total number of protons and neutrons in an atom, by subtracting the atom's atomic number from its atomic mass, you can figure out the number of neutrons. Atoms that have the same atomic number but a different atomic mass are called **isotopes** of each other. Carbon with a mass of 12 and Carbon with a mass of 14 are isotopes of each other. The difference is that Carbon 14 has two extra neutrons.

If you count the number of electrons listed on the right hand side of the small box, it will give you the total number of electrons in that atom. Whenever an atom is not bonded to another, the number of protons in the nucleus always equals the number of electrons outside the nucleus.

**Lesson Checkpoint:**  
**What can the atomic mass of an atom tell us about particles of the atom?**

## Positions in the Periodic Table

The vertical rows of the table are called **periods**. The elements in a period are not chemically similar. Normally the elements toward the left are **metals**, the ones along the dark line on the right side are **metalloids**, and the ones on the right are **non metals**. Metalloids, such as Silicon (Si), have both metallic and non metallic properties.

5 <b>B</b> 10.81	6 <b>C</b> 12.011	7 <b>N</b> 14.007	8 <b>O</b> 15.999	9 <b>F</b> 18.998	10 <b>Ne</b> 20.179
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Periods towards the bottom of the table contain **radioactive** elements. These atoms disintegrate and, when they do, large amounts of atomic or nuclear energy are released.

For period 4 shown above, K, Ca, Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn, and Ga are metals, Br and Se are metalloids, and Kr is a noble gas. The properties of these elements are explained in the next section.



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The horizontal rows of the periodic table are called **periods**. The elements in a period are not chemically similar. If you look back at the periodic table, you will notice that each atom has only one electron in its outer orbit. This is what gives these elements similar properties.

Since Li, Na, K, Rb, Cs and Fr have only one electron in their outer orbits, these atoms act as very active metals. If you look over to group 17 you will notice that each atom has seven electrons in its outer orbits. This makes, F, Cl, Br, I and At very active non metals.

Group 18 contains **noble gases**. These atoms all have eight electrons in their outer electron orbit and are almost totally unable to bond to other atoms. These elements are sometimes referred to as **inert** elements.

1 <b>H</b> 1.0079
3 <b>Li</b> 6.941
11 <b>Na</b> 22.990
19 <b>K</b> 39.098
37 <b>Rb</b> 85.468
55 <b>Cs</b> 132.91
87 <b>Fr</b> 223

### Lesson Checkpoint:

**What are the names of the vertical columns and horizontal rows of the Periodic Table?**