

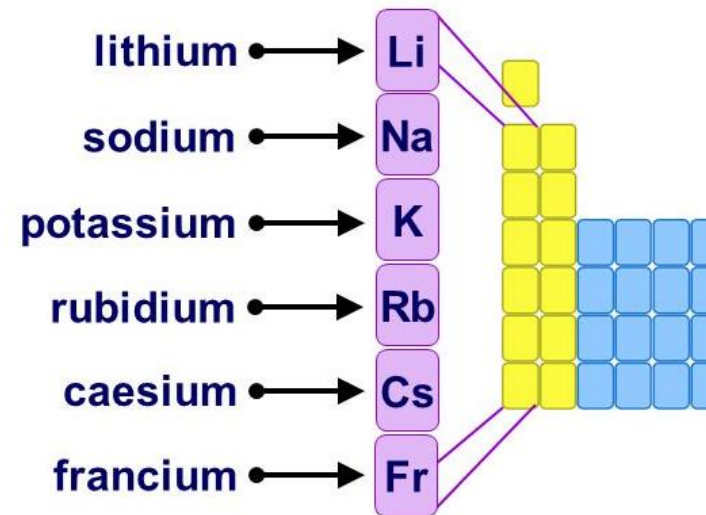
# Introduction to the Periodic Table

References : 1. General Chemistry- principles and modern applications (Petrucci, Herring, Madura, Bissonnette)  
2. Chemistry-10th Edition (Raymond Chang)



## Features of the Periodic Table

- In the periodic table, elements are listed according to increasing atomic number starting at the upper left and arranged in a series of horizontal rows.
- This arrangement places similar elements in vertical groups or families.
- For example, sodium and potassium are found together in a group labeled 1 (called the alkali metals). We should expect other members of the group, such as cesium and rubidium, to have properties similar to sodium and potassium. Chlorine is found at the other end of the table in a group labeled 17.



- Each element is listed in the periodic table by placing its symbol in the middle of a box in the table. The atomic number (Z) of the element is shown above the symbol, and the weighted-average atomic mass of the element is shown below its symbol.
- Some periodic tables provide other information, such as density and melting point, but the atomic number and atomic mass are generally sufficient for our needs. Elements with atomic masses in parentheses, such as plutonium, Pu (244), are produced synthetically, and the number shown is the mass number of the most stable isotope.

11 — Atomic number  
**Na** — Element symbol  
 Sodium — Element name  
 22.990 — Atomic weight

### How to Read the Periodic Table

The periodic table is a graphic representation of all the known elements. It is designed to give as much important information as possible in as little space as possible and to show the relationships between the elements.

#### How to Read the Hydrogen Atom

Atomic Mass The average mass of the atoms in the element	1 1.00794 <b>H</b> Hydrogen	Atomic Number The number of protons in the nucleus
Name Usually derived from a Greek or Latin root		Symbol The one or two letter abbreviation for the element

atomic number — 80 — atomic weight — 200.59  
 symbol — **Hg** — acid-base properties of higher-valence oxides —  
 electron configuration — [Xe]4f<sup>14</sup>5d<sup>10</sup>6s<sup>2</sup> — crystal structure —  
 name — mercury — physical state at 20° C (68° F) —

weakly basic	liquid
rhombohedral	transition metals

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- It is customary also to divide the elements into two broad categories—metals (tan) from the nonmetals (blue and pink). Except for mercury, a liquid, metals are solids at room temperature. They are generally malleable (capable of being flattened into thin sheets), ductile (capable of being drawn into fine wires), good conductors of heat and electricity, and have a lustrous or shiny appearance.
- The properties of nonmetals are generally opposite those of metals; for example, nonmetals are poor conductors of heat and electricity. Several of the nonmetals, such as nitrogen, oxygen, and chlorine, are gases at room temperature. Some, such as silicon and sulfur, are brittle solids. One—bromine—is a liquid.
- Two other highlighted categories in Figure are a special group of nonmetals known as the noble gases (pink), and a small group of elements, often called metalloids (green), that have some metallic and some nonmetallic properties.

1 1A											18 8A								
1 H <small>[1.007, 1.009]</small>	2 2A											13 3A	14 4A	15 5A	16 6A	17 7A	2 He <small>4.0026</small>		
3 Li <small>[6.939, 6.997]</small>	4 Be <small>9.0122</small>	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 8B	10 8B	11 1B	12 2B	5 B <small>[10.81, 10.83]</small>	6 C <small>[12.00, 12.02]</small>	7 N <small>[14.00, 14.01]</small>	8 O <small>[15.99, 16.00]</small>	9 F <small>18.998</small>	10 Ne <small>20.180</small>		
11 Na <small>22.990</small>	12 Mg <small>[24.30, 24.31]</small>	19 K <small>39.098</small>	20 Ca <small>40.078</small>	21 Sc <small>44.956</small>	22 Ti <small>47.867</small>	23 V <small>50.942</small>	24 Cr <small>51.996</small>	25 Mn <small>54.938</small>	26 Fe <small>55.845</small>	27 Co <small>58.933</small>	28 Ni <small>58.693</small>	29 Cu <small>63.546</small>	30 Zn <small>65.38</small>	31 Ga <small>69.723</small>	32 Ge <small>72.630</small>	33 As <small>74.922</small>	34 Se <small>78.96</small>	35 Br <small>[79.90, 79.91]</small>	36 Kr <small>83.798</small>
37 Rb <small>85.468</small>	38 Sr <small>87.62</small>	39 Y <small>88.906</small>	40 Zr <small>91.224</small>	41 Nb <small>92.906</small>	42 Mo <small>95.96</small>	43 Tc <small>(99)</small>	44 Ru <small>101.07</small>	45 Rh <small>102.91</small>	46 Pd <small>106.42</small>	47 Ag <small>107.87</small>	48 Cd <small>112.41</small>	49 In <small>114.82</small>	50 Sn <small>118.71</small>	51 Sb <small>121.76</small>	52 Te <small>127.60</small>	53 I <small>126.90</small>	54 Xe <small>131.29</small>		
55 Cs <small>132.91</small>	56 Ba <small>137.33</small>	57-71 La-Lu	72 Hf <small>178.49</small>	73 Ta <small>180.95</small>	74 W <small>183.84</small>	75 Re <small>186.21</small>	76 Os <small>190.23</small>	77 Ir <small>192.22</small>	78 Pt <small>195.08</small>	79 Au <small>196.97</small>	80 Hg <small>200.59</small>	81 Tl <small>[204.3, 204.4]</small>	82 Pb <small>207.2</small>	83 Bi <small>208.98</small>	84 Po <small>(209)</small>	85 At <small>(210)</small>	86 Rn <small>(222)</small>		
87 Fr <small>(223)</small>	88 Ra <small>(226)</small>	89-103 Ac-Lr	104 Rf <small>(261)</small>	105 Db <small>(262)</small>	106 Sg <small>(266)</small>	107 Bh <small>(264)</small>	108 Hs <small>(277)</small>	109 Mt <small>(268)</small>	110 Ds <small>(271)</small>	111 Rg <small>(272)</small>	112 Cn <small>(285)</small>		114 Fl <small>(289)</small>		116 Lv <small>(293)</small>				
*Lanthanide series	57 La <small>138.91</small>	58 Ce <small>140.12</small>	59 Pr <small>140.91</small>	60 Nd <small>144.24</small>	61 Pm <small>(145)</small>	62 Sm <small>150.36</small>	63 Eu <small>151.96</small>	64 Gd <small>157.25</small>	65 Tb <small>158.93</small>	66 Dy <small>162.50</small>	67 Ho <small>164.93</small>	68 Er <small>167.26</small>	69 Tm <small>168.93</small>	70 Yb <small>173.05</small>	71 Lu <small>174.97</small>				
†Actinide series	89 Ac <small>(227)</small>	90 Th <small>232.04</small>	91 Pa <small>231.04</small>	92 U <small>238.03</small>	93 Np <small>(237)</small>	94 Pu <small>(244)</small>	95 Am <small>(243)</small>	96 Cm <small>(247)</small>	97 Bk <small>(247)</small>	98 Cf <small>(251)</small>	99 Es <small>(252)</small>	100 Fm <small>(257)</small>	101 Md <small>(258)</small>	102 No <small>(259)</small>	103 Lr <small>(262)</small>				

## Periodic Variation in Physical Properties

