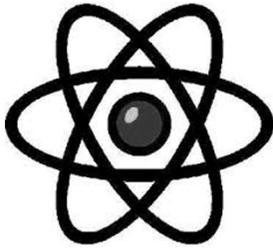


ELEMENTS AND THE



All things, both living and non-living, are made up of atoms. Atoms are the building blocks of all matter. These atoms are much too small to be seen without specialized equipment, but by studying matter, scientists know there are only a limited number of different kinds of atoms that combine in different ways to make up everything around us.

Elements are pure substances that are made up of only one type of atom. Elements can be found on the periodic table and are arranged by increasing atomic number. There are 111 different elements on the chart we will use. Elements are rarely found alone, but instead often combine with other elements to create all the different substances found on Earth.

The Periodic Table of the Elements

1 H Hydrogen 1.01	2 He Helium 4.00																
3 Li Lithium 6.94	4 Be Beryllium 9.01																
11 Na Sodium 22.99	12 Mg Magnesium 24.31																
19 K Potassium 39.10	20 Ca Calcium 40.08	21 Sc Scandium 44.96	22 Ti Titanium 47.87	23 V Vanadium 50.94	24 Cr Chromium 52.00	25 Mn Manganese 54.94	26 Fe Iron 55.85	27 Co Cobalt 58.93	28 Ni Nickel 58.69								
37 Rb Rubidium 85.47	38 Sr Strontium 87.62	39 Y Yttrium 88.91	40 Zr Zirconium 91.22	41 Nb Niobium 92.91	42 Mo Molybdenum 95.94	43 Tc Technetium (98)	44 Ru Ruthenium 101.07	45 Rh Rhodium 102.91	46 Pd Palladium 106.42								
55 Cs Cesium 132.91	56 Ba Barium 137.33	57 La Lanthanum 138.91	72 Hf Hafnium 178.49	73 Ta Tantalum 180.95	74 W Tungsten 183.84	75 Re Rhenium 186.21	76 Os Osmium 190.23	77 Ir Iridium 192.22	78 Pt Platinum 195.08								
87 Fr Francium (223)	88 Ra Radium (226)	89 Ac Actinium (227)	104 Rf Rutherfordium (261)	105 Db Dubnium (262)	106 Sg Seaborgium (266)	107 Bh Bohrium (264)	108 Hs Hassium (265)	109 Mt Meitnerium (268)	110 Ds Darmstadtium (281)								

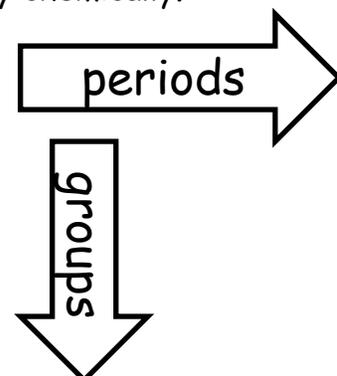
3	Li	Atomic Number
	Li	Element Symbol
	Lithium	Element Name
	6.94	Average Atomic Mass

molybdenum	← element name
42	← atomic number number of protons (Z)
Mo	← atomic symbol
95.94	← atomic mass A (this is an average mass)

58 Ce Cerium 140.12	59 Pr Praseodymium 140.91	60 Nd Neodymium 144.24	61 Pm Promethium (145)	62 Sm Samarium 150.36	63 Eu Europium 151.96
90 Th Thorium 232.04	91 Pa Protactinium 231.04	92 U Uranium 238.03	93 Np Neptunium (237)	94 Pu Plutonium (244)	95 Am Americium (243)

Each element has its own **chemical symbol**. This symbol is an abbreviated (or shortened) form of the element's name. Most element symbols match their English names, but in some cases, the symbol is a form of their Latin name so the letters don't match what you might expect. For example, Gold is Au for its Latin name - Aurum. The first letter of the symbol is always a capital letter. The second letter is always lower case.

Elements are organized on the periodic table by their properties. **Periods** are rows that go across the table and **groups** are vertical columns. Elements in the same group tend to react much the same way chemically.



PERIODIC TABLE

The periodic table of elements is like a map of the elements that shows the relationships between the elements. Dmitri Mendeleev is credited with the first arrangement of the periodic table in 1869. We still use the basis of his work today.

lements

										2 He Helium 4.00
										10 Ne Neon 20.18
										18 Ar Argon 39.95
										36 Kr Krypton 83.80
										86 Rn Radon 222
111 Rg Roentgenium (272)	112 Cn Copernicium (285)	113 Nh Nihonium (284)	114 Fl Flerovium (289)	115 Mc Moscovium (288)	116 Lv Livermorium (293)	117 Ts Tennessine (294)	118 Og Oganesson (294)			
79 Au Gold 196.97	80 Hg Mercury 200.59	81 Tl Thallium 204.38	82 Pb Lead 207.2	83 Bi Bismuth 208.98	84 Po Polonium (209)	85 At Astatine (210)	86 Rn Radon (222)			
47 Ag Silver 107.87	48 Cd Cadmium 112.41	49 In Indium 114.82	50 Sn Tin 118.71	51 Sb Antimony 121.76	52 Te Tellurium 127.60	53 I Iodine 126.90	54 Xe Xenon 131.29			
29 Cu Copper 63.55	30 Zn Zinc 65.39	31 Ga Gallium 69.72	32 Ge Germanium 72.61	33 As Arsenic 74.92	34 Se Selenium 78.96	35 Br Bromine 79.90	36 Kr Krypton 83.80			
										16 S Sulfur 32.07
										15 P Phosphorus 30.97
										14 Si Silicon 28.09
										13 Al Aluminum 26.99
										7 N Nitrogen 14.01
										6 C Carbon 12.01
										5 B Boron 10.81

64 Gd Gadolinium 157.25	65 Tb Terbium 158.93	66 Dy Dysprosium 162.50	67 Ho Holmium 164.93	68 Er Erbium 167.26	69 Tm Thulium 168.93	70 Yb Ytterbium 173.04	71 Lu Lutetium 174.97			
96 Cm Curium (247)	97 Bk Berkelium (247)	98 Cf Californium (251)	99 Es Einsteinium (252)	100 Fm Fermium (257)	101 Md Mendelevium 288	102 No Nobelium (289)	103 Lr Lawrencium (262)			

Although the periodic table is readily available as a reference, some elements are used so frequently, it's easier to memorize their symbols than to look them up each time. To the right is a list of some common elements that you might want to learn.

10 Common Elements

H = Hydrogen
O = Oxygen
N = Nitrogen
C = Carbon
He = Helium
Ca = Calcium
Na = Sodium
Al = Aluminum
Cu = Copper
S = Sulfur

Elements often bond together to create many different substances. **Compounds** are formed when two or more different elements combine in specific ratios. The make-up of compounds can be found in **chemical formulas**. Some common compounds include:

NaCl - one sodium atom and one chlorine atom - sodium chloride or table salt
H₂O - two hydrogen atom and one oxygen atom - water
CO₂ - one carbon and two oxygen atoms - carbon dioxide
Fe₃O₄ - three irons and four oxygen atoms - iron oxide or rust

The most important thing to remember about elements is that elements are pure substances that can be shown with chemical symbols. These chemical symbols can be found on the periodic table of the elements.