

Topic 5 The Periodic Table

Mendeleev Builds a Table



The system of using atomic mass to classify and organize all the elements known and undiscovered was created based on Dalton's Theory, by Dmitri Mendeleev (1834-1907)

Mendeleev collected the 63 elements known at the time and arranged them according to their **atomic mass** - *the average mass of an atom of an element* - (which he wrote on a file card).

He then arranged the cards into a 'solitaire-like' table. He played with them, by sorting and arranging the elements in many different combinations.

Mendeleev was able to identify gaps where elements, not yet discovered, would be able to fit.

Find out more about Dmitri Mendeleev
Blast From The Past @
<http://www.edquest.ca/content/view/214/>

			Ti=50	Zr=90	?[2]=180		
			V=51	Nb=94	Ta=182		
			Cr=52	Mo=96	W=186		
			Mn=55	Rh=104,4[3]	Pt=197,4[4]		
			Fe=56	Ru=104,4	Ir=198		
			Ni=Co=59	Pd=106,6	Os=199		
			Cu=63,4	Ag=108	Hg=200		
			Zn=65,2	Cd=112			
			?[6]=68	Ur=116[7]	Au=197?		
			?[8]=70	Sn=118			
			N=14	P=31	As=75	Sb=122	Bi=210?
			O=16	S=32	Se=79,4	Te=128?	
			F=19	Cl=35,5	Br=80	J=127[9]	
	Li=7	Na=23	K=39	Rb=85,4	Cs=133	Tl=204	
			Ca=40	Sr=87,6	Ba=137	Pb=207	
			?[10]=45	Ce=92[11]			
			?Er=56	La=94			
			?Yt=60	Di=95			
			?In=75,6	Th=118?			

Putting the Elements in Order

When Mendeleev arranged the elements in order of their mass he found that the properties of the elements repeated at periodic intervals. This enabled him to group elements into families. The gaps he left in the organization of the elements in his table were filled in many years later when more elements were discovered. In 1875 gallium was discovered and proved that Mendeleev's organization of the elements worked, because it fit in where he had placed a (?). The next (?) was not replaced until 1939 when francium was discovered. In 1915 the Modern Periodic Table was reorganized with a focus on **atomic structure** and included more information about each element.

Atomic Number – An element is defined by the number of protons it has. Carbon atoms have six protons, hydrogen atoms have one proton and oxygen atoms have eight protons. The chemical behavior of an atom has is called the atomic number.

Mass Number - The atomic mass number of an element is simply the sum of the protons and neutrons in the nucleus of 1 atom of the element.

Atomic Symbol - These are almost always one or two letters that represent an element. They're used worldwide and usually relate to the name of the element or the Latin name of the element. An example of this is "O" for Oxygen and "Ca" for Calcium.

Atomic Mass – The average mass of an element in atomic mass units (amu.) The mass in an atom is roughly the mass of one proton or neutron. The atomic mass is a decimal number on the Periodic Table because it's an average of the various isotopes (one or more atoms that have the same atomic number but different mass numbers) of an element.

Periodic Table Models

About 112 elements are known today.

They are organized into what is called '**The Periodic Table of Elements**'

Understanding the Periodic Table ([Web Elements.com](http://www.webelements.com))

1 H																	2 He														
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne														
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar														
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr														
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe														
55 Cs	56 Ba	57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn
87 Fr	88 Ra	89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr	104 Rf	105 Db	106 Sg	107 Bh	108 Hs	109 Mt	110 Uun								

58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb	71 Lu
90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No	103 Lr

Horizontal rows are called **periods** (*numbered 1-7*)

Vertical columns form a **group**, or **family** of elements (*numbered 1-18*)

There are so many good resources available to help you look into the details of the Periodic Table and also to help you with **Think and Link Investigation 2-D** (Science Focus pgs. 129-133) **Meet the Modern Periodic Table**, that you should have access to the Internet when you complete the investigation.

Periodic City – A Site that shows many different versions of the Period Table

http://www.mpcfacylty.net/ron_rinehart/periodic.htm

[Other versions] <http://chemlab.pc.maricopa.edu/periodic/foldedtable.html>

Los Alamos Periodic Table

Visual Elements (Flash Version)

Pictorial Periodic Table - <http://chemlab.pc.maricopa.edu/periodic/periodic.html>