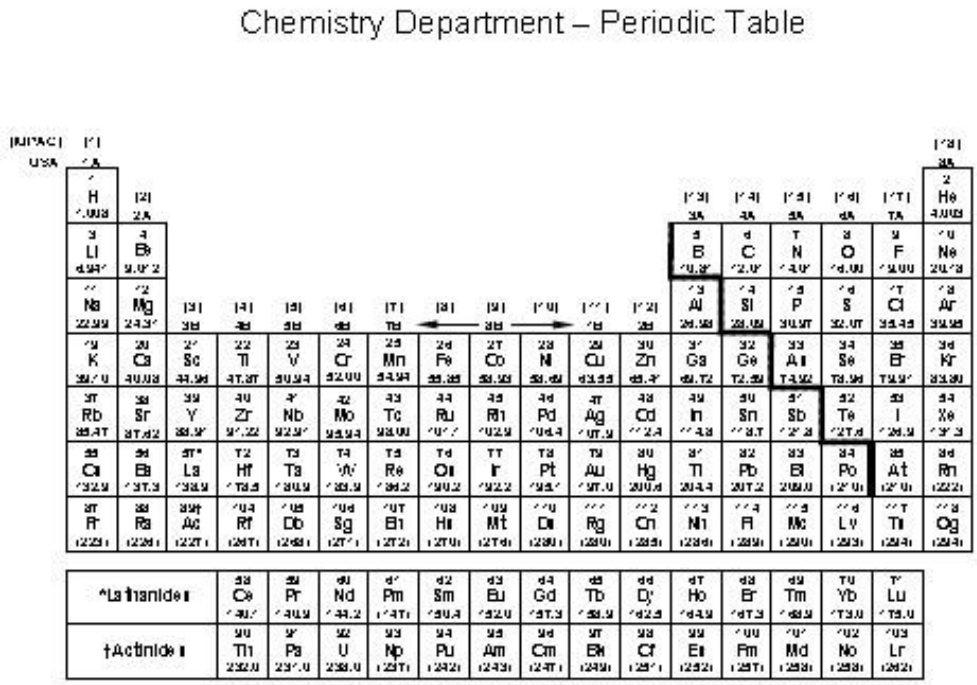
The Periodic Table

This is the Blackboard Periodic Table (xls)



Periodic – having repeated cycles

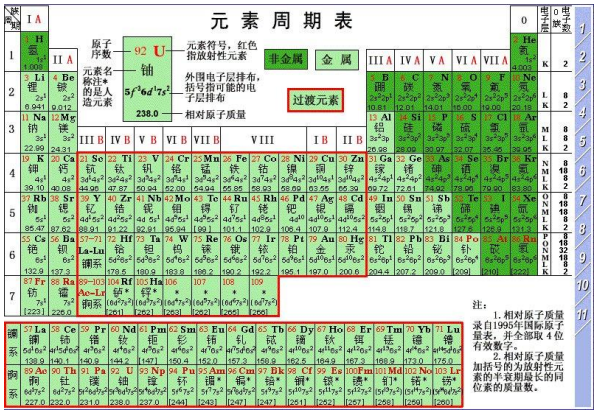
First proposed by Mendeleyev, a Russian chemist in 1869

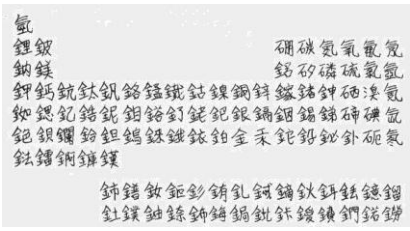
- Arranged elements by weight and chemical properties
- Had 4 empty spaces, 3 of which he predicted
  - eka-Aluminum (Gallium)
  - eka-Boron (Scandium)
  - eka-Silicon (Germanium)

The 4 th, technecium was not discovered until the 1920's

Ordered Te & I by chemical properties, not weight
Established state standards for alcohol content in Vodka

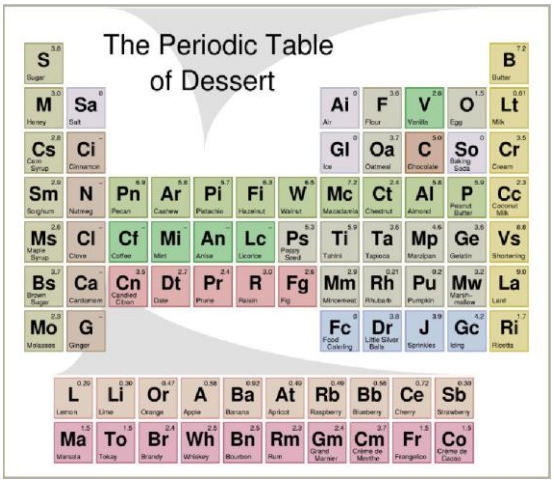
The Periodic Table Is A Universal Symbol of Chemistry

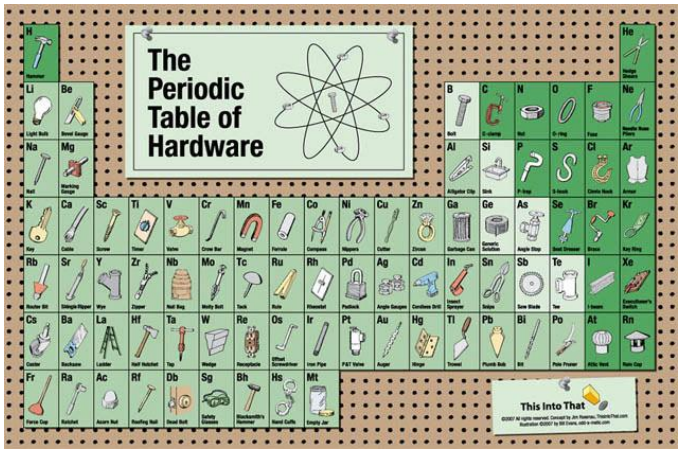




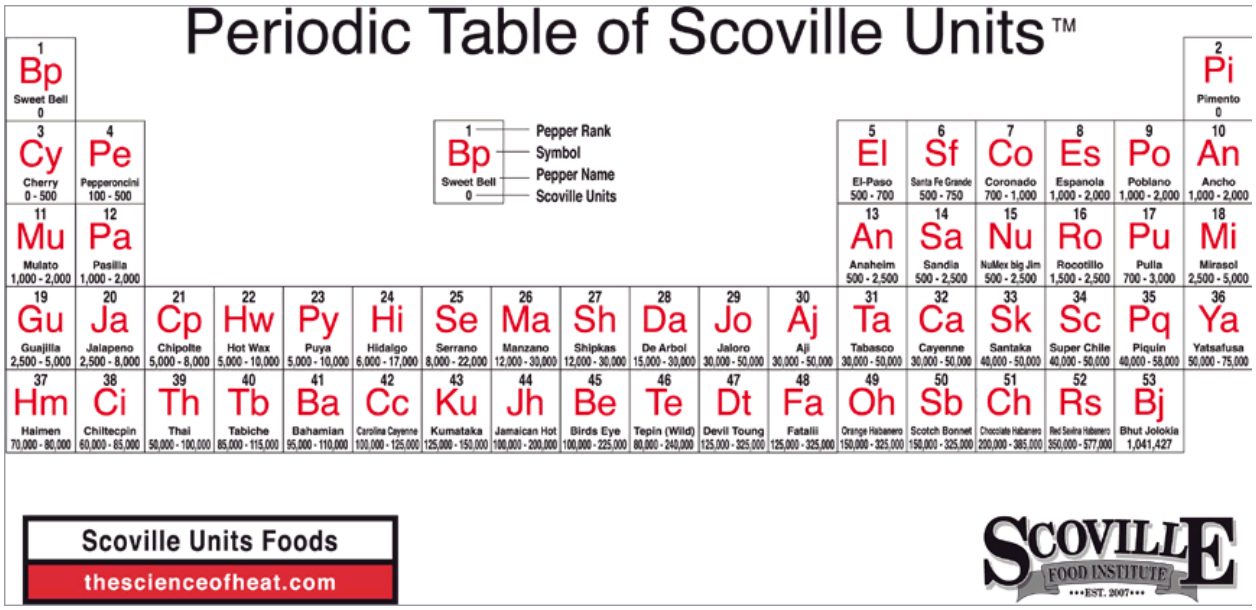
Copyright Larry P. Taylor All Rights Reserved

Format (Implied Organization) often used for humor



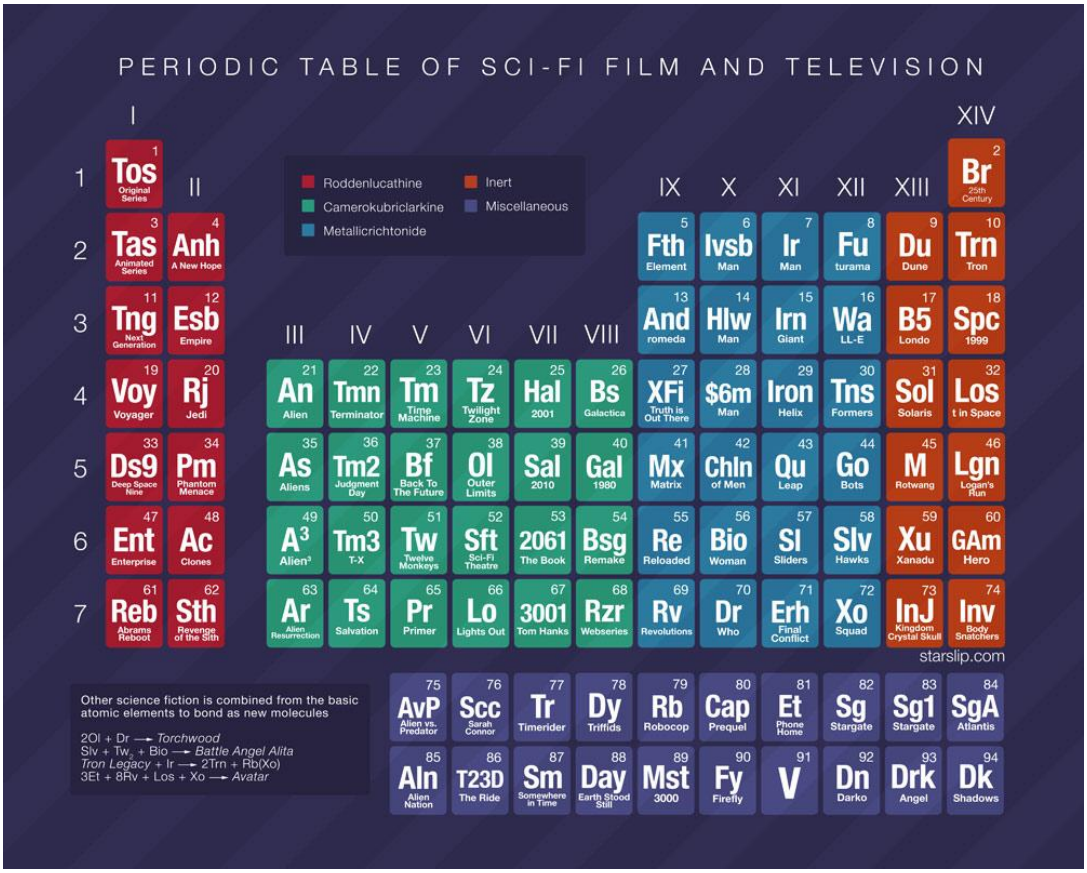


Scoville Units



Copyright Larry P. Taylor All Rights Reserved

Science-Fiction Periodic Table

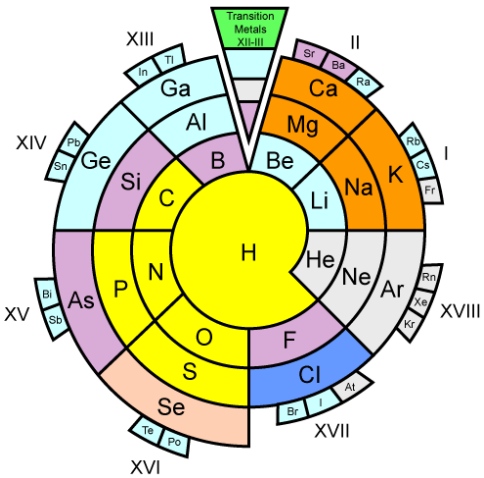


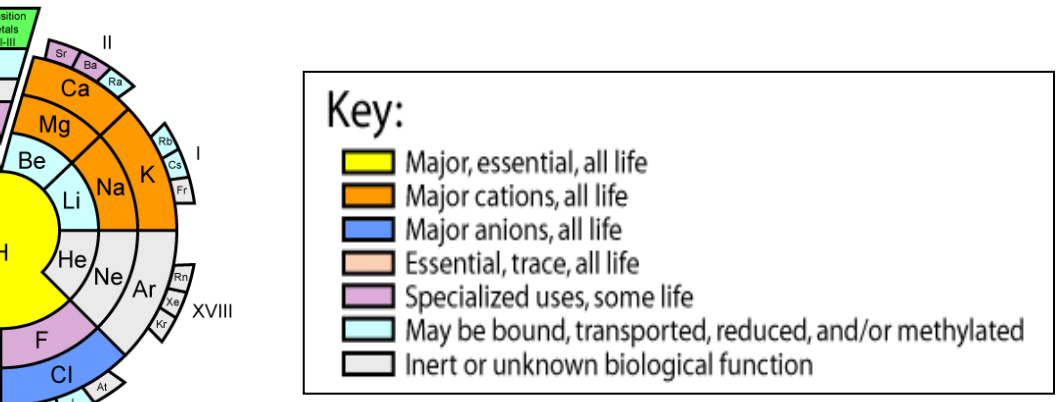
Sometimes used for emphasis
(Elements of Life)

Group	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Period																		
1	1 H																	2 He
2	3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne
3	11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
4	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
5	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
6	55 Cs	56 Ba	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
7	87 Fr	88 Ra																
Lanthanoids			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		
Actinoids			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		

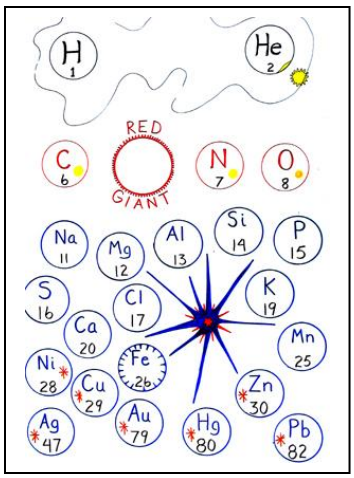
Key	Biologically relevant elements colored
	Major, essential, all life
	Major anions, all life
	Major cations, all life
	Essential, trace, all life
	Major biological transition metals
	Specialized uses, some life
	May be bound, transported, reduced, and/or methylated
	Inert or unknown biological function

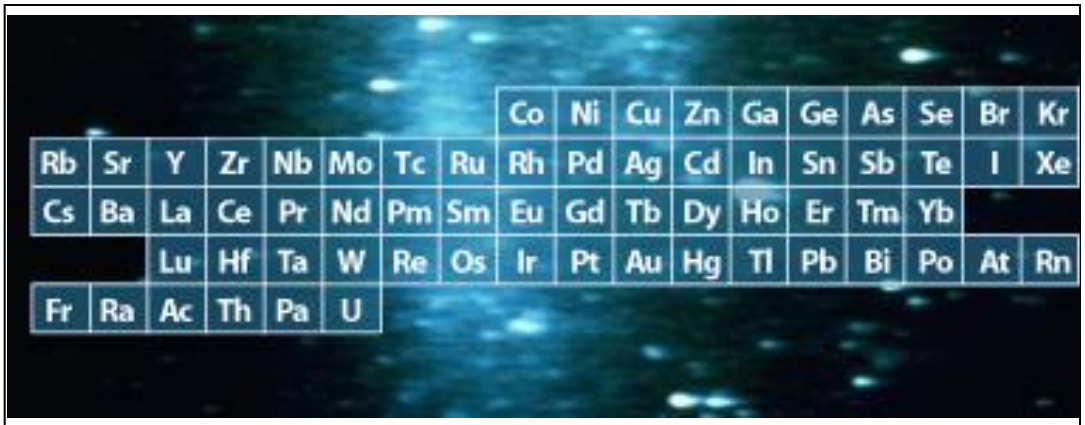
Copyright Larry P. Taylor All Rights Reserved





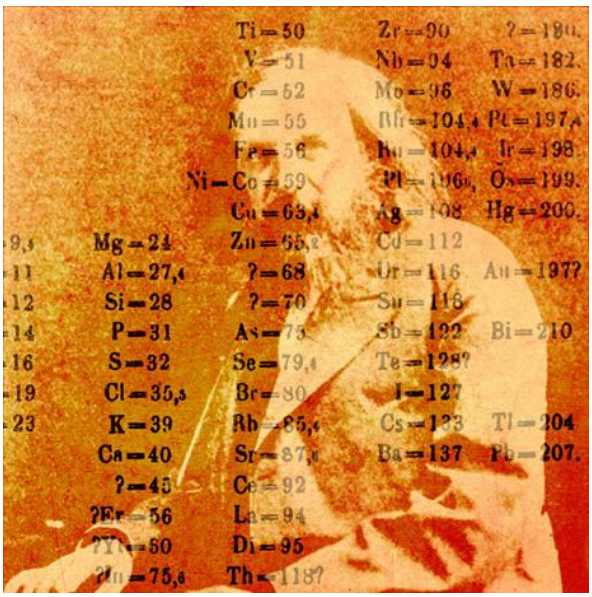
Stellar Evolution





Elements In Nature Formed Only During Supernova

Mendeleev's Original "Table"

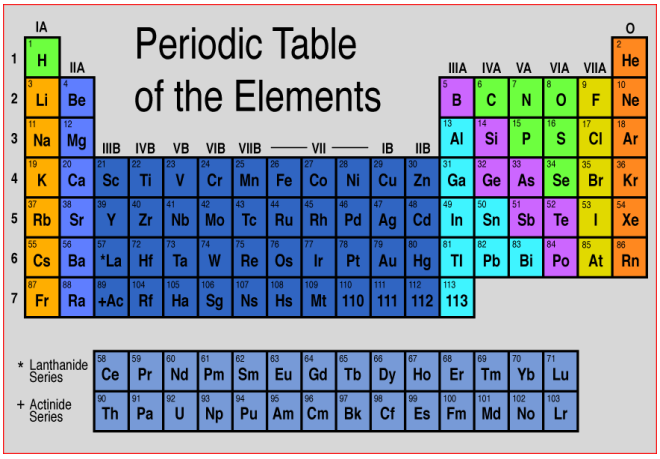


Arranged according to atomic weight

Copyright Larry P. Taylor All Rights Reserved

The Modern Periodic Table

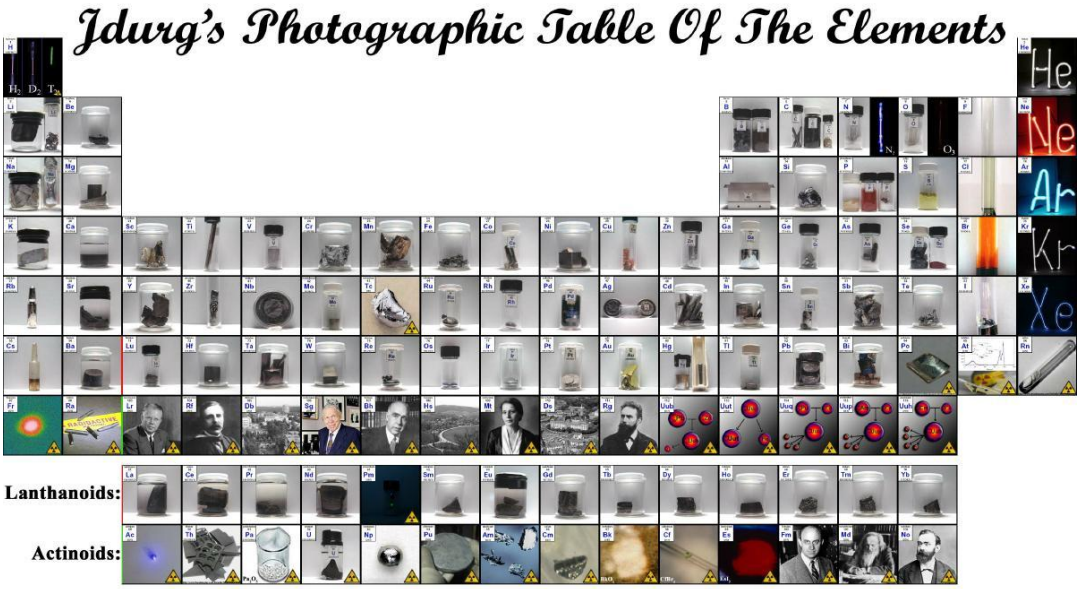
Periodic = repeating
Elements ordered by Z show "repeating properties" ← Very Important!
Period: rows ~ similar trends
Groups: columns ~ similar chemical properties
Groups = chemical families



Has a variety of Forms
Key element is periodicity

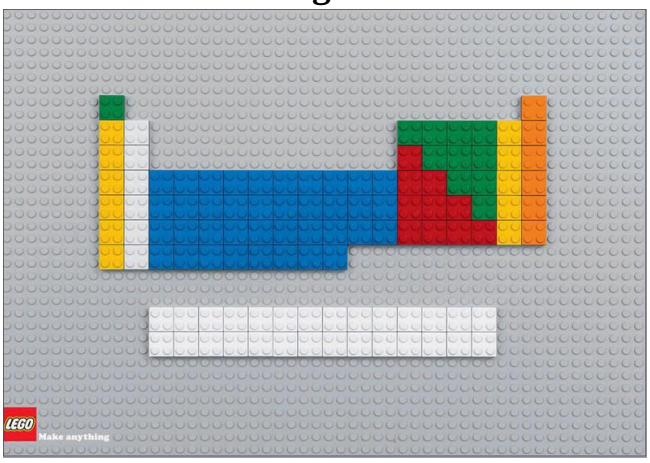
Multiple Formats:
Emphasize Periodicity
Not Tested

Photographic

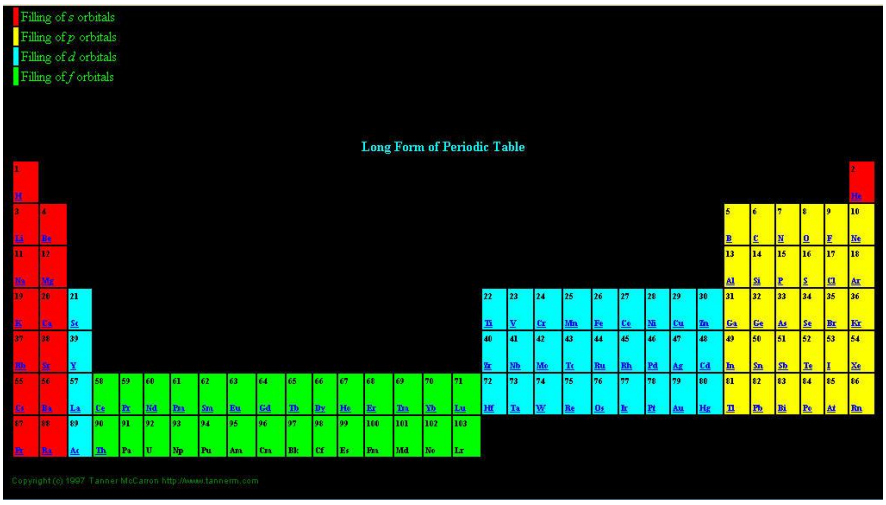


Copyright Larry P. Taylor All Rights Reserved

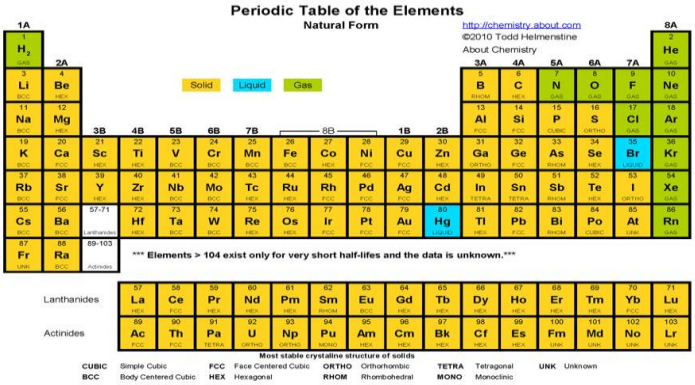
Legos



The Extended Periodic Table

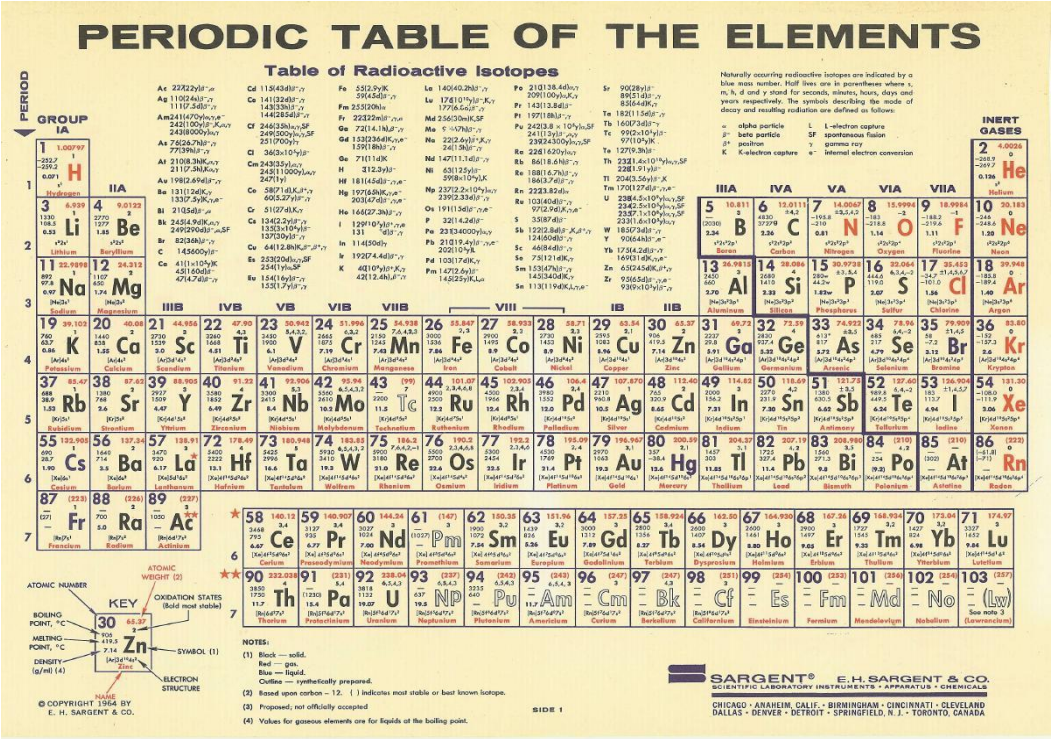


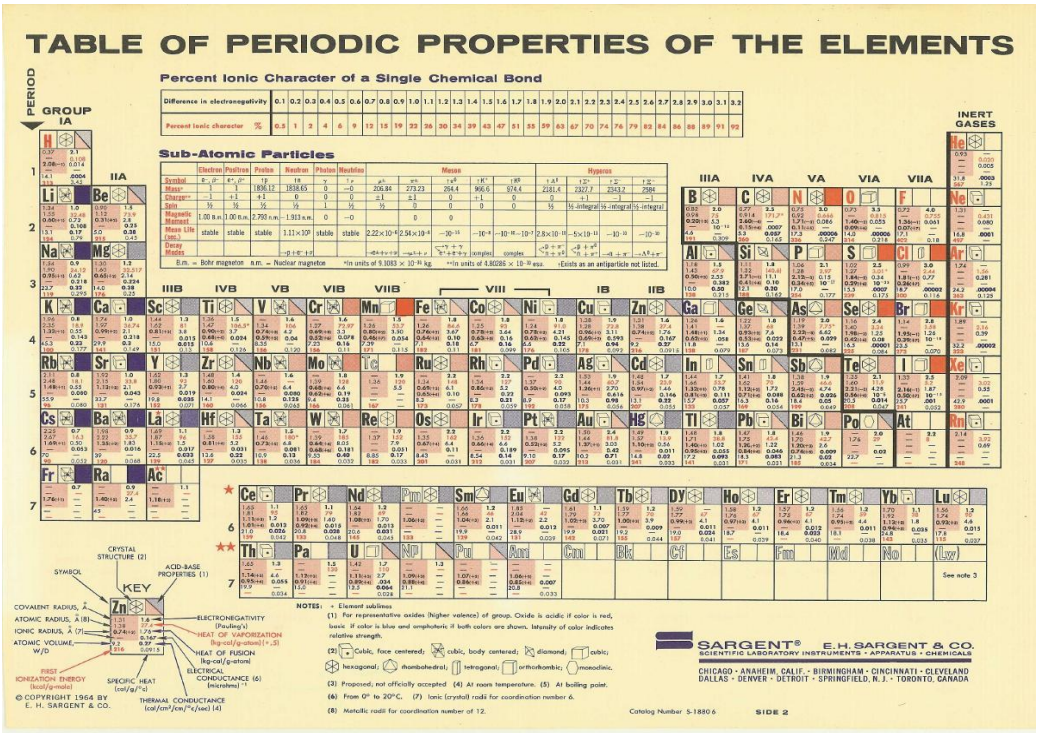
Physical State



Copyright Larry P. Taylor All Rights Reserved

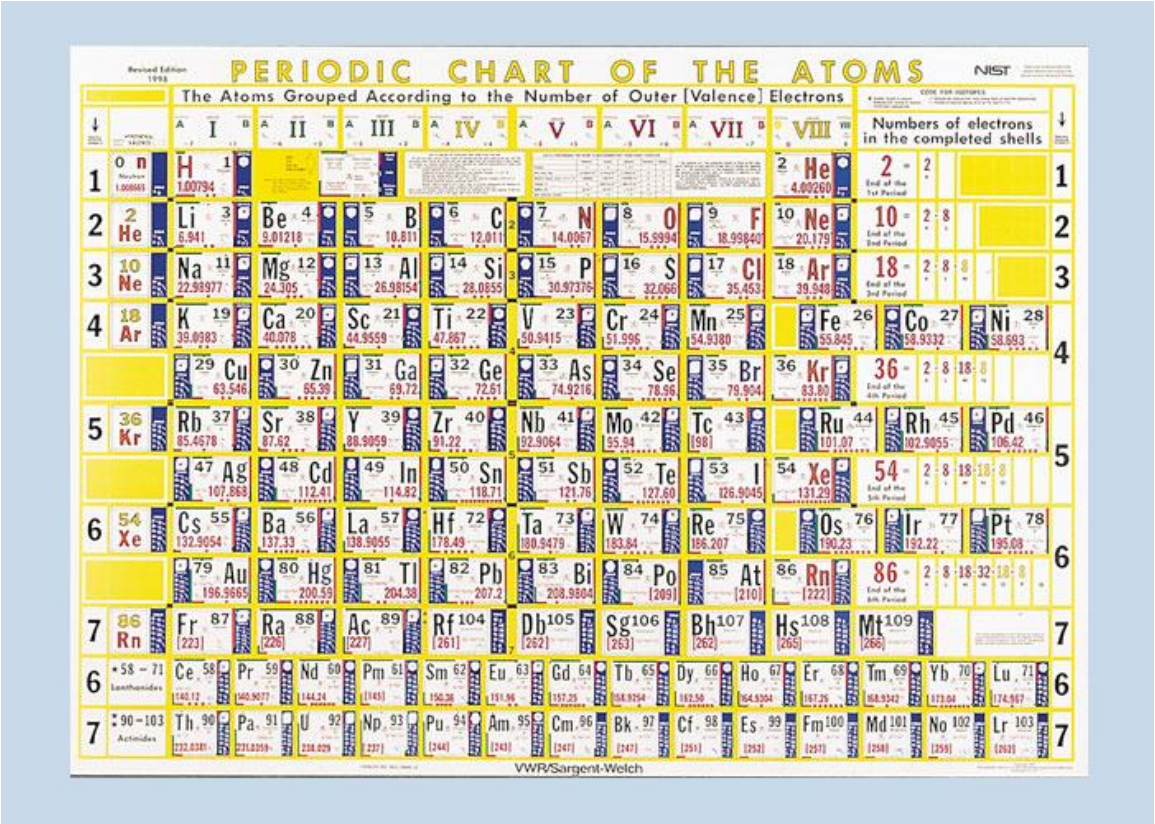
Student Table From 1960's



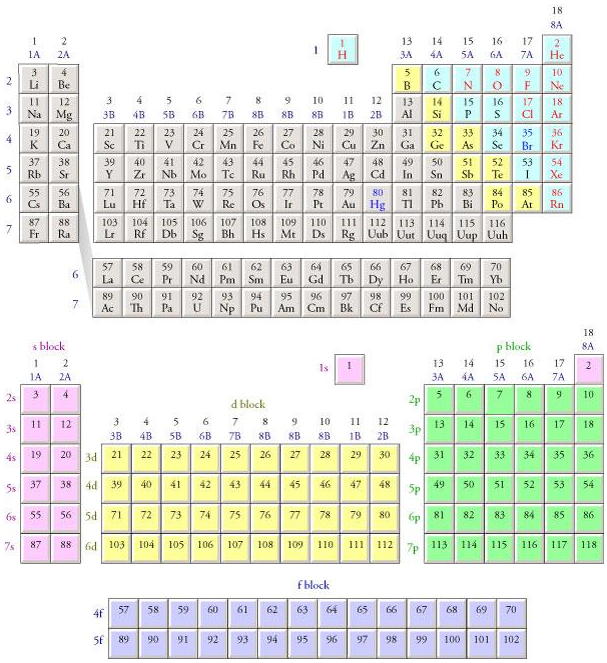


Copyright Larry P. Taylor All Rights Reserved

Welch Chart (Hollywood set dressing for years)

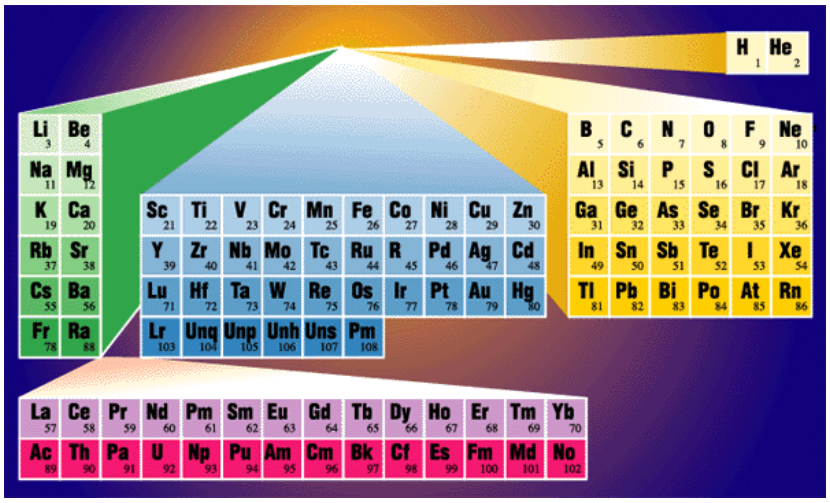


Blocked Form

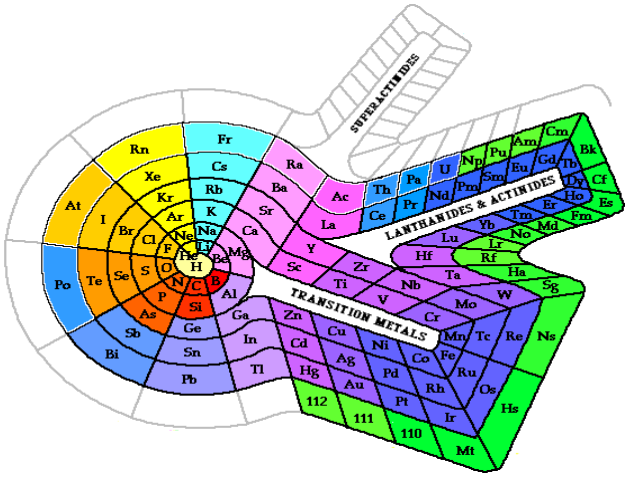


Copyright Larry P. Taylor All Rights Reserved

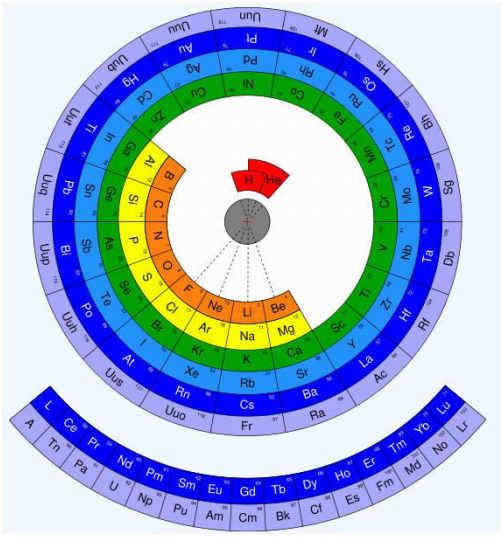
Another "Blocked Version"



A "Circular" Version

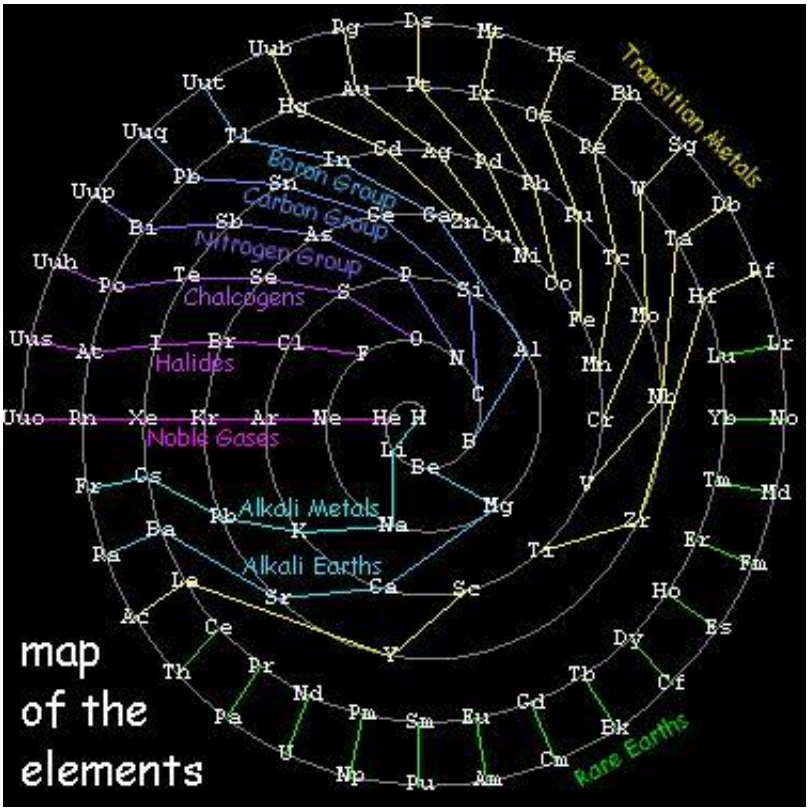


Another Circular Pattern

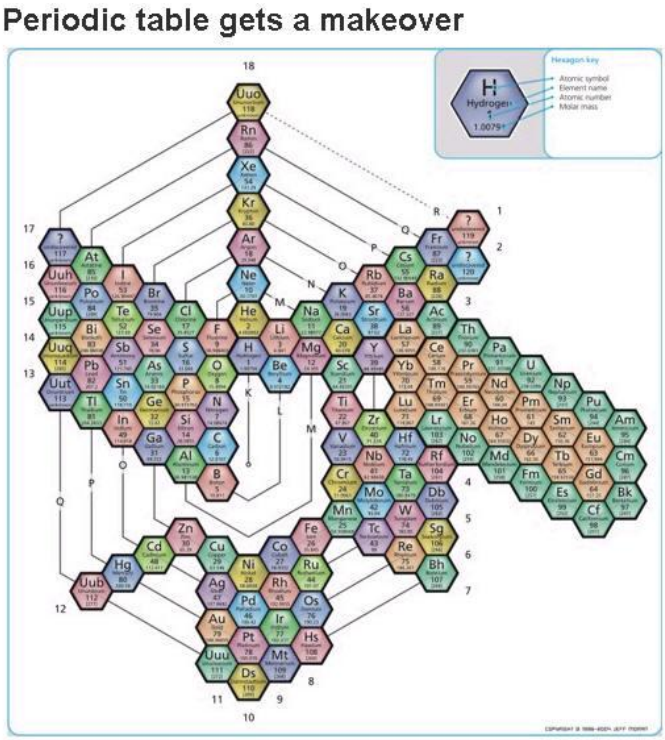


Copyright Larry P. Taylor All Rights Reserved

Spiral "Map"

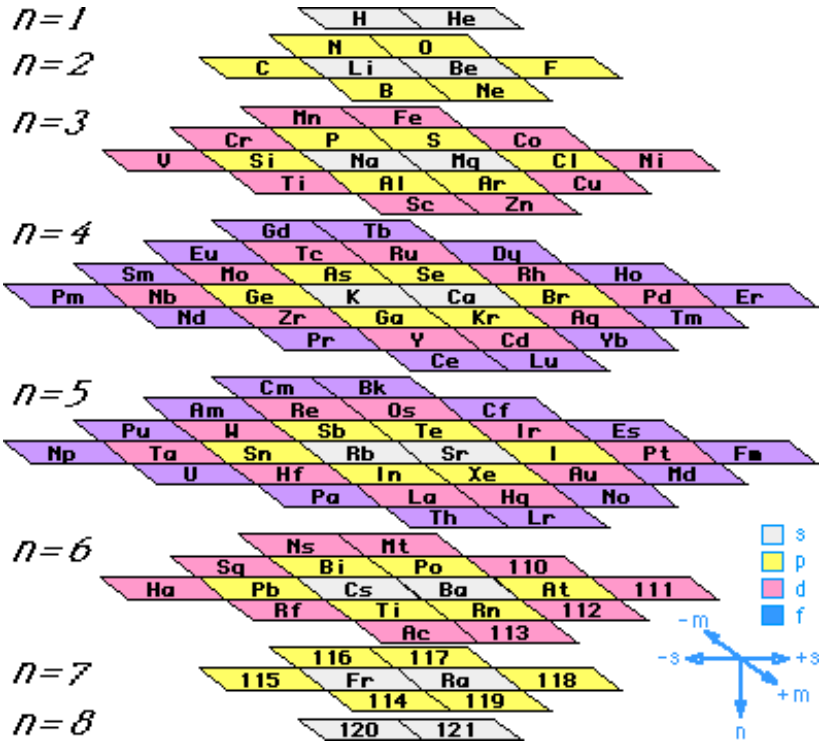


Hexagonal View

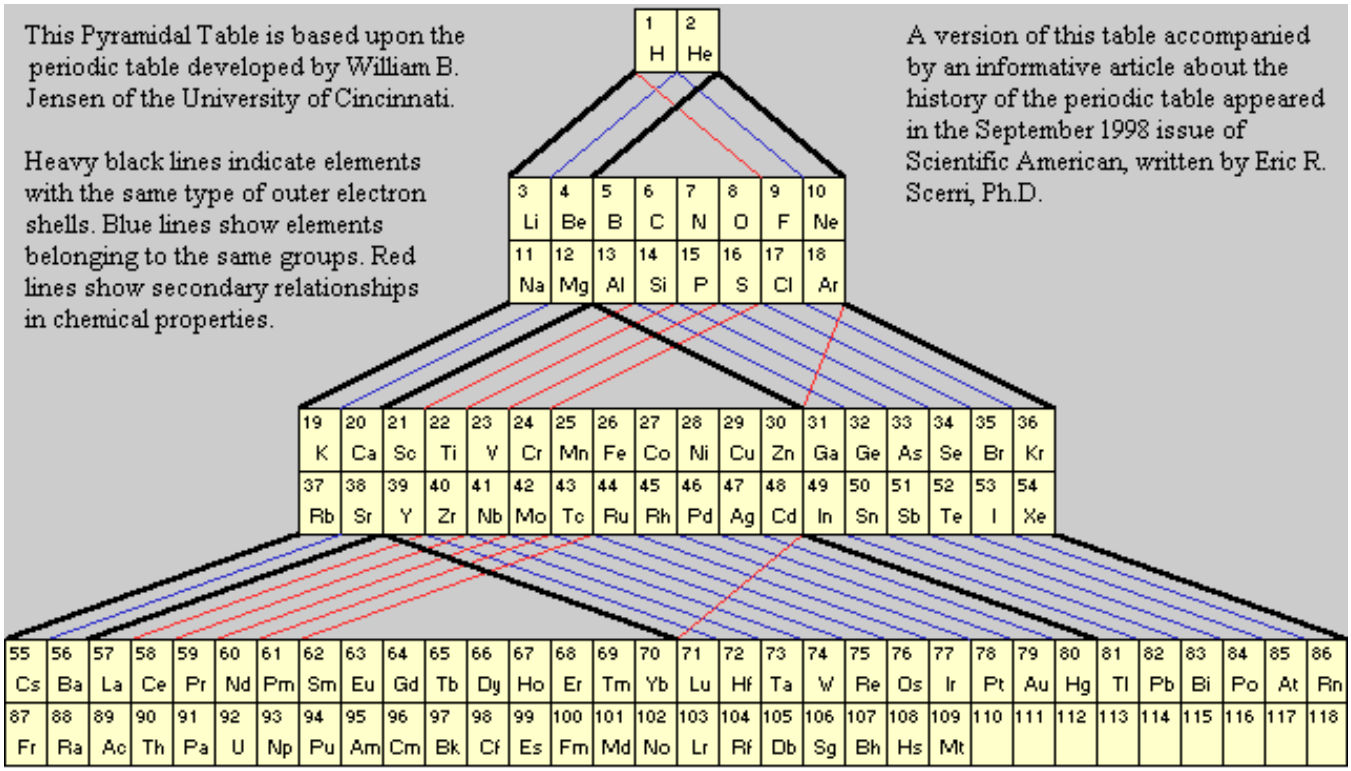


Copyright Larry P. Taylor All Rights Reserved

Planar Periodic Table

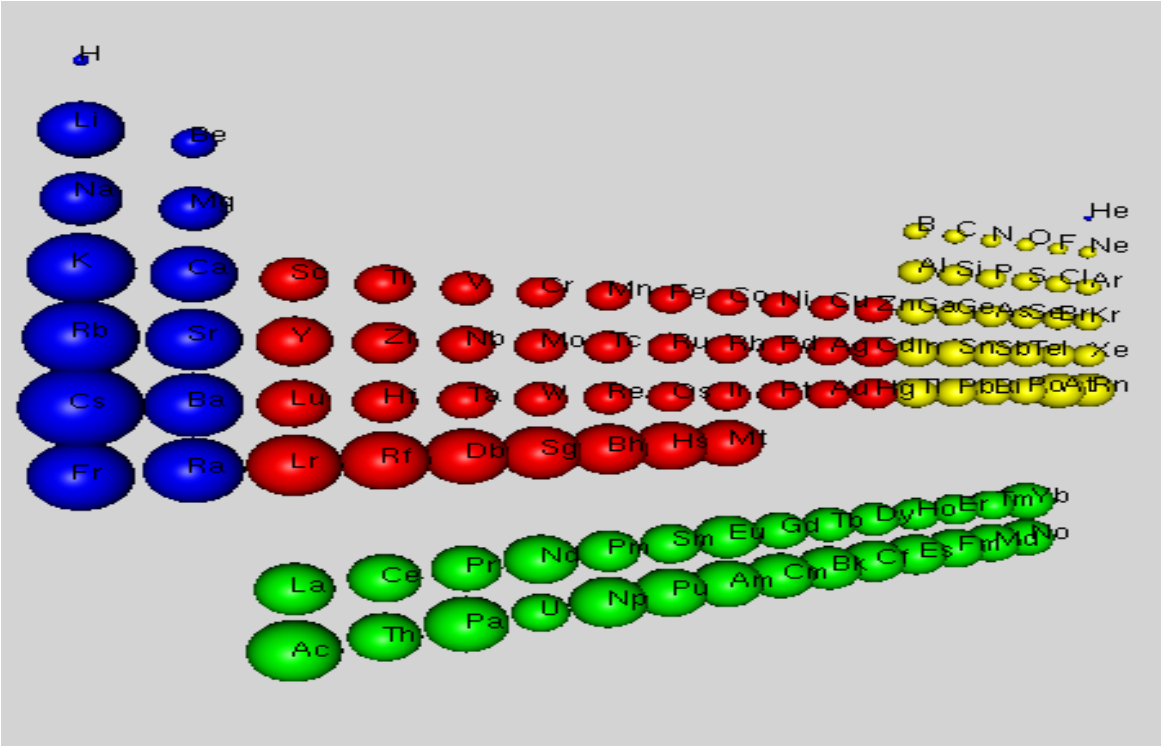


Pyramidal Periodic Table

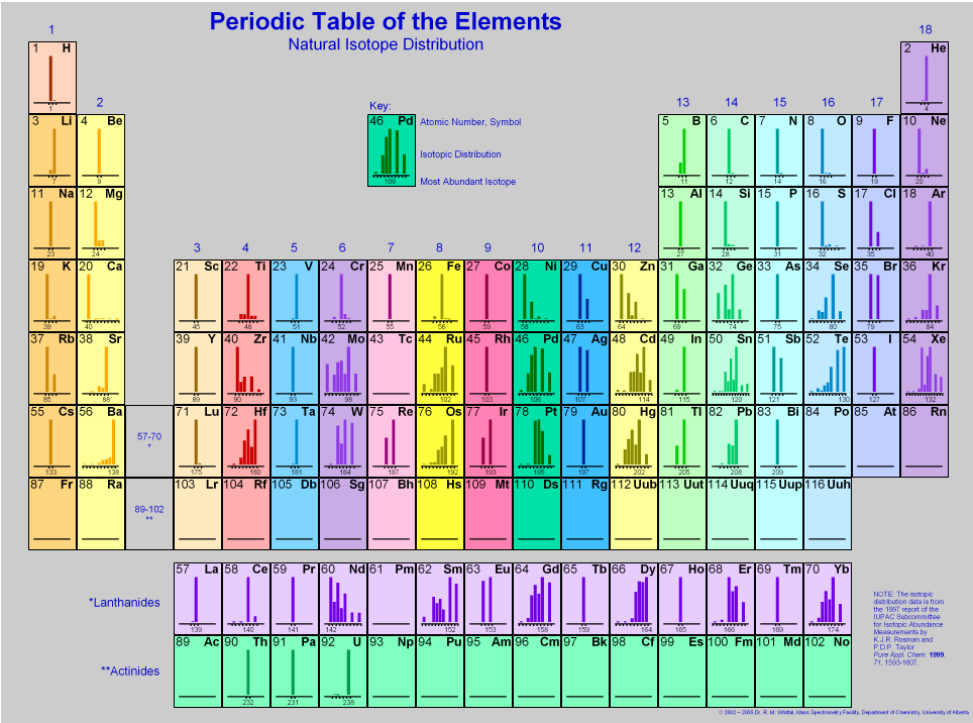


Copyright Larry P. Taylor All Rights Reserved

Atomic Size (Increases Within Family With Increasing Weight)

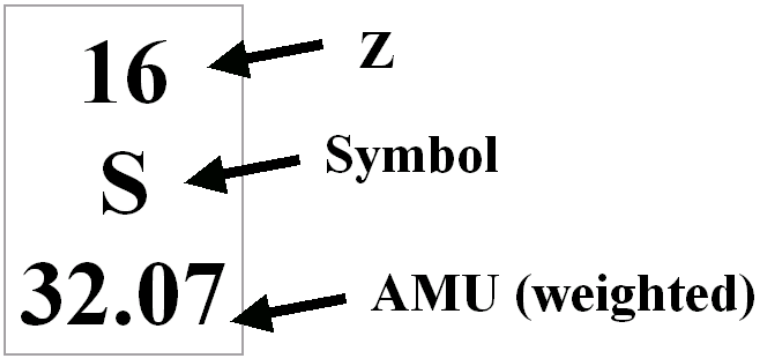


Isotope Information (typically not given)



Copyright Larry P. Taylor All Rights Reserved

The Periodic Table Notation

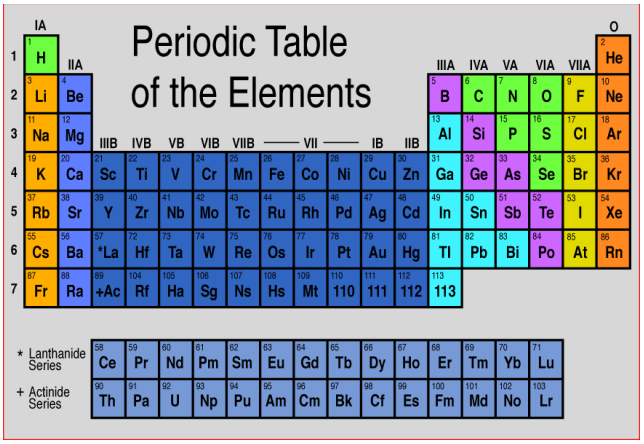


Families – Direct Result of Periodicity

Families have similar chemical properties

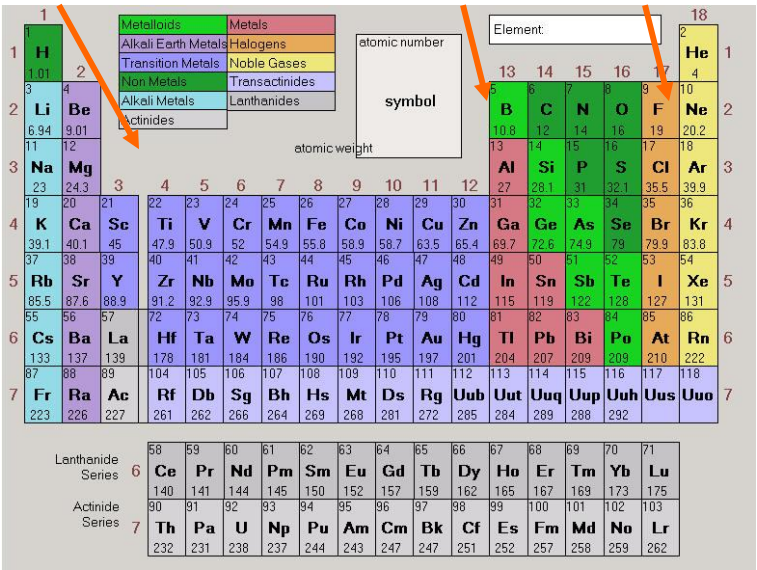
Group 1A: alkali metals
Group 2A: alkaline earth metals
Group 7A: halogens
Group 8A: noble (inert) gases

Representative: Outside Columns
Left: 2 Columns Right: 6 Columns
Transition: Inner Block (10 columns)



3 Categories: of Elements

Metals **Metalloids** **Non-Metals**



Metalloids: On Staircase

Metals: Left of Staircase
Non-Metals: Right of Staircase

Copyright Larry P. Taylor All Rights Reserved

Metals

Metallic shine or luster
Flexible
Solids @ room temp
Ductile - can be drawn into wires
Malleable - can be pounded into thin sheets
Conduct heat & electricity

Non-Metals – Right Side Periodic Table

No shine ~ variable colors
Brittle, hard
Mostly gases @ room temperature
Not malleable
Not ductile
Poor conductors

Metalloids – The "Staircase"

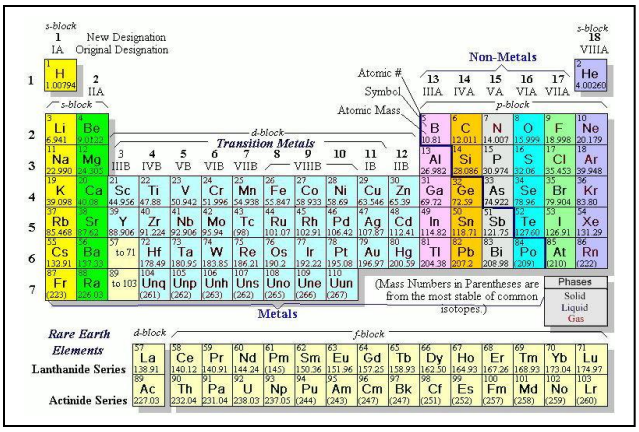
Border Between Metals & Non-Metals
Properties depend on environment
Semi-conductors
good conductor at high T
poor conductor at low T

B Boron
Si Silicon
Ge Germanium
As Arsenic
Sb Antimony
Te Tellurium
Po Polonium

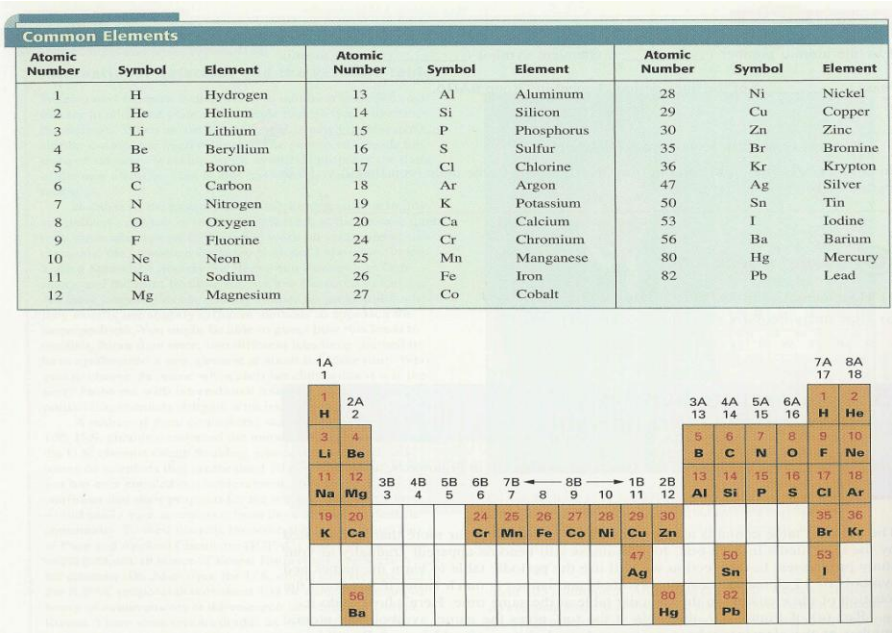
Periodic Table – Summary of Families

Group 1A: alkali metals
Group 2A: alkaline earth metals
Group 7A: halogens
Group 8A: noble (inert) gases
Representative: The A Groups (the Edges)
Transition Metals: The B Groups (the center)
Metalloids: "Staircase" B,Si, Ge, As, Sb, Te, Po

Lanthanides = upper, of lower rows
Actinides = lower, of lower row



These Common Elements Should Now Be Memorized

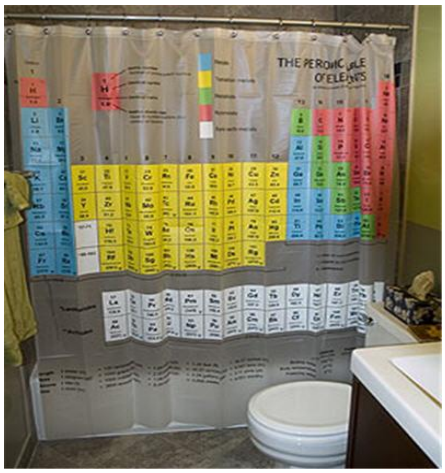


Common Elements

Atomic Number	Symbol	Element	Atomic Number	Symbol	Element	Atomic Number	Symbol	Element
1	H	Hydrogen	13	Al	Aluminum	28	Ni	Nickel
2	He	Helium	14	Si	Silicon	29	Cu	Copper
3	Li	Lithium	15	P	Phosphorus	30	Zn	Zinc
4	Be	Beryllium	16	S	Sulfur	35	Br	Bromine
5	B	Boron	17	Cl	Chlorine	36	Kr	Krypton
6	C	Carbon	18	Ar	Argon	47	Ag	Silver
7	N	Nitrogen	19	K	Potassium	50	Sn	Tin
8	O	Oxygen	20	Ca	Calcium	53	I	Iodine
9	F	Fluorine	24	Cr	Chromium	56	Ba	Barium
10	Ne	Neon	25	Mn	Manganese	80	Hg	Mercury
11	Na	Sodium	26	Fe	Iron	82	Pb	Lead
12	Mg	Magnesium	27	Co	Cobalt			

Copyright Larry P. Taylor All Rights Reserved

‘cause memorizing is preferable to these training aids



Assignment

Continue Taking Unit 4 Practice Test
Blackboard only records highest score
Take until multiple 100’s have been scored (questions are variable)
(Gives sense of test exam format and content)

The Practice Quiz is very similar to the Unit Exam
Success on Unit exam is directly related to practice exam experiences

Continue memorizing:
Polyatomic Ions

Copyright Larry P. Taylor All Rights Reserved