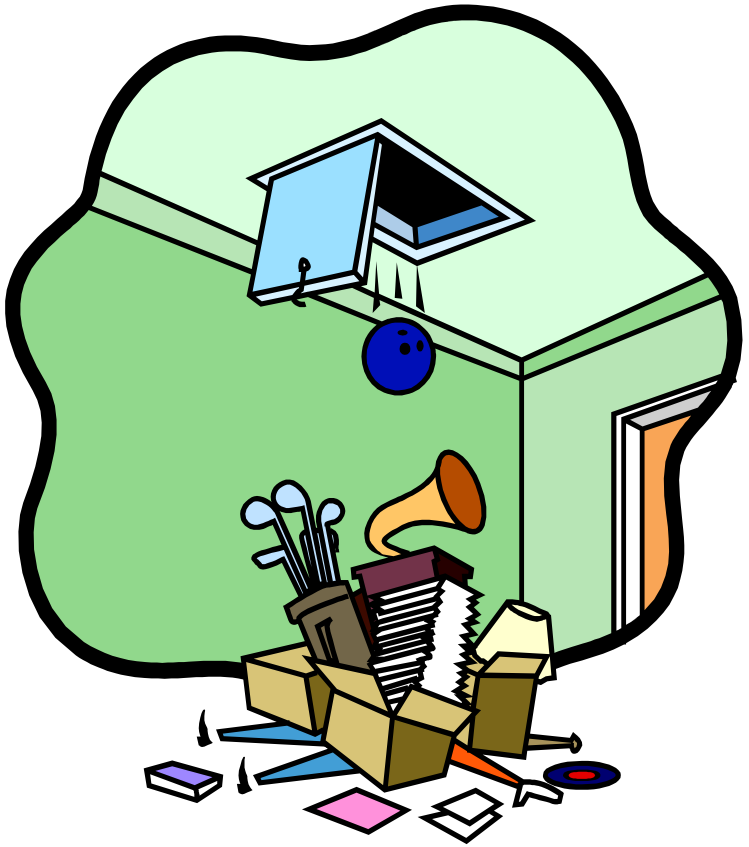
The Periodic Table

Why is the Periodic Table important to me?

- The periodic table is the most useful tool to a chemist.
- You get to use it on every test.
- It organizes lots of information about all the known elements.

Pre-Periodic Table Chemistry …

- …was a mess!!!
- No organization of elements.
- Imagine going to a grocery store with no organization!!
- Difficult to find information.
- Chemistry didn't make sense.



Dmitri Mendeleev: Father of the Table

HOW HIS WORKED…

- Put elements in rows by increasing atomic weight.
- Put elements in columns by the way they reacted.

SOME PROBLEMS…

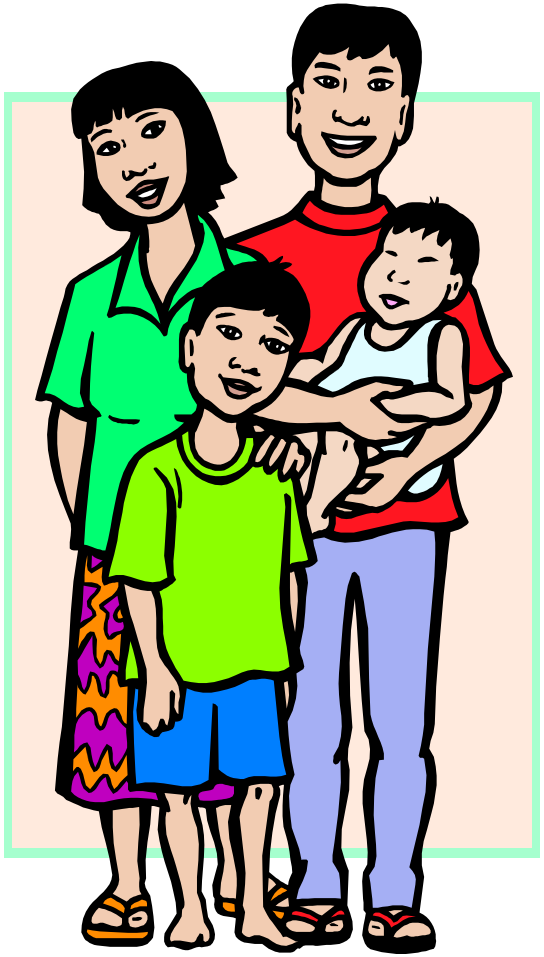
- He left blank spaces for what he said were undiscovered elements. (Turned out he was right!)
- He broke the pattern of increasing atomic weight to keep similar reacting elements together.

The Current Periodic Table

- Mendeleev wasn't too far off.
- Now the elements are put in rows by increasing **ATOMIC NUMBER!!**
- The horizontal rows are called periods and are labeled from 1 to 7.
- The vertical columns are called groups are labeled from 1 to 18.

Families on the Periodic Table

- Columns are also grouped into families.
- Families may be one column, or several columns put together.
- Families have names rather than numbers. (Just like your family has a common last name.)



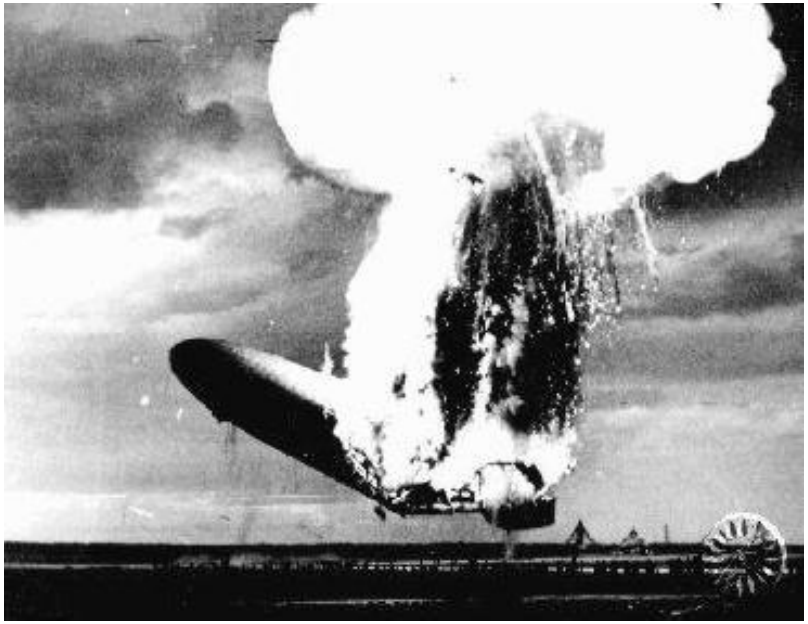
Groups…Here's Where the Periodic Table Gets Useful!!

- **Elements in the same group have similar chemical and physical properties!!**
- **(Mendeleev did that on purpose.)**

Why??

- They have the same number of valence electrons.

Hydrogen



- Hydrogen belongs to a family of its own.
- Hydrogen is a diatomic, reactive gas.
- Hydrogen was involved in the explosion of the Hindenberg.
- Hydrogen is promising as an alternative fuel source for automobiles

Alkali Metals

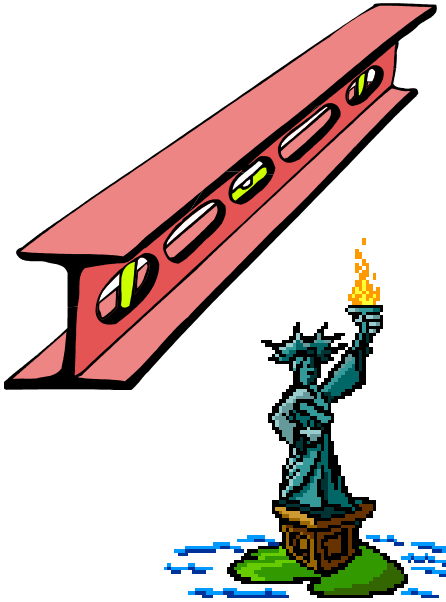
- 1st column on the periodic table (Group 1) not including hydrogen.
- Very reactive metals, always combined with something else in nature (like in salt).
- Soft enough to cut with a butter knife

Alkaline Earth Metals

- Second column on the periodic table. (Group 2)
- Reactive metals that are always combined with nonmetals in nature.
- Several of these elements are important mineral nutrients (such as Mg and Ca

Transition Metals

- Elements in groups 3-12
- Less reactive harder metals
- Includes metals used in jewelry and construction.
- Metals used “as metal.”



Boron Family

- Elements in group 13
- Aluminum metal was once rare and expensive, not a “disposable metal.”

Carbon Family

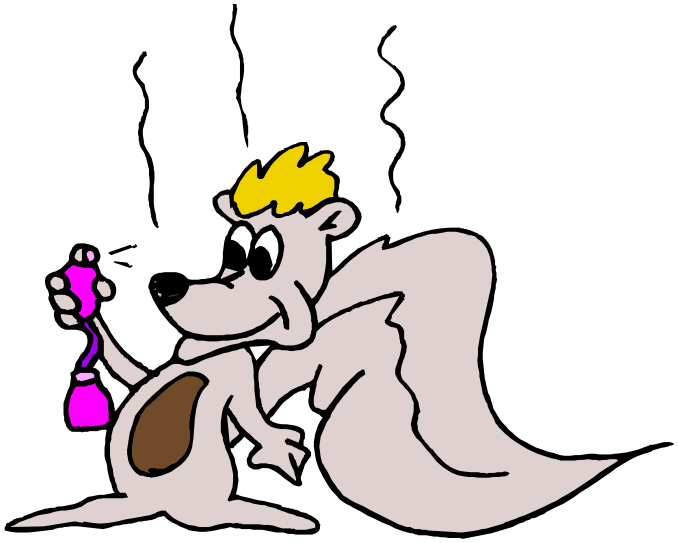
- Elements in group 14
- Contains elements important to life and computers.
- Carbon is the basis for an **entire branch** of chemistry.
- Silicon and Germanium are important semiconductors.

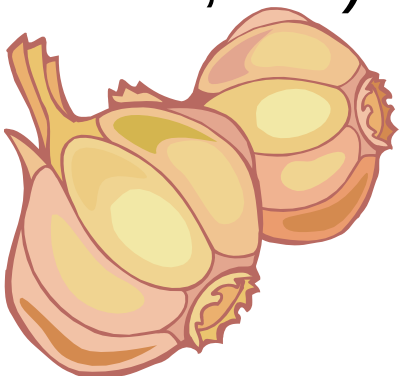
Nitrogen Family

- Elements in group 15
- Nitrogen makes up over ¾ of the atmosphere.
- Nitrogen and phosphorus are both important in living things.
- Most of the world's nitrogen is not available to living things.
- The red stuff on the tip of matches is phosphorus.

Oxygen Family or Chalogens

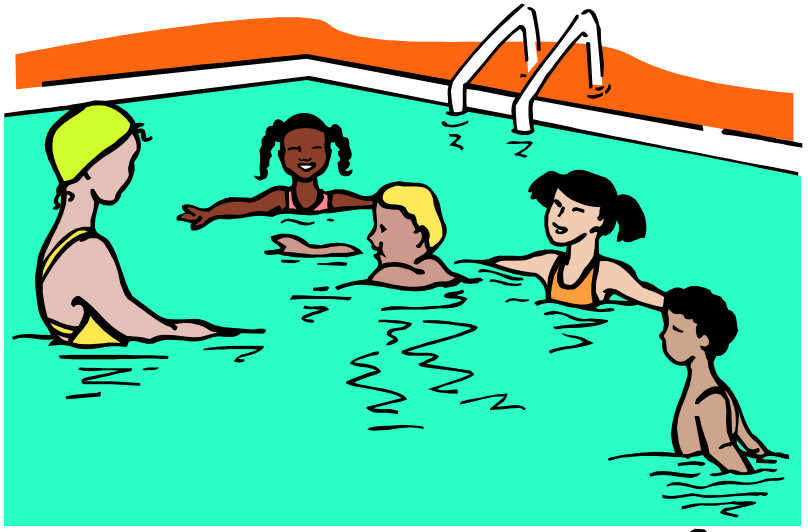
- Elements in group 16
- Oxygen is necessary for respiration.
- Many things that stink, contain sulfur (rotten eggs, garlic, skunks,etc.)

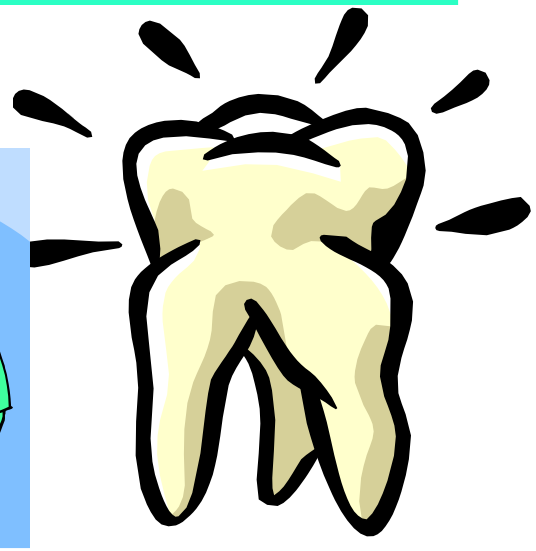




Halogens

- Elements in group 17
- Very reactive, volatile, diatomic, nonmetals
- Always found combined with other element in nature .
- Used as disinfectants and to strengthen teeth.





The Noble Gases

- Elements in group 18
- VERY unreactive, monatomic gases
- Used in lighted “neon” signs
- Used in blimps to fix the Hindenberg problem.
- Have a full valence shell.

Group Number also tells a very important fact used in bonding of elements.

- The number of valence electrons
- Valence electrons tell how many electrons are in the outer most energy levels.
- Think Bohr model of an atom

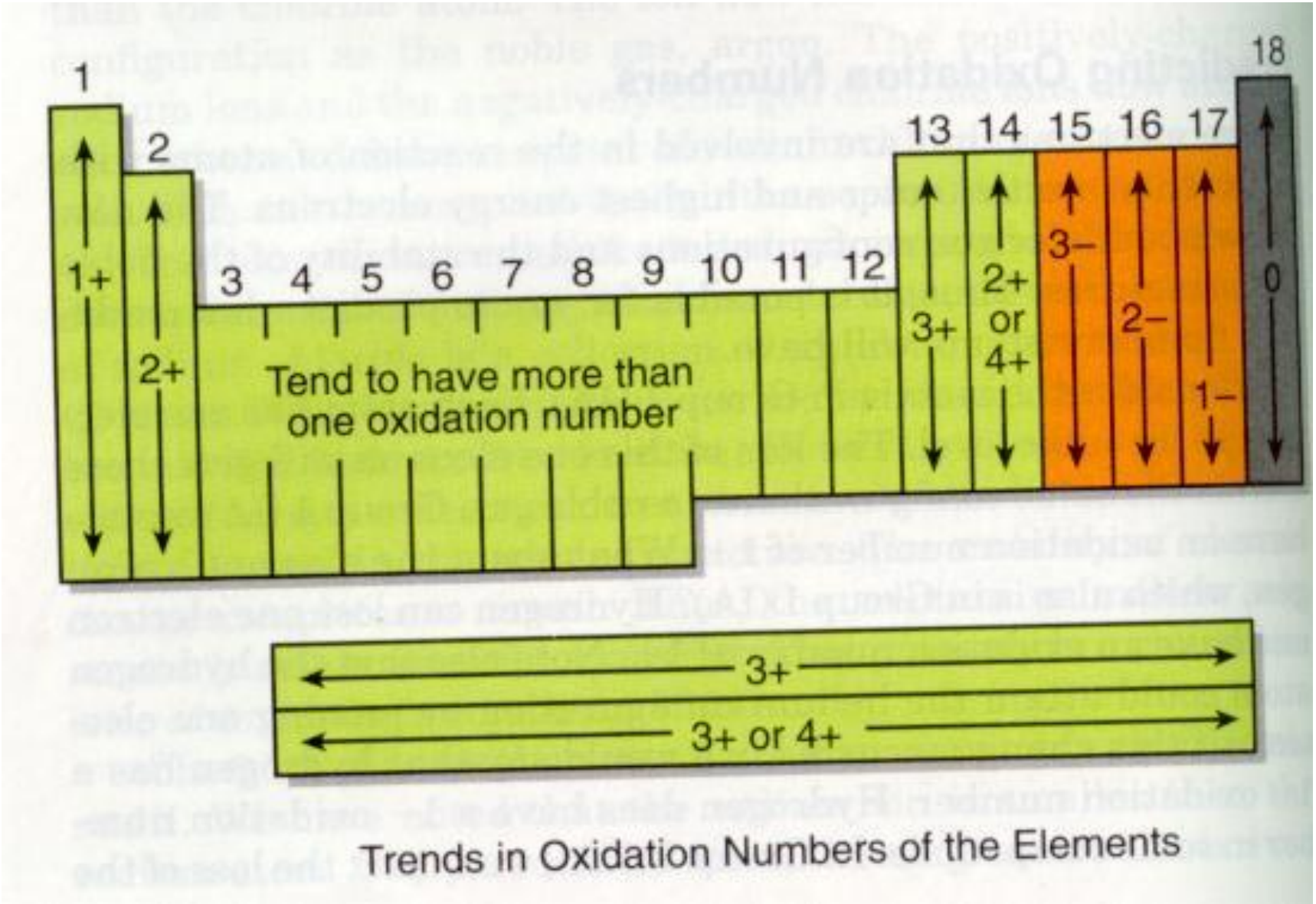
On your notes page and yellow periodic chart copy this chart, also fill in above periodic chart for page 13 in agenda.

Group Number	Family Name	Number of Valence e^-	Oxidation Number
1	Alkali Metals	1	1^+
2	Alkaline Earth Metals	2	2^+
3 through 12	Transition Metals	Must be given to you	Must be given to you
13	Boron	3	3^+
14	Carbon	4	4^+
15	Nitrogen	5	3^-
16	Oxygen/Calogens	6	2^-
17	Halogens	7	1^-
18	Noble Gases	8	0

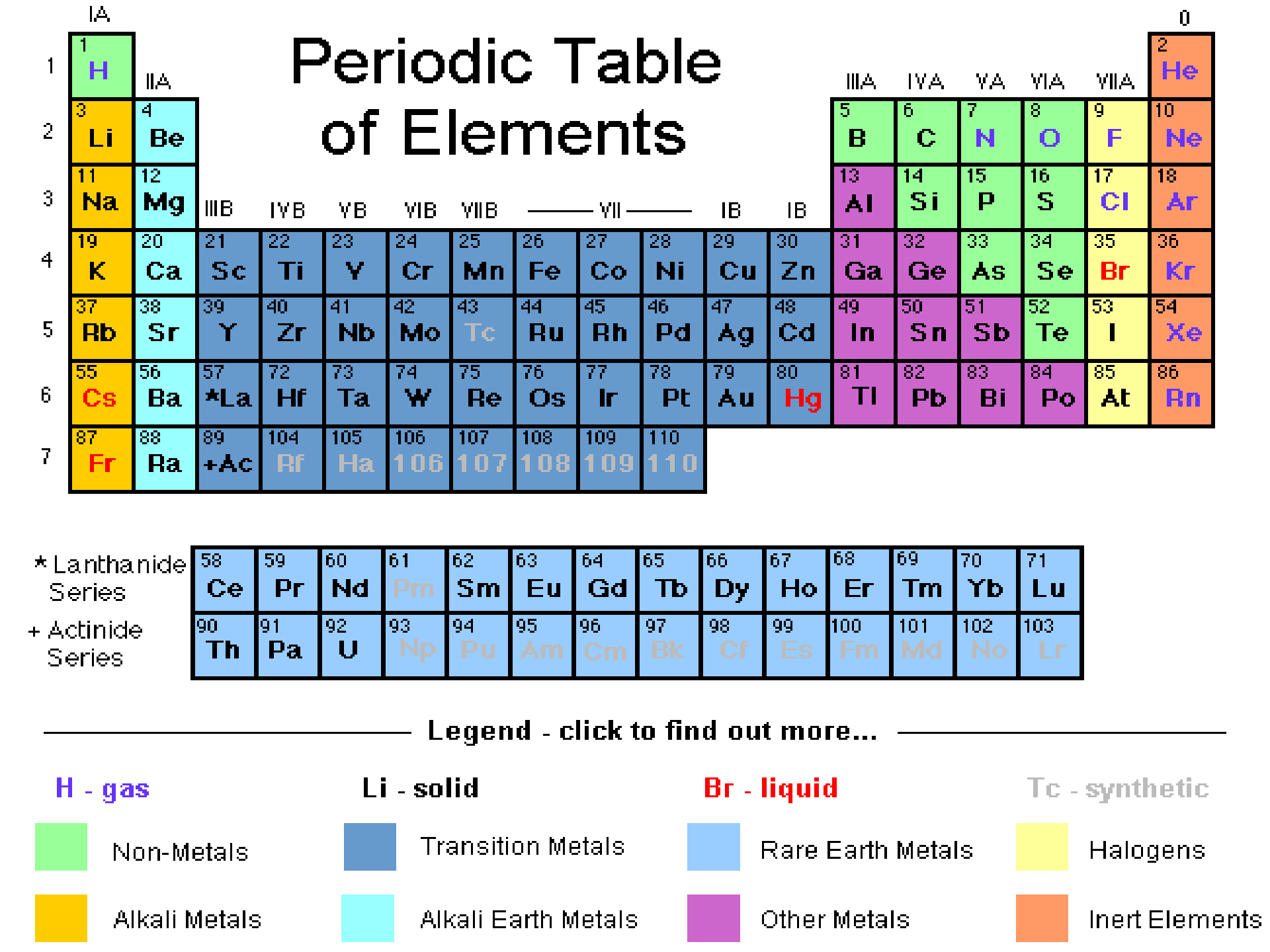
Periodic Table Families

- Color your Metals, Nonmetals, and metaloids according to page 518 and 519
- Outline each of the 10 different families
- Have key on your chart that identifies what each of the colors represent.

Periodic Table Trends



Trends in Oxidation Numbers of the Elements


Periodic Table of Elements
IA
IIA
IIIB
IVB
VB
VIB
VIIB
VII
IB
IB
IIIA
IVA
VA
VIA
VIIA
0
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
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
104 Rf
105 Ha
106 106
107 107
108 108
109 109
110 110
* Lanthanide Series
+ Actinide Series
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
Legend - click to find out more...
H - gas
Li - solid
Br - liquid
Tc - synthetic
Non-Metals
Transition Metals
Rare Earth Metals
Halogens
Alkali Metals
Alkali Earth Metals
Other Metals
Inert Elements