

The Periodic Table

Unit II—Part 4

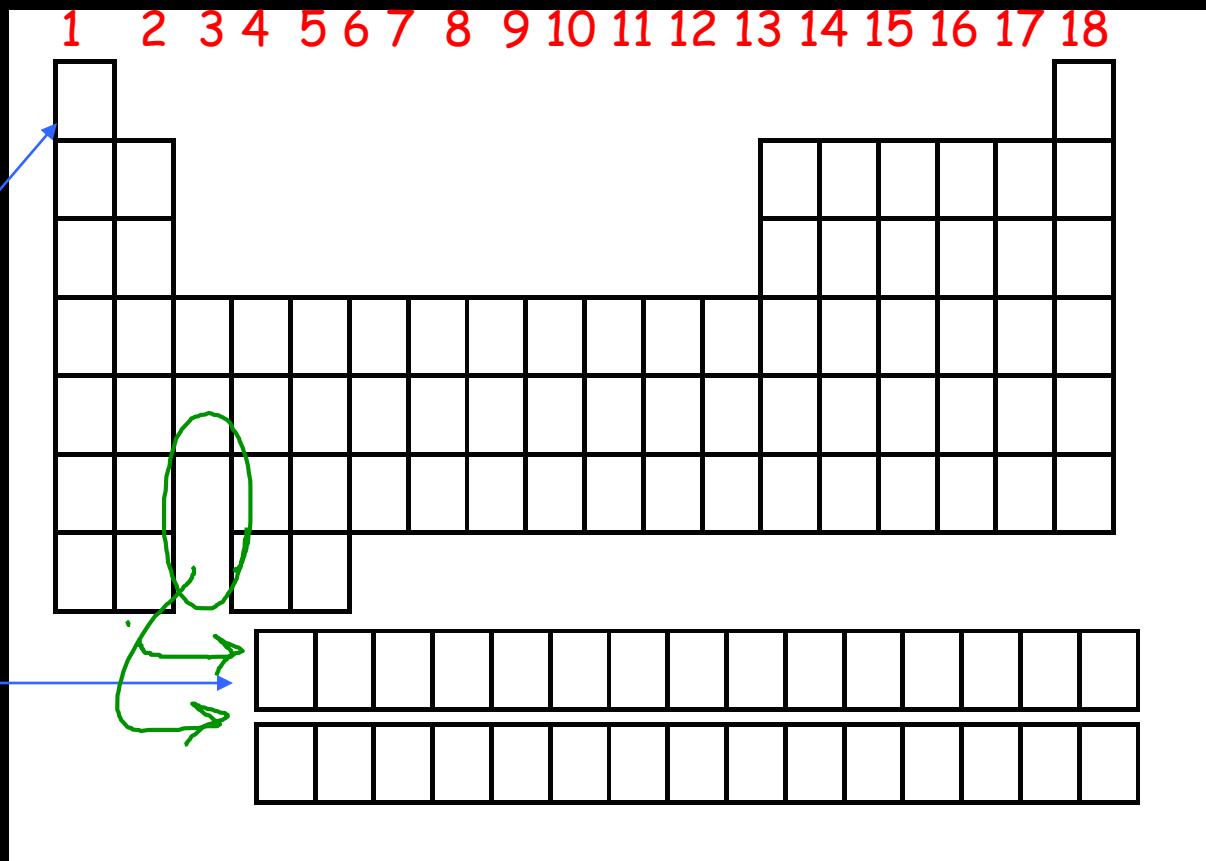
The Periodic Table

Column = Group
or Family

18 columns on the Periodic Table

**Row =
Period**

7 rows on the Periodic Table



The Father of the Periodic Table— Dimitri Mendeleev

- The first periodic table was created by Dimitri Mendeleev.
- Called the father of the periodic table
 - Arranged his periodic table by atomic mass.

The father of the periodic table

- That properties of unknown elements could be predicted by the properties of elements around the missing element

Unknown Elements?

1 H																	2 He
3 Li	4 Be																
11 Na	12 Mg																
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 Sg	107 Ns	108 Hs	109 Mt	?	111	112	113	113				

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			

The Current Periodic Table

- Later the scientist Moseley discovered that the periodic table of the elements was better organized using atomic number, not atomic mass

The Periodic Table

- As you read from left to right across a row, the atomic # increases.

Families on the Periodic Table

- Elements on the periodic table can be grouped into families based on their **chemical** properties.
- Each family has a **specific name**.
- Elements in each family **react** differently with other elements.

Periodic Table of the Elements



0	He
1 H	IIA
2 Li	Be
3 Na	Mg
4 Ca	Sc
5 Rb	Y
6 Cs	Ba
7 Fr	+Ac
8	O
9 F	Ne
10 Ne	Ar
11	P
12	S
13 Al	Si
14 Si	P
15 P	S
16 S	Cl
17 Cl	Ar
18 Kr	Br
19 K	Ti
20 Ca	VB
21 Sc	YB
22 Ti	YIB
23 V	VIB
24 Cr	VIB
25 Mn	VIB
26 Fe	VII
27 Co	VII
28 Ni	IB
29 Cu	IB
30 Zn	IB
31 Ga	III A
32 Ge	IV A
33 As	V A
34 Se	VI A
35 Br	VII A
36 Kr	0
37 Rh	Ti
38 Sr	VB
39 Y	YB
40 Zr	VIB
41 Nb	VIB
42 Mo	VIB
43 Tc	VII
44 Ru	IB
45 Rh	IB
46 Pd	IB
47 Ag	IB
48 Cd	IB
49 In	III A
50 Sn	IV A
51 Sb	V A
52 Te	VI A
53 I	0
54 Xe	0
55 Cs	Ta
56 Ba	W
57 La	Re
58 Hf	Os
59 Ta	Ir
60 W	Pt
61 Re	Au
62 Os	Hg
63 Ir	Tl
64 Pt	Pb
65 Au	Bi
66 Hg	Po
67 Tl	At
68 Pb	Rn
69 Bi	
70 Po	
71 At	
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	

* Lanthanide Series
+ Actinide Series

Solids/ Liquids/ Gasses

Green = Solid Yellow = Gas Blue = liquid

1	H	2															2	He
3	Li	Be																
11	12																	
3	Na	Mg	3	4	5	6	7	8	9	10	11	12						
4	K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
5	Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
6	Cs	Ba		72	73	74	75	76	77	78	79	80	81	82	83	84	85	86
7	Fr	Ra		104	105	106	107	108	109	110	111	112	113	114	115	116	117	118
6	La	Ce	Pr	Nd	Pm	Sm	Eu	Gd	Tb	Dy	Ho	Er	Tm	Yb	Lu			
7	Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr			

57	58	59	60	61	62	63	64	65	66	67	68	69	70	71				
Ac	Th	Pa	U	Np	Pu	Am	Cm	Bk	Cf	Es	Fm	Md	No	Lr				

Periodic Table information

- The majority of the periodic table is solid at room temperature.

Metals / Metalloids/ Non-metals

Periodic Table

1A		8B														8A		
1 H 1.008	2A								3A	4A	5A	6A	7A	2 He 4.003				
3 Li 6.941	4 Be 9.012								5 B 10.81	6 C 12.01	7 N 14.01	8 O 16.00	9 F 19.00	10 Ne 20.18				
11 Na 23.00	12 Mg 24.31	3B	4B	5B	6B	7B		1B	2B	13 Al 26.98	14 Si 28.09	15 P 30.97	16 S 32.06	17 Cl 35.45	18 Ar 39.95			
19 K 39.10	20 Ca 40.08	21 Sc 44.96	22 Ti 47.90	23 V 50.94	24 Cr 52.00	25 Mn 54.94	26 Fe 55.85	27 Co 58.93	28 Ni 58.70	29 Cu 63.55	30 Zn 65.38	31 Ga 69.72	32 Ge 72.59	33 As 74.92	34 Se 78.96	35 Br 79.90	36 Kr 83.80	
37 Rb 85.47	38 Sr 87.62	39 Y 88.91	40 Zr 91.22	41 Nb 92.91	42 Mo 95.94	43 Tc (98)	44 Ru 101.1	45 Rh 102.9	46 Pd 106.4	47 Ag 107.9	48 Cd 112.4	49 In 114.8	50 Sn 118.7	51 Sb 121.8	52 Te 127.6	53 I 126.9	54 Xe 131.3	
55 Cs 132.9	56 Ba 137.3	57 La 138.9	72 Hf 178.5	73 Ta 180.9	74 W 183.9	75 Re 186.2	76 Os 190.2	77 Ir 192.2	78 Pt 195.1	79 Au 197.0	80 Hg 200.6	81 Tl 204.4	82 Pb 207.2	83 Bi 209.0	84 Po (209)	85 At (210)	86 Rn (222)	
87 Fr (223)	88 Ra 226.0	89 Ac (261)	104 Rf (262)	105 Ha (263)	106 Unh (262)	107 Uns (262)		109 Une (267)										

Lanthanides	58 Ce 140.1	59 Pr 140.9	60 Nd 144.2	61 Pm (145)	62 Sm 150.4	63 Eu 152.0	64 Gd 157.3	65 Tb 158.9	66 Dy 162.5	67 Ho 164.9	68 Er 167.3	69 Tm 168.9	70 Yb 173.0	71 Lu 175.0
	90 Th 232.0	91 Pa 231.0	92 U 238.0	93 Np 237.0	94 Pu (244)	95 Am (243)	96 Cm (247)	97 Bk (247)	98 Cf (247)	99 Es (251)	100 Fm (252)	101 Md (257)	102 No (258)	103 Lr (260)

Metalloids

- Elements that can have properties of both a metal and a non-metal.
- Also called semi-metals.
- Semi-conductors (they can conduct heat and electricity but not as well as metals)

HYDROGEN

- Is apart of NO FAMILY on the periodic table.

ALKALI METALS

Group 1 – LIGHT BLUE

- 1 electron in the valence shell
- **Very** reactive, esp. with water
- Conduct electricity

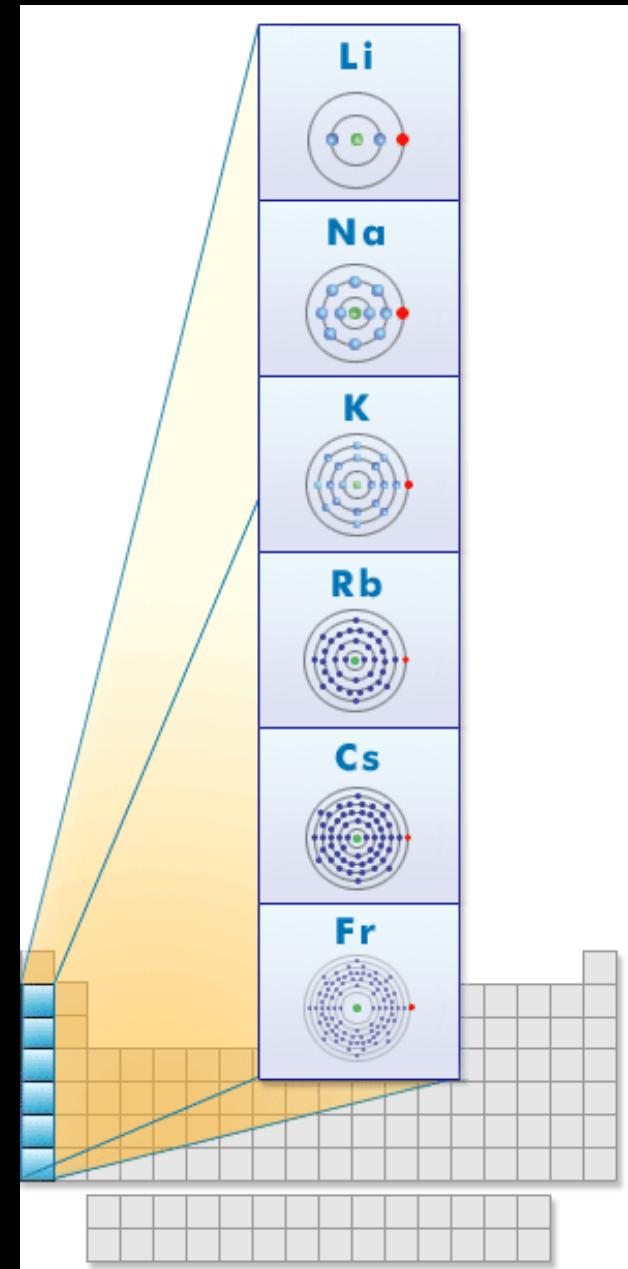
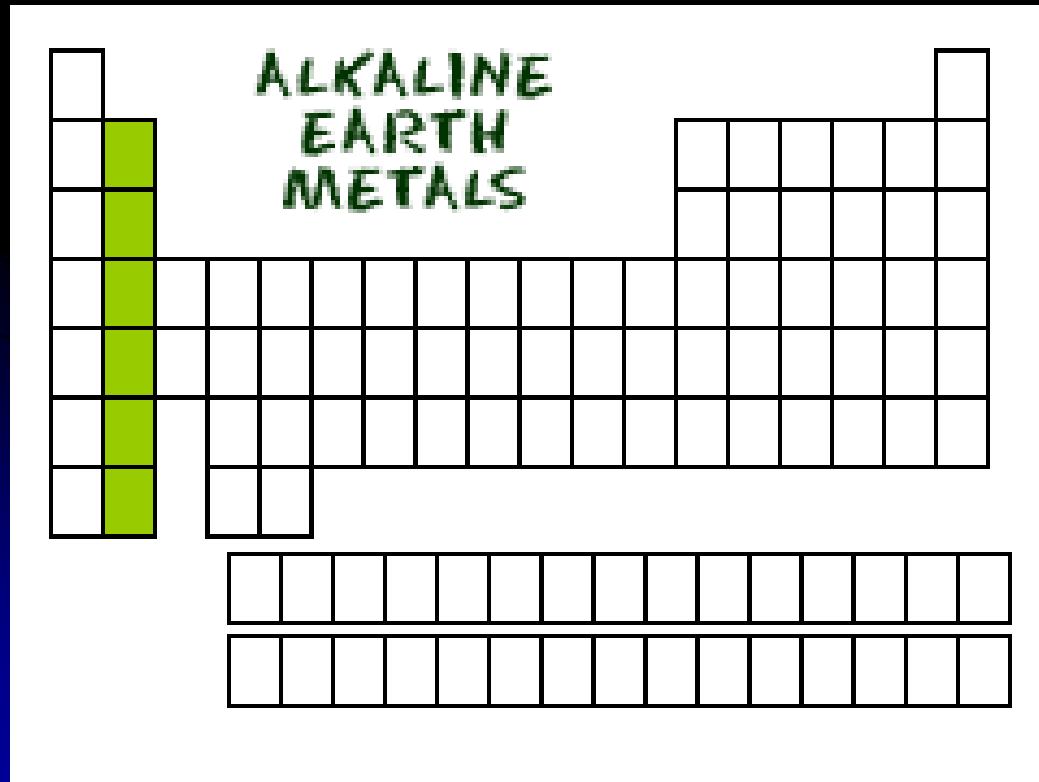


Image: <http://www.learner.org/interactives/periodic/groups2.html>

ALKALINE EARTH METALS

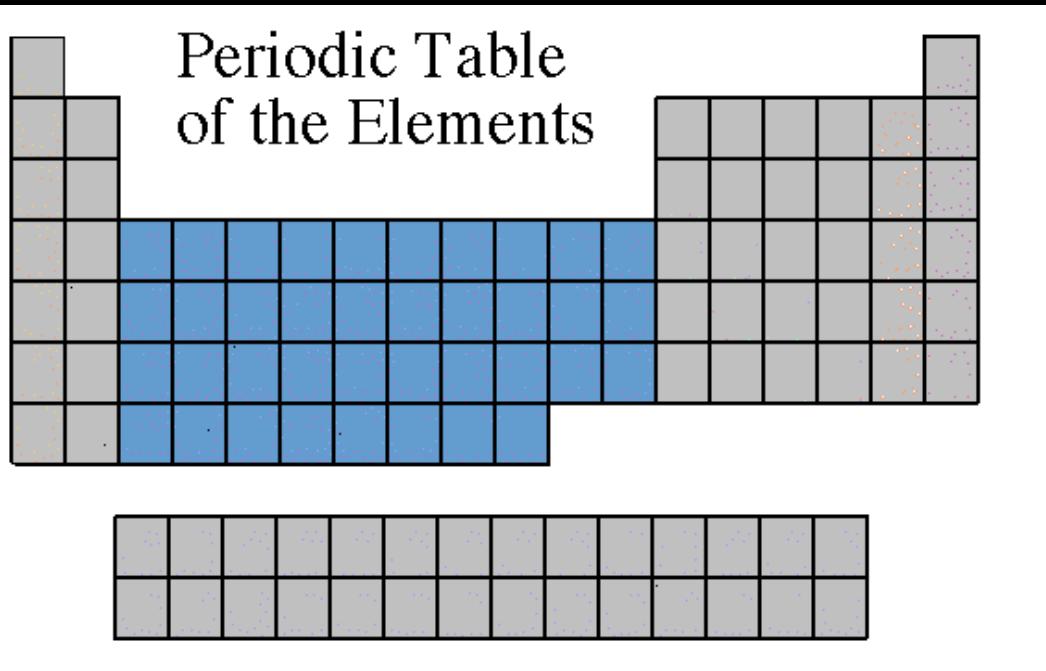
Group 2 – LIGHT GREEN

- 2 electrons in the outer shell.
- Reactive, but less than Alkali metals
- Conduct electricity



TRANSITION METALS

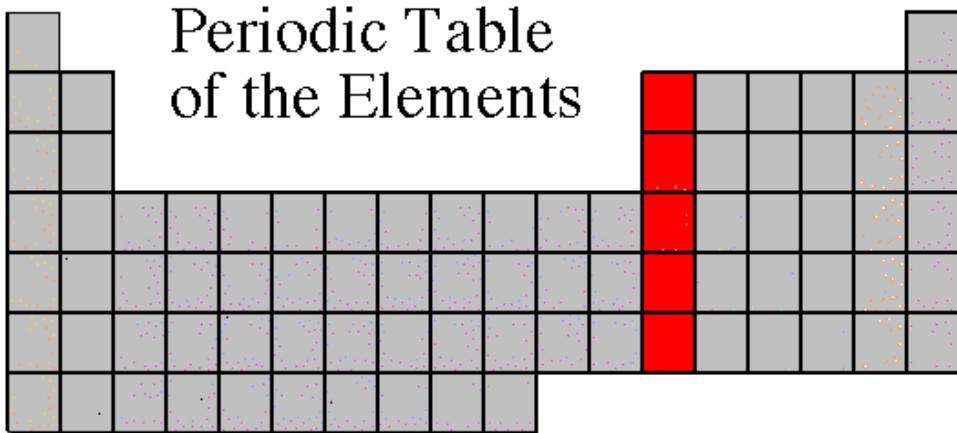
Groups 3-12
DARK BLUE



Good conductors of
heat and electricity.

BORON FAMILY

Periodic Table of the Elements



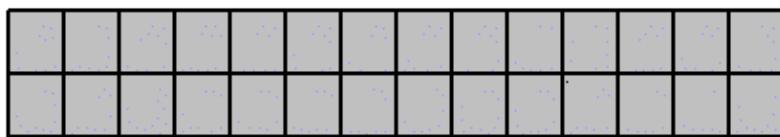
Group 13 - RED

- 3 valence electrons
 - Most are metals
 - Boron is a metalloid

CARBON FAMILY

Periodic Table of the Elements

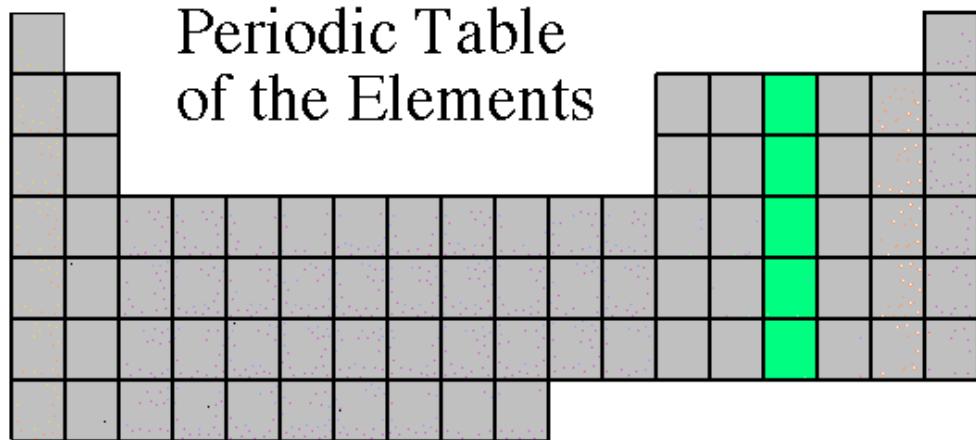
Periodic Table of the Elements



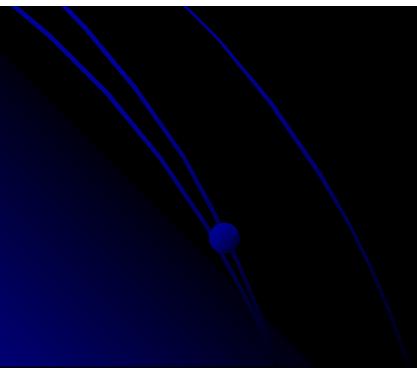
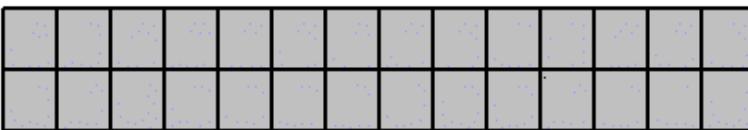
Group 14 - YELLOW

NITROGEN FAMILY

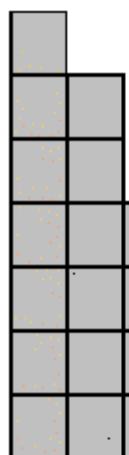
Group 15 – DARK
GREEN



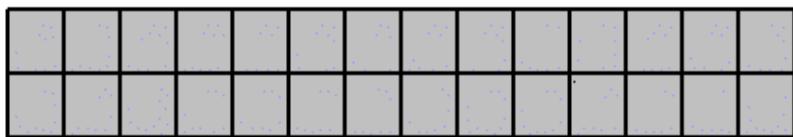
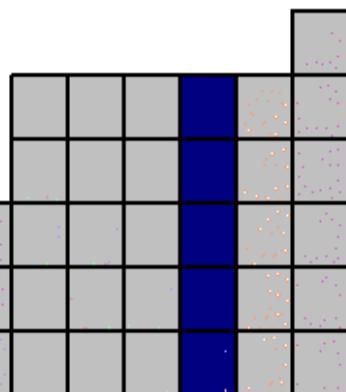
- 5 valence electrons



OXYGEN FAMILY

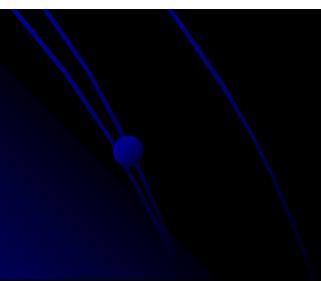


Periodic Table
of the Elements



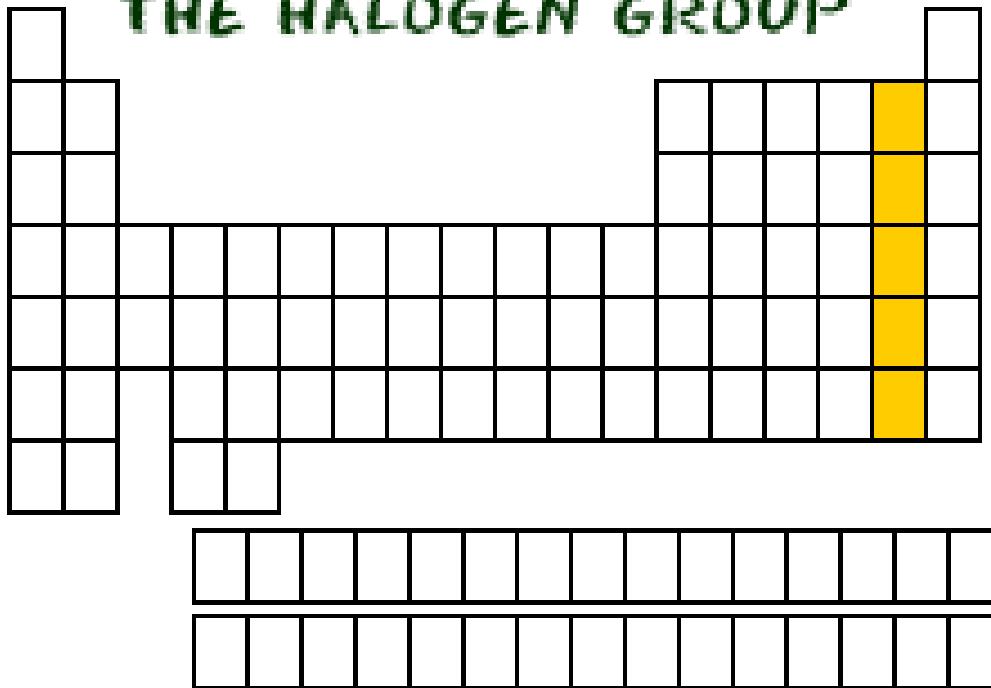
Group 16 - PURPLE

- 6 valence electrons



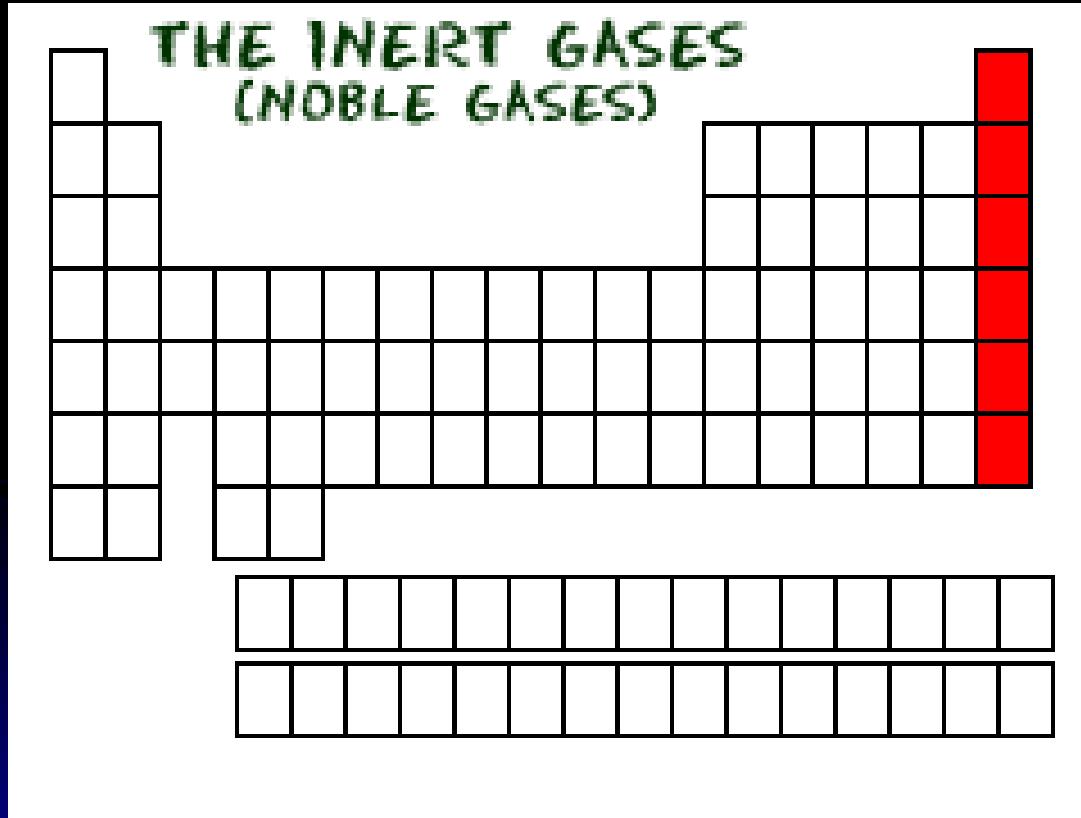
Halogens

THE HALOGEN GROUP



- ## Group 17 - ORANGE
- 7 valence electrons
 - All are **non-metals**
 - **Very reactive** are often bonded with elements from Group 1

Noble Gases

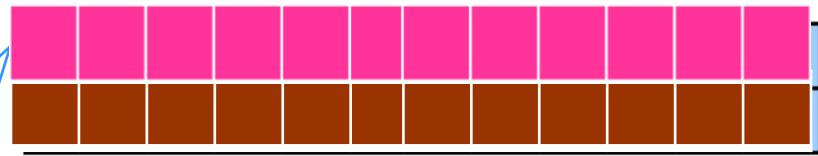
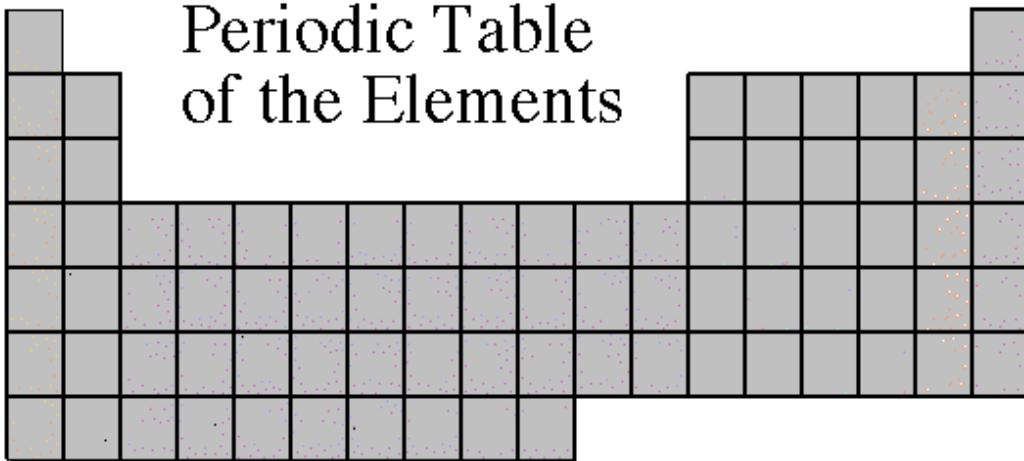


Group 18 - RED STRIPES

- Exist as gases
- Non-metals
- 8 valence electrons = HAPPY!
- Helium (He) has only 2 electrons in the outer shell = HAPPY!
- Not reactive with other elements

Rare Earth Metals

Periodic Table
of the Elements



**LANTHANIDE
SERIES - PINK**

**ACTINIDE SERIES
- BROWN**

- Some are Radioactive
- Conduct electricity

The Periodic Table

- All elements in a column have similar chemical reactivity.
 - Ex: If Sodium in group 1 is flammable when touching water, so does Lithium and all other elements in group 1.

The Periodic Table

- Elements in the same column also have the same number of valence electrons
 - Exception to this rule being the transition metals.

The Periodic Table

- All elements in the same ROW (period) have the same number of orbitals needed to hold each elements electrons.
 - As the row number increases, the number of orbitals (shells) needed increases.