Grouping the Elements

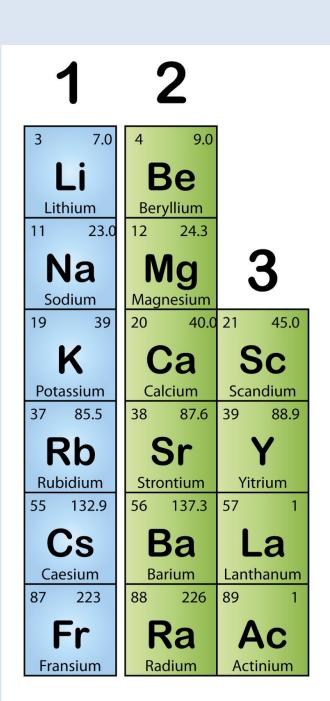
Objectives

• **Explain** why elements in a group often have similar properties.

• **Describe** the properties of the elements in the groups of the periodic table.

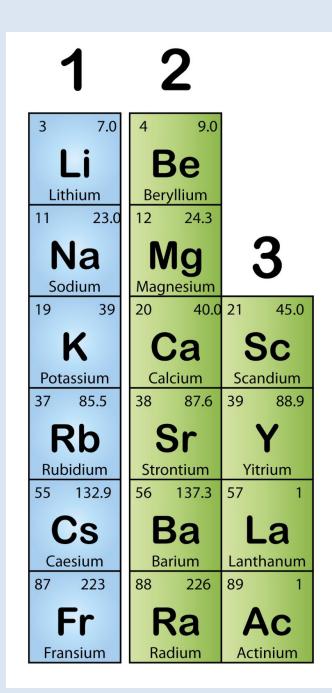
I. Group I: Alkali Metals

A. Highly Reactive Metals Alkali metals are the most reactive metals because their atoms can easily give away the one outer-level electron.



II. Group 2: Earth Metals

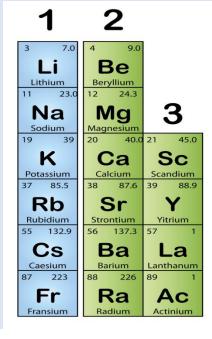
 Less Reactive Metals Alkaline-earth metals are less reactive than alkali metals are. Atoms of alkaline-earth metals have two outer-level electrons. It is more difficult for atoms to give two electrons than to give one when joining with other atoms.



III. Groups 3-12: Transition Metals

A. Properties of Transition Metals Transition metals tend to be shiny and to conduct thermal energy and electric current well.

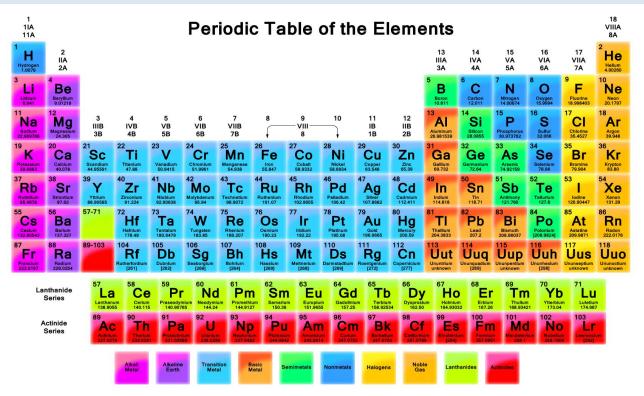
B. Lanthanides and Actinides Elements in the first row follow lanthanum and are called lanthanides. Elements in the second row follow actinium and are called actinides.



GROUP 1																	
1 H 1.0079	2	_										13	14	15	16	17	2 He 4.0026
3 Li 6.941	4 Be 9.0122											5 B 10.811	6 C 12.011	7 N 14.007	8 0 15.999	9 F 18.998	10 Ne 20.180
11 Na 22.990	12 Mg 24.305	3	4	5	6	7	8	9	10	11	12	13 Al 26.982	14 Si 28.086	15 P 30.974	16 S 32.066	17 Cl 35.453	18 Ar 39.948
19 K 39.098	20 Ca 40.078	21 Sc 44.956	22 Ti 47.867	23 V 50.942	24 Cr 51.996	25 Mn 54,938	26 Fe 55.845	27 Co 58.933	28 Ni 58,693	29 Cu 63.546	30 Zn 65.39	31 Ga 69.723	32 Ge 72.61	33 As 74.922	34 Se 78.96	35 Br 79.904	36 Kr 83.80
37 Rb 85.468	38 Sr 87.62	39 Y 88.906	40 Zr 91.224	41 Nb 92.906	42 Mo 95.94	43 Tc 98.906*	44 Ru 101.07	45 Rh 102.91	46 Pd 106.42	47 Ag 107.87	48 Cd 112.41	49 In 114.82	50 Sn 118.71	51 Sb 121.76	52 Te 127.60	53 I 126.90	54 Xe 131.29
55 Cs 132.91	56 Ba 137.33	57 La 138.91	72 Hf 178.49	73 Ta 180.95	74 W 183.84	75 Re 186.21	76 Os 190.23	77 Ir 192.22	78 Pt 195. 8	79 Au 196.97	80 Hg 200.59	81 Tl 204.38	82 Pb 207.2	83 Bi 208.98	84 Po 209.98*	85 At 209.99*	86 Rn 222.02*
87 Fr 223.02	88 Ra 226.03	89 Ac 227.03	104 Rf (261)	105 Db (262)	106 Sg (266)	107 Bh (262)	108 Hs (269)	109 Mt (266)	110 (273)	111 (272)	112 (294)						
		★Lanthanide series			59 Pr 140.91	60 Nd 144.24	61 Pm 146.92*	62 Sm 150.36	63 Eu 151.96	64 Gd 157.25	65 Tb 158.93	66 Dy 162.50	67 Ho 164.93	68 Er 167.26	69 Tm 168.93	70 Yb 173.04	71 Lu 174.97
	▲ Actinide series			90 Th 232.04	91 Pa 231.04	92 U 238.03	93 Np 237.05	94 Pu 239.05	95 Am 241.06	96 Cm 244.06	97 Bk 249.08	98 Cf 252.08	99 Es 252.08	100 Fm 257.10	101 Md 258.10	102 No 259.10	103 Lr 262.11

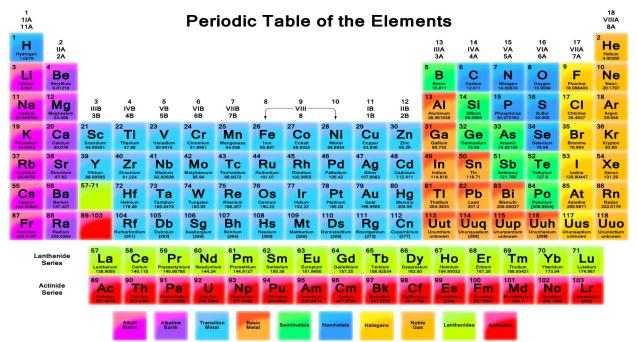
IV. Group 13: Boron Group

A. Aluminum and More The most common element from Group 13 is aluminum. In fact, aluminum is the most abundant metal in Earth's crust.



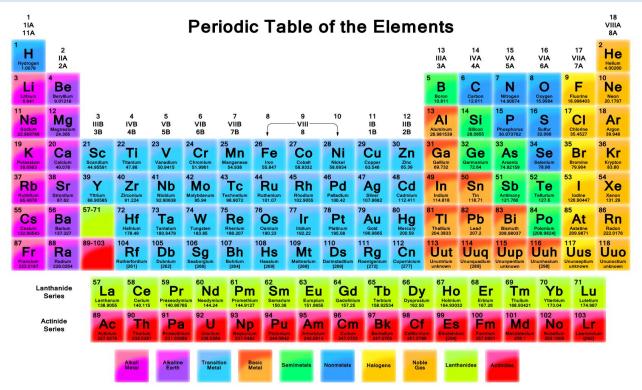
V. Group 14: Carbon Group

 Carbon: Important for Life The nonmetal carbon can be found uncombined in nature. Carbon also forms a wide variety of compounds. Some of these compounds, such as proteins, fats, and carbohydrates, are necessary for living things on Earth.



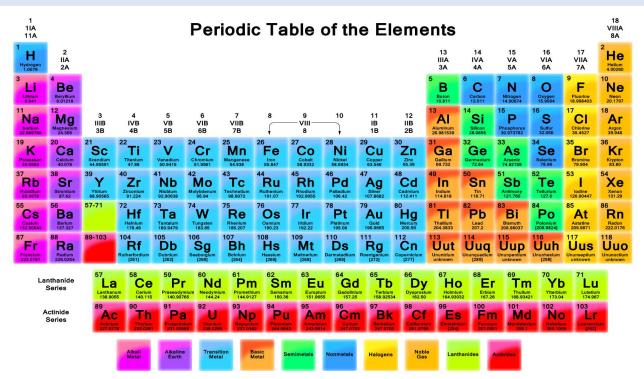
VI. Group 15: Nitrogen Group

 From Air to Fertilizers Nitrogen, which is a gas at room temperature, makes up about 80% of the air you breathe. Nitrogen removed from air can be reacted with hydrogen to make ammonia for fertilizers



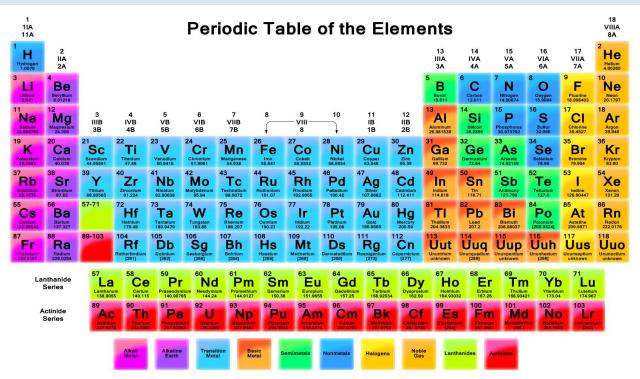
VII. Group 16: Oxygen Group

 Getting Burned Oxygen makes up about 20% of air. Oxygen is necessary for substances to burn. Oxygen is also important to most living things.



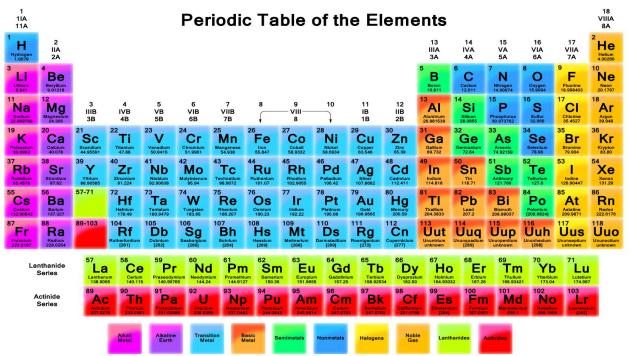
VIII. Group 17: Halogens

 Reactive Nonmetals Halogens are very reactive nonmetals because their atoms need to gain only one electron to have a complete outer level.



IX. Group 18: Noble Gases

 Stable Elements Noble gases are unreactive nonmetals and are in Group 18 of the periodic table. The atoms of these elements have a full set of electrons in their outer level.



X. Hydrogen

 An Element Apart The properties of hydrogen do not match the properties of any single group, so hydrogen is set apart from the other elements in the table. Hydrogen is above Group 1 because atoms of the alkali metals also have only one electron in their outer level. Atoms of hydrogen can give away one electron when they join with other atoms.

