

The Periodic Table of Elements

1																	18	
1	H HYDROGEN 1																	He HELIUM 4
2	Li LITHIUM 7	Be BERYLLIUM 9											NON-METALS					
3	Na SODIUM 23	Mg MAGNESIUM 24	3	4	5	6	7	8	9	10	11	12	Al ALUMINUM 27	Si SILICON 28	P PHOSPHORUS 31	S SULFUR 32	Cl CHLORINE 35	Ar ARGON 40
4	K POTASSIUM 39	Ca CALCIUM 40	Sc SCANDIUM 45	Ti TITANIUM 48	V VANADIUM 51	Cr CHROMIUM 52	Mn MANGANESE 55	Fe IRON 56	Co COBALT 59	Ni NICKEL 59	Cu COPPER 64	Zn ZINC 65	Ga GALLIUM 70	Ge GERMANIUM 73	As ARSENIC 75	Se SELENIUM 79	Br BROMINE 80	Kr KRYPTON 84
5	Rb RUBIDIUM 85	Sr STRONTIUM 88	Y YTTRIUM 89	Zr ZIRCONIUM 91	Nb NIOBIUM 93	Mo MOLYBDENUM 96	Tc TECHNETIUM 98	Ru RUTHENIUM 101	Rh RHODIUM 103	Pd PALLADIUM 106	Ag SILVER 108	Cd CADMIUM 112	In INDIUM 115	Sn TIN 119	Sb ANTIMONY 122	Te TELLURIUM 128	I IODINE 127	Xe XENON 131
6	Cs CESIUM 133	Ba BARIUM 137		Hf HAFNIUM 178	Ta TANTALUM 181	W TUNGSTEN 184	Re RHENIUM 186	Os OSMIUM 190	Ir IRIDIUM 192	Pt PLATINUM 195	Au GOLD 197	Hg MERCURY 201	Tl THALLIUM 204	Pb LEAD 207	Bi BISMUTH 209	Po POLONIUM 209	At ASTATINE 210	Rn RADON 222
7	Fr FRANCIUM 223	Ra RADIUM 226		Rf RUTHERFORDIUM 263	Db DUBNIUM 268	Sg SEABORGIUM 266	Bh BOHRIUM 272	Hs HASSIUM 277	Mt MEITNERIUM 276	Ds DARMSTADIUM 281	Rg ROENTGENIUM 280	Uub UNUNBIUM 285	Uut UNUNTRIUM 284	Uuq UNUNQUADIUM 289	Uup UNUNPENTIUM 288	Uuh UNUNHEXIUM 292	Uus UNUNSEPTIUM NOT YET OBSERVED	Uuo UNUNOCTIUM NOT YET OBSERVED

6 ←

C ←

CARBON ←

12 ←

Atomic Number = Number of Protons = Number of Electrons

Chemical Symbol

Chemical Name

Atomic Weight = Number of Protons + Number of Neutrons*

KEY

= Solid at room temperature

= Liquid at room temperature

= Gas at room temperature

= Radioactive

= Artificially Made

57	58	59	60	61	62	63	64	65	66	67	68	69	70	71
La LANTHANUM 139	Ce CERIUM 140	Pr PRASEODYMIUM 141	Nd NEODYMIUM 144	Pm PROMETHIUM 145	Sm SAMARIUM 150	Eu EUROPIUM 152	Gd GADOLINIUM 157	Tb TERBIUM 159	Dy DYSPROSIUM 163	Ho HOLMIUM 165	Er ERBIUM 167	Tm THULIUM 169	Yb YTTERBIUM 173	Lu LUTETIUM 175
89	90	91	92	93	94	95	96	97	98	99	100	101	102	103
Ac ACTINIUM 227	Th THORIUM 232	Pa PROTACTINIUM 231	U URANIUM 238	Np NEPTUNIUM 237	Pu PLUTONIUM 244	Am AMERICIUM 243	Cm CURIUM 247	Bk BERKELIUM 247	Cf CALIFORNIUM 251	Es EINSTEINIUM 252	Fm FERMIUM 257	Md MENDELEVIUM 258	No NOBELIUM 259	Lr LAWRENCIUM 262

* The atomic weights listed on this Table of Elements have been rounded to the nearest whole number. As a result, this chart actually displays the mass number of a specific isotope for each element. An element's complete, unrounded atomic weight can be found on the It's Elemental web site: <http://education.jlab.org/itselemental/index.html>

I. Design of the Periodic Table

A. Columns in the Periodic Table

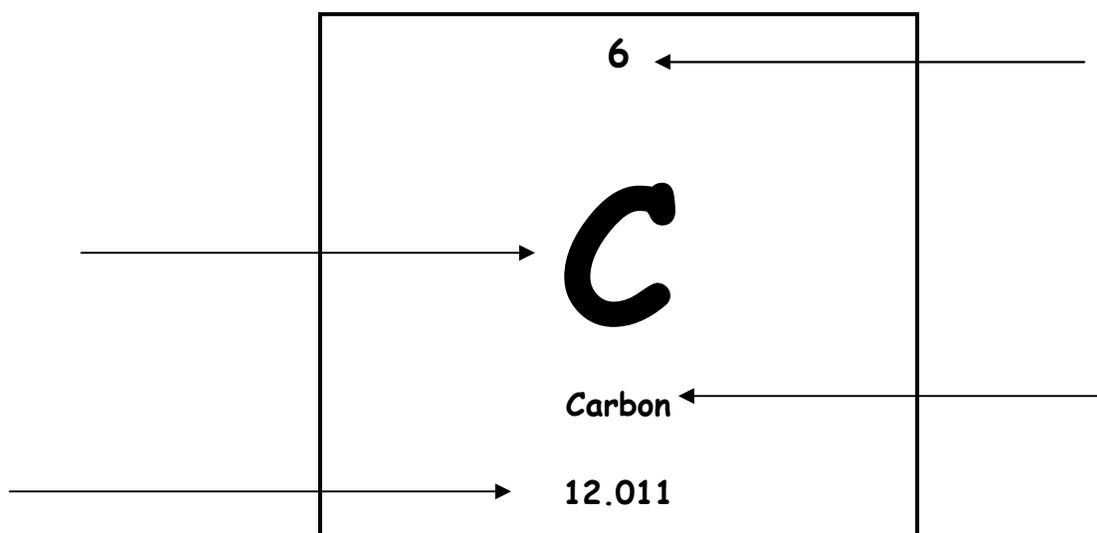
1. Groups or Families - elements within the same group or family have similar but not identical properties .

i.e. Lithium (Li), Sodium (Na), Potassium (K), and other members of family 1 are soft, white shiny metals. They are all highly reactive elements, which means they readily combine with other elements to form compounds.

B. Rows in the Periodic Table

1. Period - unlike elements in the same family, elements in the same period are not alike in properties. The properties of the elements change greatly across any given row.

C. Element Key



D. Properties of the Elements

1. Metals

a. Physical Properties

Luster, Ductile, Malleable

Define:

Luster -

Ductile -

Malleable -

b. Chemical Properties

Corrosion -

2. Nonmetals

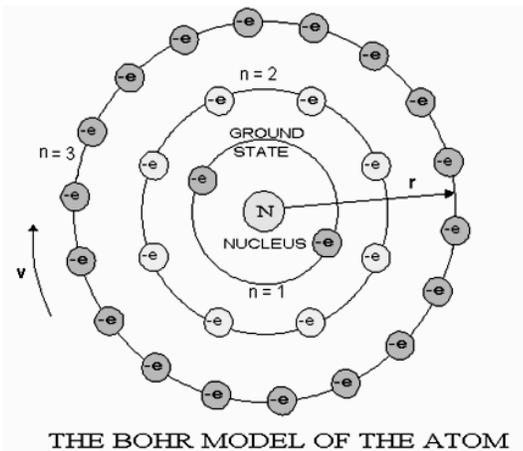
a. Physical Properties

b. Chemical Properties

3. Metalloids

II. Chemical Bonding

A. Valence Electrons and Energy Levels



1st Energy Level = _____

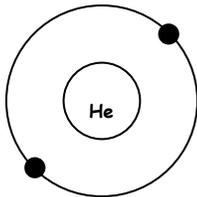
2nd Energy Level = _____

3rd Energy Level = _____

1. Valence Electrons -

2. Fill in the missing energy levels and indicate the number of electrons at each energy level. State the number of valence electrons in the outermost energy level.

Ex.



Valence Electrons = _____

Energy Levels = _____



Valence Electrons = _____

Energy Levels = _____



Valence Electrons = _____

Valence Electrons = _____

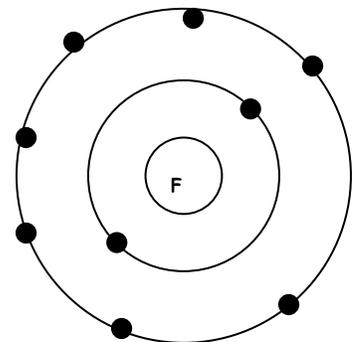
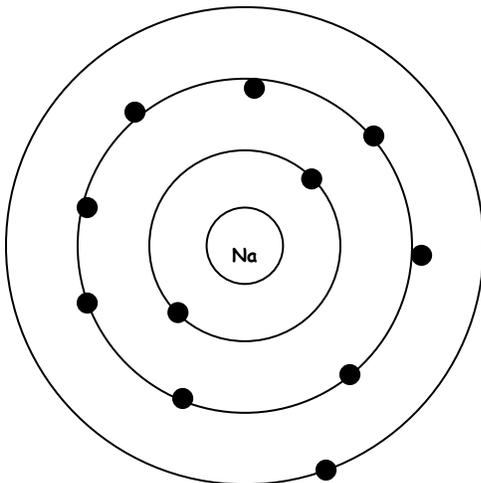
Energy Levels = _____

Energy Levels = _____

B. Electrons and Bonding

- The electron arrangement of the outermost energy level of an atom determines whether or not the atom will form chemical bonds. All atoms want to achieve stability; an atom will either gain or lose electrons to complete its outermost energy level. One atom will bond with another atom if the bonding gives both atoms complete outermost energy levels.

a. Ionic Bonds



of Valence Electrons = _____

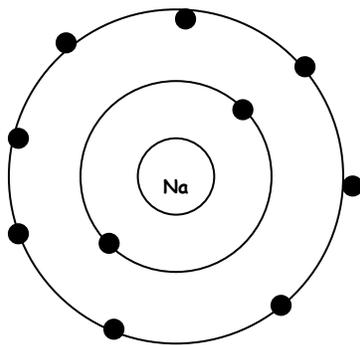
of Valence Electrons = _____

of Total Electrons = _____

of total Electrons = _____

of Protons = _____

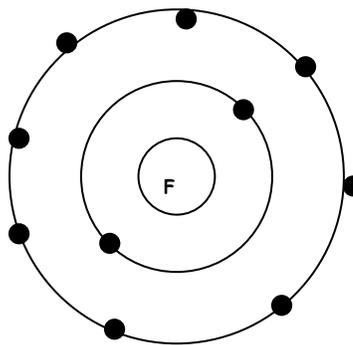
of Protons = _____



of Valance Electrons = _____

of Total Electrons = _____

of Protons = _____



of Valance Electrons = _____

of total Electrons = _____

of Protons = _____

State an observation about what happened to each atom when they formed a bond with one another.

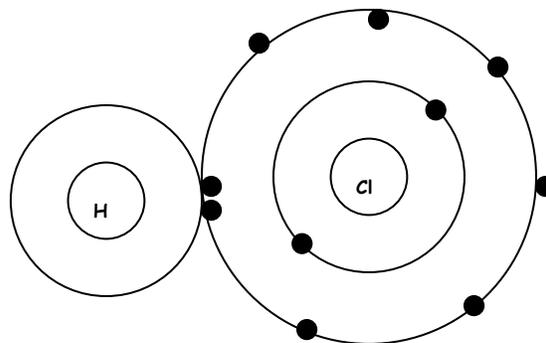
b. Define:

Ionic Bond -

Ion -

Ionization -

2. Covalent Bonds



State an observation about what happened to each atom when they formed a bond with one another.

a. Define:

Covalent Bond -

Electron-dot diagram -

Create electron-dot diagrams for the following elements:

C

H

Cl

F

O

N

III. Predicting Bonds

The number of electrons an atom gains, loses or shares when it forms chemical bonds is called its oxidation number. The oxidation number of an atom describes its combining capacity.

Rule #1 - The sum of the oxidation numbers of the atoms in a compound must be zero.

Oxidation Numbers:

Na = 1+ Mg = 2+ Cl = 1-

- How many sodium atoms are needed to bond with 1 atom of chlorine?
- What would the chemical formula be for this compound?
- How many chlorine atoms are needed to bond with 1 atom of magnesium?
- What would the chemical formula be for this compound?
- What are the oxidation numbers for the following elements?

C = _____ F = _____ O = _____ N = _____