Name: _____ Date: _____

CHEMISTRY TEST REVIEW

Please check solutions at http://leetz.weebly.com

1. Determine if the compound is ionic or covalent, then name the compound.

Compound	Ionic/Covalent	Name
MgO	Ionic/Covalent	Magnesium oxide
OCl_4	Ionic/Covalent	Oxygen tetrachloride
Li_3P	Ionic/Covalent	Lithium phosphide
NCl_3	Ionic/Covalent	Nitrogen trichloride
Be_3N_2	Ionic/Covalent	Beryllium nitride
Li_2S	Ionic/Covalent	Lithium sulphide
B_2O_3	Ionic/Covalent	Diboron trioxide
$CaBr_2$	Ionic/Covalent	Calcium bromide
Si_2Cl_6	Ionic/Covalent	Disilicon hexachloride
N_4S_5	Ionic/Covalent	Tetranitrogen pentasulfide

2. Determine if the compound is ionic or covalent, then give the formula of the compound.

Compound	Ionic/Covalent	Formula	
Hexaboron carbide	Ionic/Covalent	B_6C	
Magnesium chloride	Ionic/Covalent	$Mg^{2+}\ Cl^{1-} \rightarrow Mg_1Cl_2 \rightarrow MgCl_2$	
Lithium oxide	Ionic/Covalent	$Li^{1+}\ O^{2-} \rightarrow Li_2O_1 \rightarrow Li_2O$	
Dinitrogen trioxide	Ionic/Covalent	N_2O_3	
Beryllium nitride	Ionic/Covalent	$Be^{2+}\ N^{3-} \rightarrow Be_3N_2$	
Fluorine pentachloride	Ionic/Covalent	FCl_5	
Fluorine disulfide	Ionic/Covalent	FS_2	
Aluminum sulfide	Ionic/Covalent	$Al^{3+}\ S^{2-} \rightarrow Al_2S_3$	
Sodium silicide	Ionic/Covalent	$Na^{1+}\ Si^{4-} \rightarrow Na_4S_1 \rightarrow Na_4S$	Neither of these will be on the test
Potassium carbide	Ionic/Covalent	$K^{1+}\ C^{4-} \rightarrow K_4C_1 \rightarrow K_4C$	

3. Write the formula, then draw the bonding diagram for the following ionic compounds.

a. Lithium & Fluorine Li^{1+} F^{1-}
Formula: LiF
Bonding Diagram:

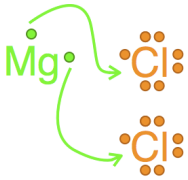
Before

After

-1 + 1 = 0

b. Magnesium & Chlorine Mg^{2+} Cl^{1-}
Formula: $MgCl_2$
Bonding Diagram:

Before



After

-2 + 2 = 0

c. Potassium & Oxygen K^{1+} O^{2-}
Formula: K_2O
Bonding Diagram:

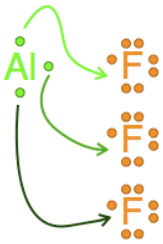
Before

After

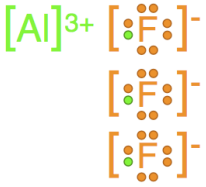
+2 - 2 = 0

d. Aluminum & Fluorine Al^{3+} F^{1-}
Formula: AlF_3
Bonding Diagram:

Before



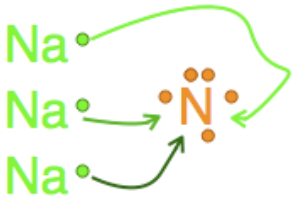
After



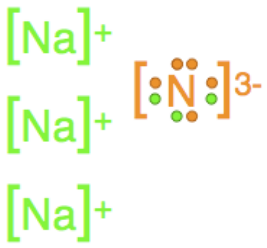
+3 - 3 = 0

e. Sodium & Nitrogen Na^{1+} N^{3-}
Formula: Na_3N
Bonding Diagram:

Before



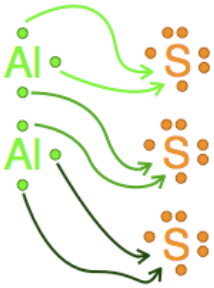
After



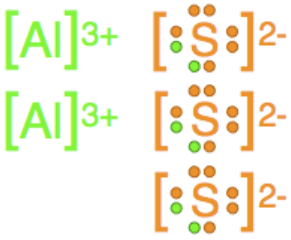
+3 - 3 = 0

f. Aluminum & Sulfur Al^{3+} S^{2-}
Formula: Al_2S_3
Bonding Diagram:

Before



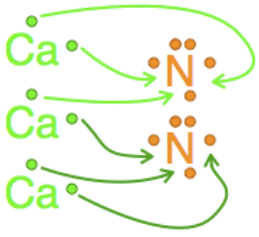
After



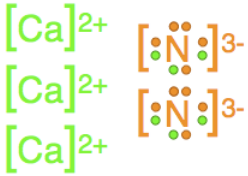
+6 - 6 = 0

g. Calcium & Nitrogen Ca^{2+} N^{3-}
Formula: Ca_3N_2
Bonding Diagram:

Before



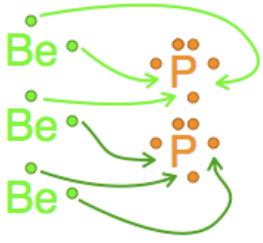
After



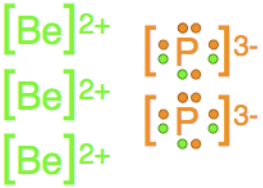
+6 - 6 = 0

h. Beryllium & Phosphorus Be^{2+} P^{3-}
Formula: Be_3P_2
Bonding Diagram:

Before

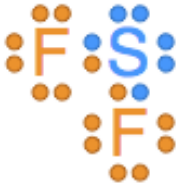
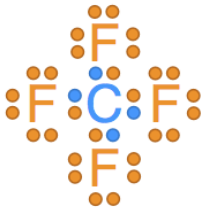
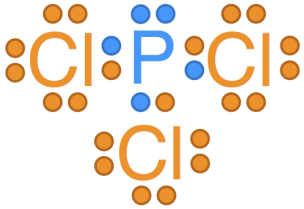
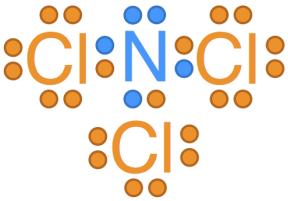


After



+6 - 6 = 0

4. Draw the Lewis diagram for the following covalent compounds. Some compounds will have double bonds.

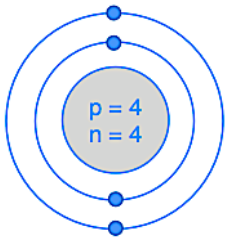
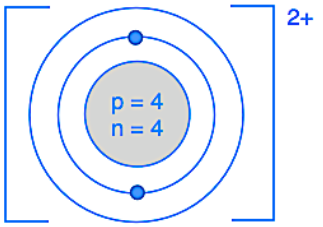
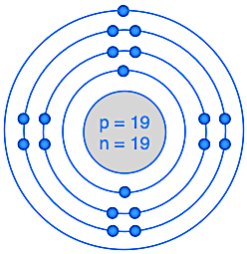
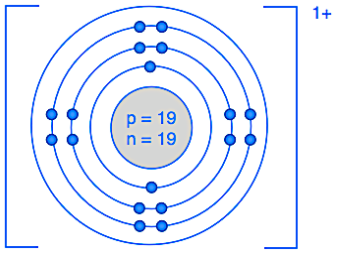
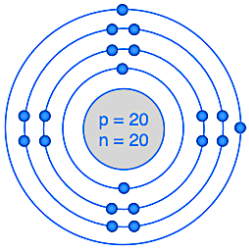
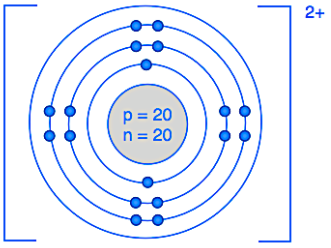
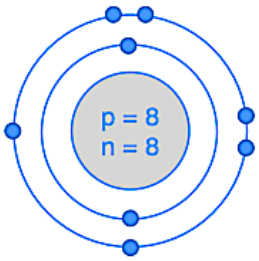
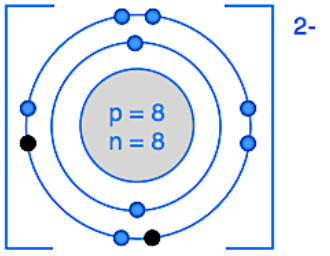
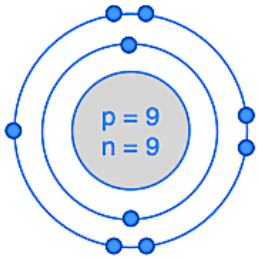
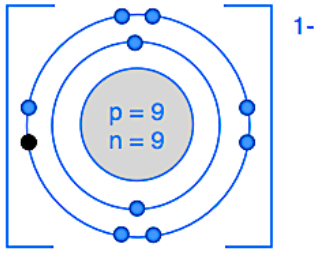
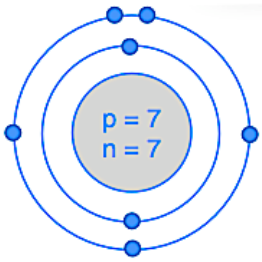
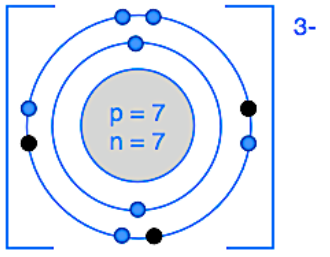
a. SF_2 	b. NF_3 	c. SO_2 **Don't Do** 	d. CO_2 
e. CF_4 	f. PCl_3 	g. OCl_2 	h. SiO_2 
i. BH_3 **Don't Do** 	j. H_2S 	k. SCl_4 **Don't Do** 	l. NCl_3 

5. Counting Atoms

$3\ Fe_2S_3$		$2\ FeSO_4$		$4\ Na_2CO_3$	
Number of Molecules:	3	Number of Molecules:	2	Number of Molecules:	4
Element:	Number:	Element:	Number:	Element:	Number:
Iron (Fe)	6	Iron (Fe)	2	Sodium (Na)	8
Sulfur (S)	9	Sulfur (S)	2	Carbon (C)	4
Total Number of Atoms:	15	Oxygen (O)	8	Oxygen (O)	12
		Total Number of Atoms:	12	Total Number of Atoms:	24

$3\ C_9H_8O_4$		$4\ NaC_2H_3O_2$		$5\ NaOH$	
Number of Molecules:	3	Number of Molecules:	4	Number of Molecules:	5
Element:	Number:	Element:	Number:	Element:	Number:
Carbon (C)	27	Sodium (Na)	4	Sodium (Na)	5
Hydrogen (H)	24	Carbon (C)	8	Oxygen (O)	5
Oxygen (O)	12	Hydrogen (H)	12	Hydrogen (H)	5
Total Number of Atoms:	12	Oxygen (O)	8	Total Number of Atoms:	15
		Total Number of Atoms:	32		

5. Bohr Rutherford (BR) Diagrams (Neutral and Charged). Assume the number of protons matches the number of neutrons.

Element	BR diagram (atom)	# electrons gained/lost	BR diagram (ion)	charge
Beryllium		2 lost		+4-2= +2
Potassium		1 lost		+19-18= +1
Calcium		2 lost		+20-18= +2
Oxygen		2 gained		+8-10= -2
Fluorine		1 gained		+9-10= -1
Nitrogen		3 gained		+7-10= -3

6. Fill in the table.

Atomic Component	Charge	Location	Size
Proton	positive	nucleus	large (=neutron)
Electron	negative	orbital	very small
Neutron	neutral	nucleus	large (=proton)

7. What is the difference between Atomic Number, Mass Number and Atomic Mass?

Atomic Number : Number of protons in an atom, number of electrons in a neutral atom
Mass Number : Number of protons + Number of neutrons
Atomic Mass : Average weight of the different isotopes of the atom, in atomic mass units (amu)

8. For the each element given below, state the symbol, number of protons, and whether the element is a metal (M) or non-metal (NM).

Tellurium	Te, 52, NM	Arsenic	As, 33, NM	Mercury	Hg, 80, M
Lithium	Li, 3, M	Bromine	Br, 35, NM	Astatine	At, 85, NM
Radon	Rn, 86, NM	Cerium	Ce, 58, M	Iridium	Ir, 77, M

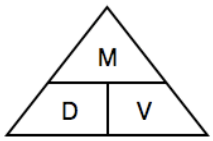
9. Using the atomic mass, calculate the number of neutrons for each element.

Vanadium	(23) 50.94=51, 51-23= **28**	Silicon	(14) 28.09=28, 28-14= **14**
Bismuth	(83) 208.98=209, 209-83= **126**	Germanium	(32) 72.64=73, 73-32= **41**
Iodine	(53) 126.90=127, 127-53= **74**	Tin	(50) 118.71=119, 119-50= **69**

10. Answer the following questions with the help of a periodic table:

a) Which element is in group 17 and period 3?	b) Which element is in group 5 and period 5?
Chlorine	Niobium
c) Which element is in group 6B and period 6?	d) How many valence electrons does Rubidium have?
Tungsten	1 (Rubidium is in group 1)
e) Which element is in group 6A and period 6?	f) Which element has atomic number 58?
Polonium	Cerium
g) In which period can Selenium be found?	h) In which group can Krypton be found?
4	18 or 8A - Noble Gases

11. Complete the following density calculations



a) A block of mystery metal has a mass of 32.4 g. The length, width and height of the block are 1 cm, 3 cm and 4 cm respectively. . What is the density and identity of the metal?

Iron = 7.87 g/cm^3	Silver = 10.49 g/cm^3	Aluminum = 2.70 g/cm^3

Volume (LxWxH)	List	Formula	Plug In	Answer
1cm x 3cm x 4cm = 12 cm^3	M = 32.4 g V = 12 cm^3 D = ?	$D=\frac{M}{V}$	$D=\frac{32.4}{12}$	D = 2.7 g/cm^3

Therefore Statement (Include density and identity)

Therefore the density is 2.7 g/cm^3 and the metal is aluminum.

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b) A mystery metal has a mass of 0.03147 kg, and a volume of 3 cm^3. What is the density and identity of the metal? (correction above)

Iron = 7.87 g/cm^3	Silver = 10.49 g/cm^3	Aluminum = 2.70 g/cm^3

Conversion	List	Formula	Plug In	Answer
$0.03147\ kg \times \frac{1000\ g}{1\ kg}$ = 31.47g	M = 31.47g V = 3 cm^3 D = ?	$D=\frac{M}{V}$	$D=\frac{31.47}{3}$	D = 10.49 g/cm^3

Therefore Statement (Include density and identity)

Therefore the density is 10.49 g/cm^3 and the identity of the metal is silver.

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c) A mystery metal has a mass of 13500 mg, and a volume of 5 cm^3. What is the density and identity of the metal?

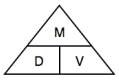
Iron = 7.87 g/cm^3	Silver = 10.49 g/cm^3	Aluminum = 2.70 g/cm^3

Conversion	List	Formula	Plug In	Answer
$13500\ mg \times \frac{1\ g}{1000\ mg}$ = 13.5 g	M = 13.5 g V = 5 cm^3 D = ?	$D=\frac{M}{V}$	$D=\frac{13.5}{5}$	D = 2.7 g/cm^3

Therefore Statement (Include density and identity)

Therefore the density is 2.7 g/cm^3 and the metal is aluminum.

12. Complete the following density calculations. Use the triangle to find the appropriate formula. Round to one decimal place if necessary.



a) Brass, an alloy of copper and zinc, has a density of 8.5 g/cm^3. A sample of brass weights 4320 mg. What is the volume of the brass sample?

Conversion	List	Formula	Plug In	Answer
$4320\ mg \times \frac{1\ g}{1000\ mg} = 4.32\ g$	M = 4.32 g V = ? D = 8.5 g/cm^3	$V = \frac{M}{D}$	$V = \frac{4.32}{8.5}$	V = 0.5 cm^3

Therefore Statement

Therefore the volume of the brass sample is 0.5 cm^3.

b) Steel, an alloy of iron and carbon, has a density of 7.8 g/cm^3. A sample of steel weighs 24 g. What is the volume of the steel?

List	Formula	Plug In	Answer
M = 24 g V = ? D = 7.8 g/cm^3	$V = \frac{M}{D}$	$V = \frac{24}{7.8}$	V = 3.1 cm^3

Therefore Statement

Therefore the volume of the steel sample is 3.1 cm^3.

c) Zinc has a density of 7.10 g/cm^3. A block of steel has a length of 2 cm, a width of 5 cm and a height of 4 cm. What is the mass of the block of zinc?

Volume (LxWxH)	List	Formula	Plug In	Answer
2cm x 5cm x 4cm = 140 cm^3	M = ? V = 40 cm^3 D = 7.10 g/cm^3	M = D x V	M = 7.10 x 40	M = 852 g

Therefore Statement (Include density and identity)

Therefore the mass is 852 g.

d) Lead has a density of 11.30 g/cm^3. A sample of lead has a volume of 16 cm^3. What is the mass of the sample?

List	Formula	Plug In	Answer
M = 16 g V = ? D = 11.30 g/cm^3	M = D x V	M = 11.30 x 16	M = 542.4 g

Therefore Statement

Therefore the mass is 542.2 g.

13. Fill in the table for each isotope.

Isotope	Element	Atomic Number	Mass Number	# Protons	# Neutrons
$^{32}_{26}S$	Sulfur	26	32	26	6
Sulfur - 33	Sulfur	26	33	26	7
$^{35}_{17}Cl$	Chlorine	17	35	17	18
Chlorine - 37	Chlorine	17	37	17	20
Vanadium - 50	Vanadium	23	50	23	27
$^{51}_{23}V$	Vanadium	23	51	23	28
Germanium - 74	Germanium	32	74	32	42
$^{76}_{32}Ge$	Germanium	32	76	32	44
$^{70}_{32}Ge$	Germanium	32	70	32	38
Germanium - 72	Germanium	32	72	32	40
$^{73}_{32}Ge$	Germanium	32	73	32	41

13. Antimony - 121 has an atomic mass of 120.9038 amu at an abundance of 57.21%. Antimony 123 has an atomic mass of 122.9042 amu, at an abundance of 42.79%. What is the average atomic mass of Antimony?

57.21% = 0.5721 120.9038 x 0.5721 = 69.17

42.79% = 0.4279 122.9042 x 0.4279 = 52.59

121.76 amu

14. Calculate the average atomic mass of magnesium using the information in the table below.

Magnesium-24	23.9850 amu	78.99%	or	0.7899	23.9850	x	0.7899	= 18.95
Magnesium-25	24.9858 amu	10.00%	or	0.1000	24.9858	x	0.1000	= 2.50
Magnesium-26	25.9826 amu	11.01%	or	0.1101	25.9826	x	0.1101	= 2.86

correction ↑

24.31 amu

15. History of the atom.

Scientist & Date	Name & Features of Model	Improvements on previous model	Problems with the model
Democritus (400 BCE)			
John Dalton (1807)	SEE YOUR NOTES AND/OR TEXTBOOK		
J.J. Thomson (1897)			
Ernest Rutherford (1909)			
Niels Bohr (1913)			
James Chadwick (1932)			

16. Based on your knowledge of the patterns in the periodic table, draw a Lewis diagram for each of the following elements. Also determine if the element is a metal, non-metal or metalloid.

Cesium	Arsenic	Radon	Radium
			
metal / nonmetal / metalloid	metal / nonmetal / metalloid	metal / nonmetal / metalloid	metal / nonmetal / metalloid

18. Which is more reactive, hydrogen or helium? Why?

19. Which element is used in lightbulb filaments? Why?

SEE YOUR NOTES AND/OR TEXTBOOK

20. Answer the following questions pertaining to water.
    a. What is special about the density of liquid water compared to solid water?

    b. What feature of the water molecule allows the property in "a" to occur?

    c. What are some benefits and drawbacks of this property?

Definitions:	
PARTICLE THEORY OF MATTER	PURE SUBSTANCE
MIXTURE	HETEROGENEOUS MIXTURE
HOMOGENEOUS MIXTURE	ALLOY
ELEMENT	CHEMICAL PROPERTIES
QUALITATIVE PROPERTY	QUANTITATIVE PROPERTY
VISCOSITY	PHYSICAL CHANGE
BOILING POINT	ALKALI METALS
CHARACTERISTIC PHYSICAL PROPERTY	DENSITY
FREEZING POINT	MELTING POINT
PHYSICAL PROPERTY (LIST AT LEAST 5)	CHEMICAL CHANGE (LIST THE SIGNS OF A CHEMICAL CHANGE)

SEE YOUR NOTES AND/OR TEXTBOOK

Definitions:	
ELEMENT SYMBOL	COMPOUND
METAL	NON-METAL
METALLOID	GROUP
PERIOD	ATOM
ELECTRON	PROTON
NEUTRON	ALKALINE EARTH METALS
HALOGENS	ISOTOPE
ATOMIC MASS	MOLECULE
NOBLE GASES	MOLECULAR ELEMENT (WHAT ARE THEY?)
MOLECULAR COMPOUND	ION
ANION	CATION
IONIC COMPOUND	COVALENT COMPOUND

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