

Ionic vs Molecular Compounds

Name _____

Period _____

Unit 4 – Worksheet 1 (Goal 1 – 2)

1. What are Valence Electrons? How are the number of valence electrons found for the Representative Elements?

2. Define ion –
 - a. What charge are Cations? _____ What types of elements tend to form Cations? _____
 - b. What charge are Anions? _____ What types of elements tend to form Anions? _____

3. Describe what an Ionic compound is made of.

4. Are Ionic compounds +, -, or neutral. Explain.

5. Create a list of physical properties that Ionic Compounds share.

6. The formula of an Ionic compound is called _____

7. Define molecule –

8. Molecules are electrically _____.

9. What type of elements are typically bonded together to form a molecular compound?

10. Produce a list of physical properties that molecules and molecular compounds share.
11. _____ Formulas show the type and number of atoms in a molecule.
12. A _____ written after the element symbol indicates the number of atoms of each element in the molecular compound.
13. How many atoms of each element are in CH_4 ?
14. How many atoms of each element are in $4\text{H}_2\text{O}$?
15. What information can be gathered from the molecular formula CO_2 ?
16. Chemical formulas can also be written for ionic compounds. In this case, however, the formula does not represent a molecule. There are no separate compounds, only a continuous array of _____.
17. Formula units are always made of _____ and _____.
18. For Fe_3P_2 :
- What is the cation in the ionic compound?
 - What is the anion in the ionic compound?
 - What is the ratio of cations to anions in the ionic compound?
19. How many of each ion are present in AlCl_3 ?
20. There are also seven common elements that exist in nature as two atoms bonded together. They are commonly called "diatomic elements".
- They are:
 - Which words best describe these substances? (element, compound, ionic compound, molecular compound, molecule)

Writing the Chemical Name and Formula of an Ionic Compound

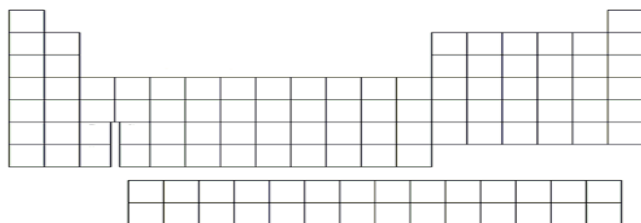
Name _____

Period _____

Unit 4 – Worksheet 2 (Goals 3 – 4)

- Representative Elements: There is a pattern in predicting how many electrons are lost and gained for the representative elements, can you guess it?

WRITE ON YOUR PERIODIC TABLES THE CHARGES OF THE REPRESENTATIVE ELEMENTS NOW.



- The Transition metals have much more complicated patterns of valence electrons. There are two methods of naming such cations. The preferred method is called the stock system. As part of this system, a roman numeral in parentheses indicates the charge value of the cation.

Examples: Name the following transition metal ions:

- tin (lost 2 electrons): *Tin (II)*
- tin (lost 4 electrons)
- iron (lost 3 electrons)
- iron (lost 2 electrons)

There are 2 exceptions to this rule:

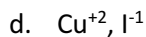
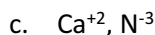
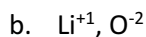
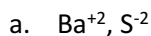
- DO NOT USE A ROMAN NUMERAL WHEN NAMING SILVER, ZINC AND CADMIUM IONS.
- DO NOT USE A ROMAN NUMERAL WHEN NAMING A REPRESENTATIVE ELEMENTS ION.

Write the symbol and charge of the following elements.		Name the ion	Cation or Anion?
a. sulfur	S ²⁻	Sulfide	anion
b. lead (4 electrons lost)			
c. strontium			
d. bromine			
e. copper (1 electron lost)			
f. selenium	Ag ⁺		
g. silver			
h. cesium			
i. phosphorus			

- What are the “rules” for writing Ionic Compounds?

- Write the _____ ion first
- Write the _____ ion last
- The net charge for the compound must add to _____ (positive, negative, or 0)
- Use _____ to indicate how many of each ion you need to “balance” the charge.

4. Write the formulas for the compounds formed between these pairs of ions.



5. Write formulas for these compounds.

a. sodium iodide

b. potassium sulfide

c. tin (II) chloride

d. calcium iodide

6. Define ternary ionic compounds – (Remember, they are still just two ions, and all rules from before still apply!)

7. Write the formula for lithium nitrate, a ternary compound:

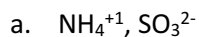
8. Sometimes, we need to take more than one polyatomic ion to balance the charge to 0. If this happens, place the polyatomic ion in parenthesis and the subscript outside of the parentheses.

a. Write the formula for calcium nitrate:

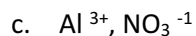
b. Write the formula for aluminum hydroxide:

c. Write the formula for magnesium phosphate:

9. Write the name & formulas for ionic compounds formed from these pairs of ions:



b. Calcium ion, phosphate ion



d. Potassium ion, chromate ion

10. Write formulas for these compounds

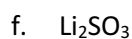
a. lithium hydrogen sulfate

b. chromium (III) nitrite

c. copper (II) bromide

d. ammonium dichromate

11. Name these compounds:



Writing the Chemical Name and Formula of a Molecular Compound

Name _____

Period _____

Unit 4 – Worksheet 3 (Goal 5)

1. What is a binary molecular compound?
2. We use prefixes when naming binary molecular compounds. Fill in the following:

Prefix	Number	Prefix	Number
	1		6
	2		7
	3		8
	4		9
	5		10

3. Say the name of the first element, say the name of the second element, ending in –IDE, and put the appropriate prefix in to indicate how many of each element there are in the formula:

If the prefix for the first element in a binary molecular compound is _____, it may be dropped. However, it must be said if it is for the second element.

Don't reduce the subscripts (like you did for binary ionic compounds)

4. Name these binary molecular compounds:
 - a. N_2O
 - b. PCl_3
 - c. SF_6
 - d. OF_2
 - e. Cl_2O_8
 - f. SO_3
5. Write formulas for the following binary molecular compounds:
 - a. nitrogen trifluoride
 - b. disulfur dichloride
 - c. dinitrogen tetroxide
 - d. octoxygen dichloride
 - e. trinitrogen pentoxide

For the list on the left, name the molecular compound. For the list on the right, give the chemical formula that corresponds to the name.

Name		Formula	
1)	CCl_4	11)	dihydrogen monoxide
2)	CO	12)	sulfur trifluoride
3)	P_2O_5	13)	iodine monochloride
4)	SF_6	14)	nitrogen tribromide
5)	N_2O_3	15)	phosphorus pentachloride
6)	SO_3	16)	xenon difluoride
7)	OCl_2	17)	dichlorine octoxide
8)	CO_2	18)	dinitrogen monoxide
9)	CS_2	19)	trisilicon tetranitride
10)	SeCl_2	20)	boron trichloride

Mole Conversions

Name _____

Period _____

Unit 4 – Worksheet 4 (Goals 6 – 8)

1. Identify the representative particle in each of the following: (atom, molecule, formula unit)

a. CuSO_4 _____

b. H_2O _____

c. NaCl _____

d. Zn _____

e. Cu _____

f. CO_2 _____

2. How many atoms are present in the following compounds?

a. BaS _____

b. O_3 _____

c. Cl_2 _____

d. Ag_3PO_4 _____

e. $\text{Fe}(\text{NO}_3)_3$ _____

f. PCl_5 _____

3. Consider the following samples: 1.00 mol H_2O_2 , 1.00 mol C_2H_6 , or 1.00 mol CO

a. Which sample contains more molecules?

b. Which sample contains more atoms?

4. Write the relationship between the mole and Avogadro's number.

5. Calculate the number of representative particles (molecules, formula units, atoms) or moles for each of the following using Avogadro's number:

a. 8.2 mol CuSO_4

b. 8.67×10^{18} atoms Zn

c. 343.67 mol H_2O

d. 328 formula units H_3PO_4

6. Calculate the molar mass of each of the following using the periodic table:

a. CO_2

b. $\text{C}_6\text{H}_{12}\text{O}_6$

c. CCl_4

d. HNO_3

e. Fe

f. CuOH

7. Write the relationship between the mole and molar mass.

8. Calculate the number of grams or moles for each of the following using molar mass:

a. 142.7 g NaHCO_3

b. 13.87 mol CuCl_2

c. 3.14×10^3 mol HCl

d. 8.63×10^{-3} g CaCO_3

9. Write the relationship between the mole and molar volume at STP.

10. Calculate the volume in liters or moles for each of the following at STP using molar volume:

a. 27 L NO_2

b. 3.5 mol H_2

c. 2.30×10^1 L HCN

d. 0.250 mol O_2

11. Calculate the required information for each problem:

- a. Molecules in 87.6 grams of CO_2
- b. Volume in liters of 100.0 grams of gaseous O_2 at STP
- c. Mass in grams of 9.2×10^{21} NaCl formula units
- d. Volume in liters of 1.33×10^{24} N_2 molecules
- e. Mass in grams of 300 molecules of H_2O
- f. Number of H atoms in 6.047×10^{23} molecules of H_2
- g. Number of O atoms in 13.7 grams of SO_2 .