Ionic Bonding Handouts

Name :_____

Date : _____

Table #1: Forming Ions

Name of neutral atom	Total # of electrons	metal / nonmetal	Symbol of the noble gas closest to the neutral atom	# of electrons lost or gained to be isoelectric with a noble gas	Symbol of the cation or anion	Name of the ion
Sodium						
Calcium						
Nitrogen						
Sulfur						
Hydrogen (anion)						
Carbon (anion)						
Carbon (cation)						

Table 2: Lewis Dot Diagrams

Neutral Atom	Group number	# of valence electrons	Lewis dot diagram
Oxygen			
Aluminum			
Hydrogen			
Phosphorous			
Bromine			

Table 3: Ionic Bonding and Lewis Dot Diagrams

Ionic bond between K and I	Ionic bond between Mg and S	Ionic bond between Ca and P

Table 4: Writing formulas of binary ionic compounds:

The Cross Over Method

Steps	Example 1 Calcium fluoride	Example 2 Gallium arsenide	Example 3 Tungsten (IV) sulfide
1. Write the symbols of the elements in the order given in the name			
2. Write the charge above each element. If metal is multivalent, the roman numeral after the name indicates the charge of the metal			
3. Crossover the charges. Drop the signs and write them as subscripts			
4. Reduce the subscripts to its lowest form			
5. Drop any ones in the formula			
6. The formula			

Table 5: Nomenclature of Binary Ionic Compounds: Fill in the table with appropriate metal ion, non-metal ion and the chemical formula of the compound.

	Name	Mono/ Multivalent metal	Metal ion (cation)	Non-metal ion (anion)	Chemical formula
1	Barium Fluoride	Monovalent	Ba^{2+}	F^{1-}	$Ba_1\ F_2 \rightarrow BaF_2$
2	Magnesium phosphide				
3	Calcium oxide				
4	Gold (III) oxide				
5	Potassium bromide				
6	Beryllium sulfide				
7	Aluminum nitride				
8	Lead (IV) sulfide				
9	Lithium nitride				
10	Sodium sulfide				
11	Tungsten (VI) oxide				
12	Calcium fluoride				

Table 6: Naming regular binary Ionic Compounds:

Fill in the table with appropriate metal ion, non-metal ion and the chemical name of the compound.

	Chemical formula	Metal ion (cation)	Non-metal ion (anion)	Name
1	$CaCl_2$	Ca^{+2}	Cl^{-1}	calcium chloride
2	AlI_3			
3	Ca_3P_2			
4	MgO			
5	KCl			
6	BeS			
7	Ba_3N_2			
8	Ga_2S_3			
9	Li_3P			
10	Na_2S			
11	Ag_2O			
12	CaF_2			

Table 7: Writing names of ionic compounds that contain a multivalent metal

Steps to follow when writing the chemical name for an ionic compound that contains a multivalent metal:(use paper copy to fill in)

Steps to follow	Example 1 Fe_3P_2	Example 2 V_2O_5	Example 3 PbS_2
1. Identify if the metal is multivalent. If Yes then proceed to the next step otherwise just name the compound			
2. Place brackets above each element and place an equal sign between them			
3. Place the ratio of the ions in the chemical formula (the subscripts) outside the bracket			
4. ALWAYS place the negative charge (anion) first INSIDE the bracket. Calculate the total negative charge			
5. Calculate the positive charge of the metal. So that the total + charge = total – charge			
6. The positive charge in the bracket is the charge of the metal ion. Write this charge as a Roman numeral after the name of the metal			

Table 8:Nomenclature of Multivalent Binary Ionic Compounds: Fill the table with appropriate metal ion, non-metal ion and the chemical formula of the compound.

	Chemical Formula	Metal	Non-metal	Calculations	Chemical Name
1	AuF	$Au^{1+, 3+}$	F^{1-}	Total negative charge = -1,	Gold (I) Fluoride
2	NiTe				
3	HgI_2				
4	FeF_2				
5	V_2Se_5				
6	Cu_3As				
7	CoN				
8	Ti_3P_4				
9	Cr_2Se_3				
10	NiF_3				
11	UO_3				
12	SnS_2				

Table 9: Nomenclature of Binary Ionic Compounds

Name the following binary compounds. Not all of these binary compounds are multivalent.

	Chemical formula	Chemical name
1	$AlCl_3$	
2	CuF	
3	Zr_3N_4	
4	$CaBr_2$	
5	MnS_2	
6	NiP	

	Chemical formula	Chemical name
7	CdO	
8	WP_2	
9	Zn_3N_2	
10	$AgCl$	
11	Sn_3P_4	
12	$CuBr_2$	