Naming Ionic Compounds HW #1 ANSWERS

1. Isoelectric means having the same electron configuration as a noble gas. Metals must LOSE electrons to get that configuration while non metals must GAIN electrons to do so.
2. List the symbols of ALL the noble gases in group 18

He, Ne, Ar, Kr, Xe, and Rn.

In high school we won't see these nonmetal atoms make anions: H, B, C, Si, Te, At

3. List the symbols of ALL of the other non metals that WILL gain electrons to form anions

N	O	F	P	S
Cl	As	Se	Br	I

atom	# protons (atomic number)	ground state e^- configuration	ion e^- configuration (isoelectric to?)	#electrons in ion	ionic symbol
Li	3	2-1	2	2	Li^{+1}
Be	4	2-2	2	2	Be^{+2}
Na	11	2-8-1	2-8 (Ne)	10	Na^{+1}
Mg	12	2-8-2	2-8 (Ne)	10	Mg^{+2}
K	19	2-8-8-1	2-8-8	18	K^{+1}
Ca	20	2-8-8-2	2-8-8	18	Ca^{+2}
N	7	2-5	2-8	10	N^{-3}
O	8	2-6	2-8	10	O^{-2}
F	9	2-7	2-8	10	F^{-1}
P	15	2-8-5	2-8-8	18	P^{-3}
S	16	2-8-6	2-8-8	18	S^{-2}
Cl	17	2-8-7	2-8-8	18	Cl^{-1}
Br	35	2-8-18-7	2-8-18-8	36	Br^{-1}

Compounds HW #2 Naming simple ionic compounds ANSWERS

1st name rule: name the metal cation, it is always the same name as the metal atom
2nd name rule: name the non-metal anion, but change the ending to be -ide.

Examples: Oxygen becomes oxide, sulfur becomes sulfide, bromine becomes bromide (etc.).

No matter what the ratio of cations to anions is, we use the single metal name and the single anion name.

For each pair of metals and non metals, write the ions symbols with charges, write the neutral formula for the ionic compound that they form, then, name the compound.

Metal	Non-metal	Cation that forms	Anion that forms	Compound that forms	Compound name
Ba	S	Ba^{+2}	S^{-2}	BaS	Barium sulfide
Rb	N	Rb^{+1}	N^{-3}	Rb_3N	Rubidium nitride
Li	O	Li^{+1}	O^{-2}	$L_{i2}O$	Lithium oxide
Al	F	Al^{+3}	F^{-1}	AlF_3	Aluminum fluoride
Sr	S	Sr^{+2}	S^{-2}	SrS	Strontium sulfide
Na	Br	Na^{+1}	Br^{-1}	NaBr	Sodium bromide
Ca	O	Ca^{+2}	O^{-2}	CaO	Calcium oxide
Cs	P	Cs^{+1}	P^{-3}	Cs_3P	Cesium phosphide
Be	O	Be^{+2}	O^{-2}	BeO	Beryllium oxide
Mg	N	Mg^{+2}	N^{-3}	Mg_2N_3	Magnesium nitride
K	O	K^{+1}	O^{-2}	K_2O	Potassium oxide
Na	P	Na^{+1}	P^{-3}	Na_3P	Sodium phosphide

Compounds HW #3 Naming Molecular Compounds ANSWERS

Molecular compounds are made when 2 or more non metals bond together by sharing electrons to form a new compound. Metal atoms or cations do not make molecular compounds, only non-metals do this. To name these compounds we use the prefix method, in our class we need to name and recognize up to 10 atoms of any one kind, which means we need to know how to "count" to ten in "prefixes". Mono is first, write the prefixes for 2-10:

Mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca

The rules to naming molecular compounds are summed up using 3 common substances. Their formulas are:

H_2O water CO_2 carbon dioxide CO carbon monoxide

Name these, or write their formulas:

N_2O_5	Dinitrogen pentoxide	Hydrogen monoiodide	HI
SO_3	Sulfur trioxide	silicon difluoride	SiF_2
PCl_3	Phosphorous trichloide	dinitrogen monoxide	N_2O
NF_4	Nitrogen tetrafluoride	fluorine monobromide	FBr
PBr_3	Phosphorous tribromide	arsenic trichloride	$AsCl_3$
CCl_4	Carbon tetrachloride	sulfur dioxide	SO_2
H_2S	Dihydrogen monosulfide	phosphorous pentabromide	PBr_5
I_4F_7	Tetraiodine heptafluoride	diarsenic decabromide	As_2Br_{10}
$SeCl_4$	Selenium tetrachloride	tritellurium dichloride	Te_3Cl_2

Compound HW #4 Naming Transitional Metal compounds name: _____

Transitional metals make cations like other metals. Many of these can make more than one kind of stable cation, which is very different from metals in groups 1 and 2 and Al. If there is more than one + numbered ion in the atom's box on the periodic table, then each of these is a possible cation charge.

Atom 26, iron has a +2 and +3 ion charge listed. That means that iron can make Fe^{+2} or Fe^{+3} cations. We call these, Iron (II) cation, and the Iron (III) cation. The ROMAN NUMERAL matches to the charge of the ion. Atom 30 is Zinc, but it has just a +2 charge, it can only make the Zn^{+2} cation.

When these different iron ions, and zinc combine with the anion for oxygen (oxide, or O^{-2}) they do so this way: Fe^{+2} and O^{-2} forms FeO or Iron (II) oxide. Fe^{+3} and O^{-2} forms Fe_2O_3 or Iron (III) oxide. Zn^{+2} and O^{-2} forms ZnO or zinc oxide, without any roman numeral. Since it only makes one kind of ion, it makes only one kind of zinc oxide. There is nothing to differentiate, no need to clarify "which" zinc ion is being used.

Name these compounds or write their formulas

CuS	copper (II) sulfate	tin (IV) fluoride	SnF_4
Ni_2O_3	nickel (III) oxide	niobium (V) phosphide	Nb_3P_5
PbO_2	lead (IV) oxide	bismuth (III) chloride	$BiCl_3$ ☺
PbO	lead (II) oxide	iron (III) oxide	Fe_2O_3
$TiCl_4$	titanium (IV) chloride	iron (II) oxide	FeO
CrO_3	chromium (VI) oxide	gold (I) sulfide	Au_2S
MnS_2	manganese (IV) sulfide	gold (III) selenide	Au_2Se_3
Mn_2S_7	manganese (VII) sulfide	yttrium oxide	Y_2O_3
TaI_5	Tantalum Iodide	silver sulfide	Ag_2S

Naming Compounds Homework #5 Answers

Write in the formulas, or names, or ions with charges, as requested. This is BIG, it counts for 25 HW points, because it's long (no complaints) and you must know this in order to find future success in this course. Good luck. Use your reference tables, put fingers in the right boxes!

cations	anions	formulas
Fe^{+2}	NO_3^{-1}	$Fe(NO_3)_2$
Fe^{+3}	OH^{-1}	$Fe(OH)_3$
Au^{+1}	OH^{-1}	AuOH
Ir^{+4}	NO_3^{-1}	$Ir(NO_3)_4$
Li^{+1}	P^{-3}	Li_3P
Al^{+3}	SO_4^{-2}	$Al_2(SO_4)_3$
NH_4^{+1}	O^{-2}	$(NH_4)_2O$
NH_4^{+1}	N^{-3}	$(NH4)_3N$

formulas	STOCK NAMES
N_2S_3	dinitrogen trisulfide
CBr_4	carbon tetrabromide
HI	hydrogen monoiodide
SiF_4	silicon tetrafluoride
BN	boron mononitride
CSe_2	carbon diselenide

cations	anions	formulas
Tin II	chlorate	$Sn(ClO_3)_2$
Tin IV	chlorite	$Sn(ClO_2)_4$
palladium IV	sulfite	$Pd(SO_3)_2$
tungsten	oxide	WO_3
Lead II	permanganate	$Pb(MnO_4)_2$
Lead IV	carbonate	$Pb(CO_3)_2$
Osmium III	carbonate	$Os_2(CO_3)_3$
Osmium IV	permanganate	$Os(MnO_4)_4$

formulas	STOCK NAMES
$AsCl_3$	arsenic trichloride
SF_4	sulfur tetrafluoride
PI_5	phosphorous pentaiodide
B_2O_3	diboron trioxide
SiO_2	silicon dioxide
$SeBr_6$	selenium hexabromide

	atom	ground state electron configuration	possible excited state electron configuration	electron configuration as an ION	This is isoelectric to which noble gas?
1	Mg	2-8-2	2-8-1-1 2-7-3	2-8	neon
2	S	2-8-6	2-8-5-1 2-7-7	2-8-8	argon
3	F	2-7	2-6-1 1-8	2-8	neon
4	K	2-8-8-1	2-8-7-2 2-8-7-1-1	2-8-8	argon
5	N	2-5	2-4-1 1-6	2-8	neon

	Make up an example for each Combine a…	cation	anion	formula	name
6	monoatomic cation + monoatomic anion	Na^{+1}	Cl^{-1}	NaCl	sodium chloride
7	monoatomic cation + polyatomic anion	Ca^{+2}	NO_3^{-1}	$Ca(NO_3)_2$	calcium nitrate
8	polyatomic cation + monoatomic anion	NH_4^{+1}	N^{-3}	$(NH_4)_3N$	ammonium nitride
9	polyatomic cation + polyatomic anion	NH_4^{+1}	$Cr_2O_7^{-2}$	$(NH_4)_2Cr_2O_7$	ammonium dichromate
10	transitional metal cation + monoatomic anion (with Roman Numeral)	Pb^{+4}	S^{-2}	PbS_2	Lead IV sulfide
11	transitional metal cation + polyatomic anion (without a Roman Numeral!)	Sb^{+5}	$S_2O_3^{-2}$	$Sb_2(S_2O_3)_5$	antimony V thiosulfate
12	Si + F into a molecular compound (your choice which one) THIS IS NOT IONIC	Si^{+2} Si^{+4}	F^{-1} F^{-1}	SiF_2 is silicon difluoride SiF_4 is silicon tetrafluoride	