

# Naming Compounds Quiz A

1. How can you quickly tell if a compound is molecular or ionic? Give an example of each kind.
2. Name these compounds: NaBr, MgS, AlN, Na<sub>2</sub>S, Mg<sub>3</sub>P<sub>2</sub>, AlF<sub>3</sub>.
3. Name these compounds: FeO, Fe<sub>2</sub>O<sub>3</sub>, WS<sub>3</sub>, TiI<sub>4</sub>, TiI<sub>3</sub>, ZnBr<sub>2</sub>.
4. Name these compounds: N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>5</sub>, CO, CO<sub>2</sub>, SeBr<sub>2</sub>.
5. Name these compounds: KNO<sub>2</sub>, KNO<sub>3</sub>, Al(OH)<sub>3</sub>, (NH<sub>4</sub>)<sub>2</sub>CrO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, CaC<sub>2</sub>O<sub>4</sub>.
6. Name these compounds: Cu(NO<sub>3</sub>)<sub>2</sub>, CuNO<sub>3</sub>, AlPO<sub>4</sub>, Nb(MnO<sub>4</sub>)<sub>5</sub>, Nb<sub>2</sub>(SO<sub>3</sub>)<sub>3</sub>, NaCN.
7. List 10 prefixes used to name molecular compounds 1 to 10.
8. What metals use roman numerals?
9. Why don't we ever say something like sodium (I) chloride, or zinc (II) oxide?
10. Why does EVERY COMPOUND in the Universe with manganese HAVE TO HAVE a roman numeral? What ion charges go with which roman numerals?

# Naming Compounds Quiz A ANSWERS

1. How can you quickly tell if a compound is molecular or ionic? Give an example of each kind.  
Molecular compounds always start with nonmetals, ex: CO, H<sub>2</sub>O, CO<sub>2</sub>, CH<sub>4</sub>, C<sub>6</sub>H<sub>12</sub>O<sub>6</sub>.  
Ionic compounds always start with metals, ex: NaCl, MgO, TiBr<sub>2</sub>, TiBr<sub>3</sub>, TiBr<sub>4</sub> - one exception: NH<sub>4</sub><sup>+1</sup>
2. Name these compounds: NaBr, MgS, AlN, Na<sub>2</sub>S, Mg<sub>3</sub>P<sub>2</sub>, AlF<sub>3</sub>. sodium bromide, magnesium sulfide, aluminium nitride, sodium sulfide, magnesium phosphide, aluminum fluoride.
3. Name these compounds: FeO, Fe<sub>2</sub>O<sub>3</sub>, WS<sub>3</sub>, TiI<sub>4</sub>, TiI<sub>3</sub>, ZnBr<sub>2</sub>. Iron (II) oxide, Iron (III) oxide, Tungsten sulfide, Titanium (II) iodide, Titanium (III) iodide, Titanium (IV) iodide, zinc bromide.
4. Name these compounds: N<sub>2</sub>O, NO<sub>2</sub>, N<sub>2</sub>O<sub>5</sub>, CO, CO<sub>2</sub>, SeBr<sub>2</sub>. dinitrogen monoxide, nitrogen dioxide, dinitrogen pentoxide, carbon monoxide, carbon dioxide, selenium dibromide.
5. Name these compounds: KNO<sub>2</sub>, KNO<sub>3</sub>, Al(OH)<sub>3</sub>, (NH<sub>4</sub>)<sub>2</sub>CrO<sub>4</sub>, (NH<sub>4</sub>)<sub>2</sub>Cr<sub>2</sub>O<sub>7</sub>, CaC<sub>2</sub>O<sub>4</sub>. potassium nitrite, potassium nitrate, aluminum hydroxide, ammonium chromate, ammonium dichromate, calcium oxalate.
6. Name these compounds: Cu(NO<sub>3</sub>)<sub>2</sub>, CuNO<sub>3</sub>, AlPO<sub>4</sub>, Nb(MnO<sub>4</sub>)<sub>5</sub>, Nb<sub>2</sub>(SO<sub>3</sub>)<sub>3</sub>, NaCN.  
Copper (II) nitrate, copper (I) nitrate, aluminum phosphate, niobium (V) sulfite, sodium cyanide.
7. List 10 prefixes used to name molecular compounds 1 to 10.  
mono, di, tri, tetra, penta, hexa, hepta, octa, nona, deca.
8. What metals use roman numerals?  
Any transitional metal (groups 3-12 plus under the stairs) that has two or more positive oxidation numbers.  
Example: cobalt makes 2 cations, always gets a RN. Zinc makes 1 cation, never gets a RN.
9. Why don't we ever say something like sodium (I) chloride, or zinc (II) oxide? Sodium and zinc both are not transitional metals, and both do not make more than one kind of cation. Sodium ions come in one flavor: Na<sup>+1</sup>. Zinc cations also are one flavor: Zn<sup>+2</sup>. A roman numeral would be like saying it twice, which is silly.
10. Why does EVERY COMPOUND in the Universe with manganese HAVE TO HAVE a roman numeral? What ion charges go with which roman numerals? Manganese is a transitional metal, that happens to have more than one positive oxidation number. Mn cations come in four flavors: Mn<sup>+2</sup>, Mn<sup>+3</sup>, Mn<sup>+4</sup>, and Mn<sup>+7</sup>.  
They are called: manganese (II), manganese (III), manganese (IV), manganese (VII),.



# Naming Compounds Quiz B ANSWERS

1. What is the correct formula for chromium (III) oxide?  $\text{Cr}_2\text{O}_3$  ( $\text{Cr}^{+3}$  with  $\text{O}^{-2}$ , criss cross)
2. An atom represented by X forms a compound  $\text{X}_3\text{N}_2$ . The atom could be: Al Cs Mg Na  
It HAS to be a +2 cation so that when "criss-crossed", the  $\text{N}^{-3}$  combines to an  $\text{X}^{+2}$  ion. Only Mg here is +2.
3. How many oxygen atoms are present in this formula:  $\text{Al}_2(\text{CO}_3)_3$ ? 9 (three oxygens in the carbonate, tripled)
4. What is the correct name for this compound:  $\text{CrPO}_4$ ?  
chromium (III) phosphate Here chromium is bonded in a 1:1 ratio with phosphate, which is a -3 anion. The chromium has to be the  $\text{Cr}^{+3}$  cation.
5. What is the correct formula for iron (III) oxide?  $\text{Fe}_2\text{O}_3$  ( $\text{Fe}^{+3}$  with  $\text{O}^{-2}$ , criss cross)
6. The HONClBrIF twins are: diatomic elements Diatomic means 2 atoms of the same atom bonded together
7. What is the formula for lead (II) oxide?  $\text{PbO}$  ( $\text{Pb}^{+2}$  with  $\text{O}^{-2}$ , criss cross, the simple whole number ratio 1:1)
8. The correct formula of the thiosulfate anion is:  
 $\text{S}_2\text{O}_3^{-2}$  LOOK THIS UP ON TABLE E, don't be lazy or guess!
9. What is the formula of the neutral compound formed when magnesium combines with phosphorous?  
 $\text{Mg}_3\text{P}_2$  ( $\text{Mg}^{+2}$  with  $\text{P}^{-3}$ , criss-cross)
10. How many bromine anions would it take to combine to one strontium cation? 2 ( $\text{Sr}^{+2}$  with  $\text{Br}^{-1}$ , criss cross)

# Naming Compounds Quiz C

1. The atoms sulfur and selenium both have the following selected oxidation states: -2, +4, and +6. What are all the ions that these atoms can form into?
2. Nitrogen has the most selected oxidation states for any atom (-3, -2, -1, +1, +2, +3, +4, and +5). How many different ions can nitrogen form into? List them all.
3. Write the formulas for sulfuric acid, sulfurous acid, and phosphoric acid.
4. Write out the proper formulas for these compound names
  - A. sulfur dioxide
  - B. carbon tetrachloride
  - C. dinitrogen pentafluoride
  - D. phosphorous trinitride
  - E. carbon monoxide
  - F. carbon dioxide
  - G. silicon monosulfide
  - H. arsenic tribromide
5. Manganese and Fluorine can combine in FOUR different ways. State the four compound names and their four proper formulas.
6. Write the formulas of these names

Cobalt (III) thiocyanate	Lead (IV) chromate
Tin (II) hydroxide	Iron (II) nitride
7. What is the correct formula for sodium oxide?       $\text{NaO}_2$        $\text{SO}_2$        $\text{S}_2\text{O}$        $\text{Na}_2\text{O}$
8. Determine all of the phosphorous-chlorine compounds, names and formulas.
9. Define ISOELECTRIC, give a metal and a nonmetal example.
10. If ISOELECTRIC is a “chemistry thing”, how can you explain that nickel (and many other metals) can make more than one kind of cation? Doesn't the isoelectric rule apply them?

# Naming Compounds Quiz C ANSWERS

- The atoms sulfur and selenium both have the following selected oxidation states: -2, +4, and +6. What are all the ions that these atoms can form into? Both can ONLY make a -2 anion. Selected oxidation numbers are “really” for combining nonmetals together. Both of these atoms follow the simple isoelectric rule: nonmetals gain enough electrons to match the electron configuration of the nearest noble gas. Both of these need to “gain” 2 electrons.
- Nitrogen has the most selected oxidation states for any atom (-3, -2, -1, +1, +2, +3, +4, and +5). How many different ions can nitrogen form into? List them all. Nitrogen follows the same isoelectric rule, it ONLY makes a  $N^{-3}$  anion.
- Write the formulas for sulfuric acid, sulfurous acid, and phosphoric acid.  $H_2SO_{4(AQ)}$ ,  $H_2SO_{3(AQ)}$ ,  $H_3PO_{4(AQ)}$ . All acids MUST be aqueous, all acids you need to know are in table K.
- Write out the proper formulas for these compound names
 

sulfur dioxide	$SO_2$	carbon tetrachloride	$CCl_4$
dinitrogen pentafluoride	$N_2F_5$	phosphorous trinitride	$PN_3$
carbon dioxide	$CO_2$	silicon monosulfide	$SiS$
		arsenic tribromide	$AsBr_3$
- Manganese and Fluorine can combine in FOUR different ways. State the four compound names and their 4 proper formulas.
 

$Mn^{+2} F^{-1} \rightarrow MnF_2$	manganese (II) fluoride	$Mn^{+3} F^{-1} \rightarrow MnF_3$	manganese (III) fluoride
$Mn^{+4} F^{-1} \rightarrow MnF_4$	manganese (IV) fluoride	$Mn^{+7} F^{-1} \rightarrow MnF_7$	manganese (VII) fluoride
- Write the formulas of these names
 

Cobalt (III) thiocyanate	$Co(SCN)_3$	Lead (IV) chromate	$Pb(CrO_4)_2$
Tin (II) hydroxide	$Sn(OH)_2$	Iron (II) nitride	$Fe_3N_2$
- What is the correct formula for sodium oxide?  $Na_2O$  ( $Na^{+1}$  and  $O^{-2}$ , criss-cross)
- Determine all of the phosphorous-chlorine compounds, names and formulas.  
(Start with  $P^{-3}$ , go methodically through the combos. Combined oxidation numbers = 0)
 

<u>P</u>	<u>Cl</u>	
-3	-1	$PCl_3$ phosphorous trichloride
+3	+1	$PCl$ phosphorous monochloride
+5	+3	$P_5Cl_3$ pentaphosphorous trichloride
	+5	$P_7Cl_3$ heptaphosphorous trichloride
	+7	$PCl_5$ phosphorous pentachloride
- Define ISOELECTRIC, give a metal and a nonmetal example. For Metal Atoms that are becoming cations, these atoms lose (transfer) exactly enough electrons each to end with the same electron configuration of the closest noble gas. Metals ALWAYS lose electrons. For Nonmetal Atoms that are becoming anions, these atoms gain electrons (from the metals who transfer them to the nonmetals) and they end with the same electron configuration as the closest noble gas.
- If ISOELECTRIC is a “chemistry thing”, how can you explain that nickel (and many other metals) can make more than one kind of cation? Doesn’t the isoelectric rule apply them? Many transitional metals do not follow the “simple” isoelectric rule because they are able to stretch their outermost, or valence orbital, to become stable by losing more than one number of electrons. They can make different cations and still be stable. We differentiate these cations with Roman Numerals.

# Naming Compounds Quiz D

1-4 Fill in this chart. Indicate which NOBLE GAS each ion is isoelectric too as well.

Atom symbol	Atom e <sup>-</sup> config	Ion e <sup>-</sup> config	Ion symbol (isoelectric to?)
F	2-7	2-8	F <sup>-1</sup> (Ne)
Cl	2-8-7		
Br	2-8-18-7		
I	2-8-18-18-7		
O	2-6		
S	2-8-6		
N	2-5		
P	2-8-5		

- Write the formulas for each molecule: phosphorous tribromide, diphosphorous trioxide, oxygen difluoride, Dihydrogen monoxide, Nitrogen monoxide
- Write the formulas and NAMES for each of the HONClBrIF Twins.
- Write the formulas for nickel (III) bromide, vanadium (V) sulfate, and chromium (VI) sulfide
- Write the formulas for sodium hydrogen carbonate, sodium hydrogen sulfate, and sodium acetate
- Why do these compounds NOT exist? Argon fluoride, Chromium (IV) sulfide, Zinc (II) oxide
- When naming compounds from formulas, what is ALWAYS the first thing to look at?

# Naming Compounds Quiz D ANSWERS

1-4 Fill in this chart. Indicate which NOBLE GAS each ion is isoelectric too as well.

Atom symbol	Atom e <sup>-</sup> config	Ion e <sup>-</sup> config	Ion symbol ( <i>isoelectric to?</i> )
F	2-7	2-8	F <sup>-1</sup> (Ne)
Cl	2-8-7	2-8-8	Cl <sup>-1</sup> (Ar)
Br	2-8-18-7	2-8-18-8	Br <sup>-1</sup> (Kr)
I	2-8-18-18-7	2-8-18-18-8	I <sup>-1</sup> (Xe)
O	2-6	2-8	O <sup>-2</sup> (Ne)
S	2-8-6	2-8-8	S <sup>-2</sup> (Ar)
N	2-5	2-8	N <sup>-3</sup> (Ne)
P	2-8-5	2-8-8	P <sup>-3</sup> (Ar)

5. Write the formulas for each molecule: phosphorous tribromide PBr<sub>3</sub>      diphosphorous trioxide P<sub>2</sub>O<sub>3</sub>  
oxygen difluoride OF<sub>2</sub> (for fun it's OFF, but you get no points for that!)  
dihydrogen monoxide H<sub>2</sub>O      nitrogen monoxide NO (oh yes!)
6. Write the formulas and NAMES for each of the HONClBrIF Twins.  
Hydrogen H<sub>2</sub>, Oxygen O<sub>2</sub>, Nitrogen N<sub>2</sub>, Chlorine Cl<sub>2</sub>, Bromine Br<sub>2</sub>, Iodine I<sub>2</sub>, and Fluorine F<sub>2</sub>.
7. Write the formulas for nickel (III) bromide, vanadium (V) sulfate, and chromium (VI) sulfide  
NiBr<sub>3</sub> (Ni<sup>+3</sup> Br<sup>-1</sup>)      V<sub>2</sub>(SO<sub>4</sub>)<sub>5</sub> (V<sup>+5</sup> SO<sub>4</sub><sup>-2</sup> table E!)      CrS<sub>3</sub> (Cr<sup>+6</sup> S<sup>-2</sup>, crisscrossed, simple ratio)
8. Write the formulas for sodium hydrogen carbonate, sodium hydrogen sulfate, and sodium acetate  
(Na<sup>+1</sup> HCO<sub>3</sub><sup>-1</sup> table E!) NaHCO<sub>3</sub>      (Na<sup>+1</sup> HSO<sub>4</sub><sup>-1</sup>) NaHSO<sub>4</sub>      (Na<sup>+1</sup> C<sub>2</sub>H<sub>3</sub>O<sub>2</sub><sup>-1</sup>) NaC<sub>2</sub>H<sub>3</sub>O<sub>2</sub>
9. Why do these compounds NOT exist? Argon fluoride, Chromium (IV) sulfide, Zinc (II) oxide  
Argon makes NO compounds, Chromium does not make a +4 cation, zinc NEVER gets a roman numeral
10. When naming compounds from formulas, what is ALWAYS the first thing to look at? If the first atom, or name is a metal, it's an ionic compound and follows certain rules. If it's a nonmetal, it's molecular with prefix name rules.

# Naming Compounds Quiz E

1-4. Fill in all of the boxes. Clearly you should know the vocabulary words to do this.

Property	Metals	Nonmetals	Ionic compounds
Luster			
Ductile			
Malleable			
Conducts electricity			
Conducts heat			
Phase at room temp			
Forms cations?			
Forms anions?			
Relative melting point			
Representative Particle			

5. Is  $\text{Rb}_3\text{P}$  an ionic or molecular compound? Name this compound.
6. Is  $\text{PoCl}_4$  an ionic or molecular compound? Name this compound.
7. Is  $\text{AuBr}$  an ionic or molecular compound? Name this compound.
8. Is  $\text{VO}_2$  an ionic or molecular compound? Name this compound.
9. Is  $\text{KFC}$  an ionic or molecular compound? Name this compound.
10. Is  $\text{PtS}$  an ionic or molecular compound? Name this compound.

# Naming Compounds Quiz E ANSWERS

1-4. Fill in all of the boxes. Clearly you should know the vocabulary words to do this.

Property	Metals	Nonmetals	Ionic compounds
Luster	Yes	No	No
Ductile	Yes	No	No
Malleable	Yes	No	No
Conducts electricity	Yes	No	No
Conducts heat	Yes	No	No
Phase at room temp	Solid	Solid, liquid, gas	Solid
Forms cations?	Yes	No	X
Forms anions?	No	Yes	X
Relative melting point	High	Lowest	Highest
Representative Particle	Atoms	Atoms or diatomic molecules	Formula units

5. Is  $\text{Rb}_3\text{P}$  an ionic or molecular compound? Name this compound. – Ionic, Rubidium phosphide
6. Is  $\text{PoCl}_4$  an ionic or molecular compound? Name this compound. – Ionic, Polonium (IV) chloride
7. Is  $\text{AuBr}$  an ionic or molecular compound? Name this compound. – Ionic, Gold (I) bromide
8. Is  $\text{VO}_2$  an ionic or molecular compound? Name this compound. – Ionic, Vanadium (IV) oxide
9. Is KFC an ionic or molecular compound? Name this compound. – Neither, Kentucky Fried Chicken (sorry)
10. Is  $\text{PtS}$  an ionic or molecular compound? Name this compound. – Ionic, Platinum (II) sulfide