

Nitrogen N^{-3}	Nitrogen N^{-3}	Phosphorous P^{-3}	Phosphorous P^{-3}
Ammonium NH_4^{+1}	Ammonium NH_4^{+1}	Ammonium NH_4^{+1}	
Acetate $\text{C}_2\text{H}_3\text{O}_2^{-1}$	Acetate $\text{C}_2\text{H}_3\text{O}_2^{-1}$	Acetate $\text{C}_2\text{H}_3\text{O}_2^{-1}$	
Chlorate ClO_3^{-1}	Chlorate ClO_3^{-1}	Hydroxide OH^{-1}	
Nitrate NO_3^{-1}	Nitrate NO_3^{-1}	Nitrate NO_3^{-1}	

Carbonate CO_3^{-2}	Carbonate CO_3^{-2}	Carbonate CO_3^{-2}
Sulfate SO_4^{-2}	Sulfate SO_4^{-2}	Sulfate SO_4^{-2}
Phosphate PO_4^{-3}	Chlorate ClO_3^{-1}	Phosphate PO_4^{-3}
	Hydroxide OH^{-1}	
	Hydroxide OH^{-1}	

NAME _____ DATE _____ CLASS _____

LAB ACTIVITY

Chapter 11

Writing Formulas for Binary Compounds

Objectives: Students will be able to write chemical formulas for binary compounds.

Materials: Scissors**Procedure:**

1. Cut out the shapes on the pages provided and throw out any scrap paper in the garbage can.
2. Copy the information on the shapes on to the tables below. The first ones have been done for you.

Oxidation Numbers of Some Elements		
+1	+2	+3
Hydrogen, H ⁺¹		
-1	-2	-3

Polyatomic Ions and Their Charges			
+1	-1	-2	-3
Ammonium, NH ₄ ⁺¹			

3. Use the rules for writing *binary compounds* to write formulas below.

Rules for Writing Formulas for Binary Compounds

Rules for Naming Binary Compounds

1. The metal (+oxidation#) is written first.	1. The metal (+oxidation#) is written first.
2. The nonmetal (-oxidation#) is written second.	2. The nonmetal (-oxidation#) is written second.
3. The sum of the oxidation must add to zero.	3. Write the first syllable of the nonmetal, then add "ide."

Potassium and Iodine

Calcium and Fluorine

Hydrogen and Sulfur

Copper (II) and Oxygen

4. Use the tables on the previous page to name the following binary compounds.



5. Use the tables on the previous page and the paper cards to write formulas for the following compounds. *These aren't binary compounds since they contain polyatomic ions.*

Ammonium and Oxygen

Silver and Nitrate

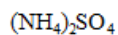
Sodium and Hydroxide

Copper (II) and Sulfate

Calcium and Acetate

Aluminum and Nitrate

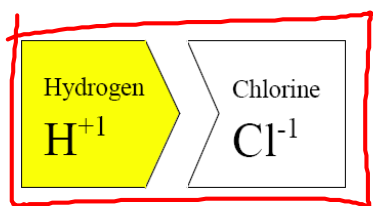
6. Use the tables on the previous page and the paper cards to Name the following compounds. *These aren't binary compounds since they contain polyatomic ions. The rules are the same except that the polyatomic ions don't change their names.*



Questions:

1. What is special about binary compounds? _____

2. Why are compounds that contain polyatomic ions not binary compounds?



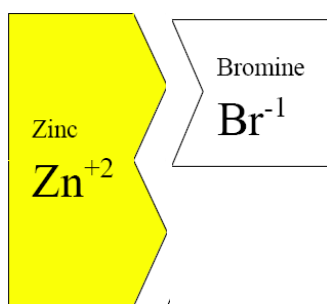
CHEMICAL FORMULA

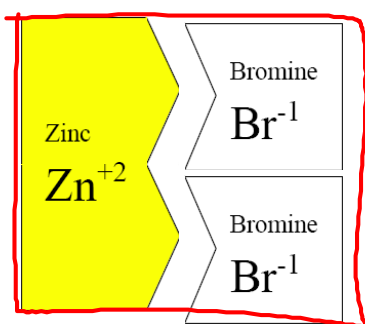


$+1 - 2 = -1$ SUM OF OXIDATION #S
IS ZERO

NAME

HYDROGEN CHLORIDE





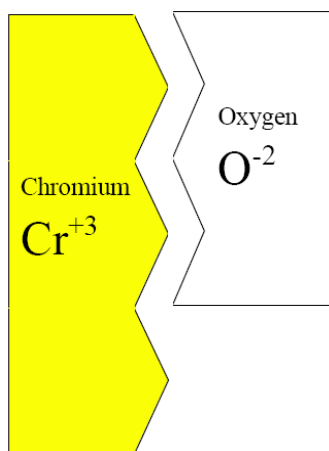
$$+2 - 1 - 1 = 0 \checkmark$$

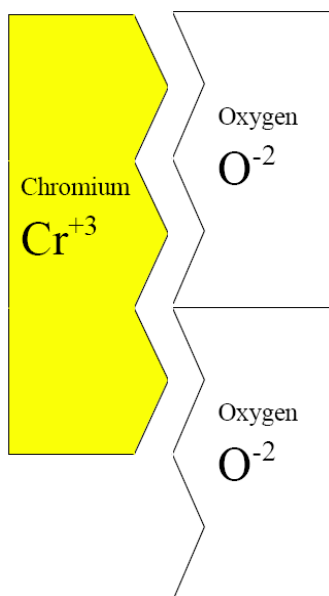
CHEMICAL FORMULA



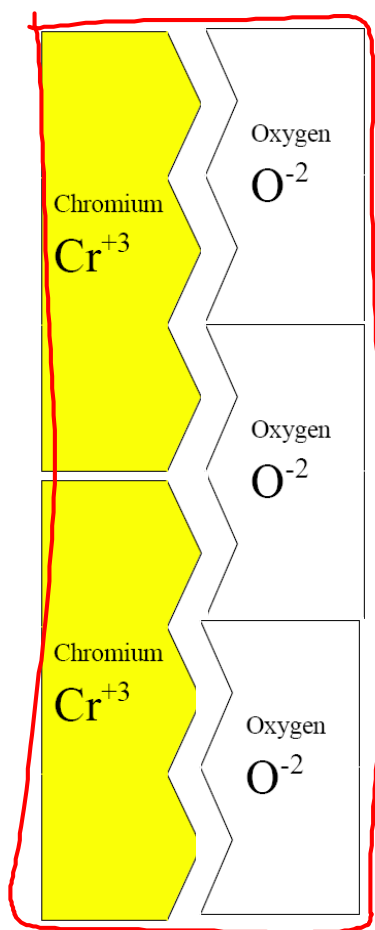
NAME

ZINC BROMIDE



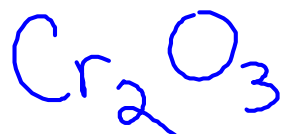






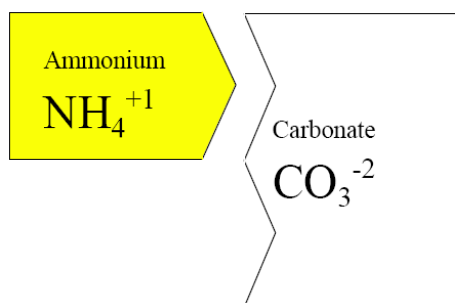
$$+3 +3 -2 -2 -2 = 0 \checkmark$$

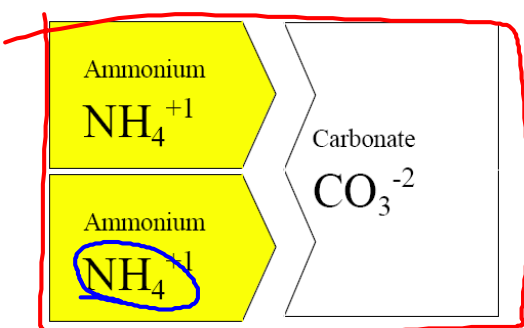
CHEMICAL FORMULA



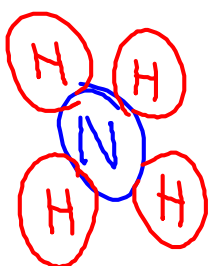
NAME

CHROMIUM OXIDE

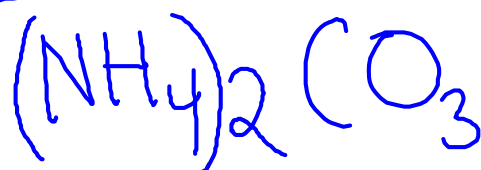




$$+1 + 1 - 2 = 0 \checkmark$$



CHEMICAL FORMULA



NAME

AMMONIUM CARBONATE

NAME _____ DATE _____ CLASS _____

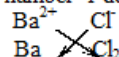
ENRICHMENT**Chapter 20****Formulas and Names of Compounds***WRITING CHEMICAL FORMULAS WITH THE CRISSCROSS METHOD*

Oxidation numbers are useful for writing chemical formulas. Use your textbook or a periodic table to find oxidation numbers for elements and polyatomic ions. In the following examples, oxidation numbers and the crisscross method will be used for writing chemical formulas. Remember that subscripts in a formula give the ratio of atoms in a compound. After crisscrossing, simplify the ratio, if necessary.

Example 1. What is the formula for barium chloride? Solution: Barium is in Group 2. Elements in this group tend to lose two electrons, so their oxidation number is 2+. Chlorine is in Group 17. Elements in this group tend to gain one electron. Chlorine has an oxidation number of 1-. Now write the symbols in the correct order. The metal ion is written first. Write the oxidation numbers as superscripts. For oxidation number of 1+ or 1-, only the positive or negative sign is written.

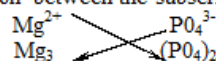


Next, crisscross the numbers only and show them as subscripts. The number 1 does not need to be written.



The correct formula for barium chloride is BaCl_2 .

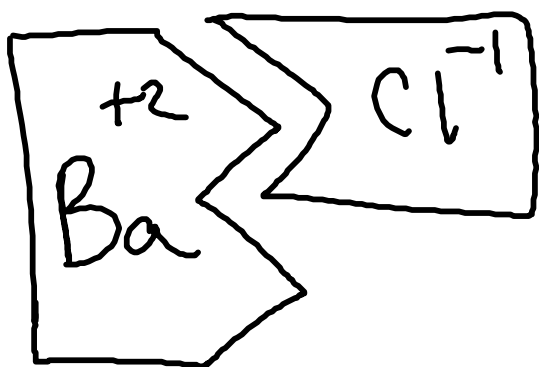
Example 2. What is the formula for magnesium phosphate? Solution: Write the parts of the formula in the correct order. Assign oxidation numbers. Write the formula for the compound by crisscrossing the superscripts. Since the phosphate ion is used more than once, place it in parentheses. The parentheses prevent confusion between the subscripts.

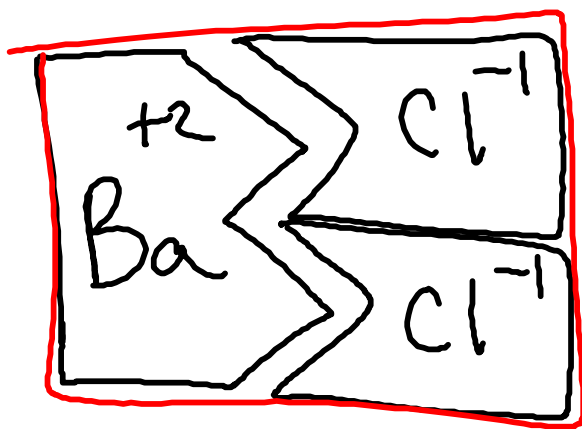


The correct formula for magnesium phosphate is $\text{Mg}_3(\text{P} \text{O}_4)_2$.

Use the crisscross method to write the chemical formulas for the compounds described below.

1. The compound ammonium selenate is used as a mothproofing agent. The selenate ion is written as SeO_4^{2-} . What is the formula for this compound?
2. Titanium oxide is used as a white paint pigment. If titanium has an oxidation number of 4+ in this compound, what is this compound's formula?
3. Zinc iodide is used as an antiseptic. What is its formula?
4. Potassium chloride is used in fertilizer, photography, and as a salt substitute. What is its chemical formula?
5. Write the correct chemical formula for a compound containing barium and oxygen. What is the name of this compound?





$$+2 - 1 - 1 = 0 \checkmark$$

