

Name: \_\_\_\_\_ **KEY** \_\_\_\_\_ Class Period: \_\_\_\_\_

### Compound Names and Formulas Activity

#### Part 1

Instructions: Study the following compound formulas and their corresponding names. Then answer the questions below.

Formula	Name	Formula	Name
NaCl	sodium chloride	NaBr	sodium bromide
KI	potassium iodide	MgCl <sub>2</sub>	magnesium chloride
MgO	magnesium oxide	Na <sub>2</sub> O	sodium oxide
K <sub>2</sub> O	potassium oxide	CaF <sub>2</sub>	calcium fluoride
Al <sub>2</sub> S <sub>3</sub>	aluminum sulfide	AlCl <sub>3</sub>	aluminum chloride
K <sub>3</sub> N	potassium nitride	LiBr	lithium bromide

#### Questions:

1. What type of elements are in these compounds? Metals or Nonmetals?

***metals and nonmetals***

2. How many different types of elements are in each compound?

***2***

3. Is there an order the elements are written in both name and formula? If yes, what is it?

***metal is 1<sup>st</sup>; then the nonmetal***

4. **Subscripts** tell how many of each element there are. How are these elements put together? What determines if there needs to be more than one of either element?

***The overall charge of the compound must be neutral ( Equal number of + and -)***

5. Are there **suffixes** or prefixes used in the names? If so, is there a pattern to the usage?

***-ide to nonmetal; the metals name do not change***

Based on the examples of formulas/names and the answers to your questions, come up with a set of rules for naming compounds.

Rules for Ionic Compounds with 2 elements

Writing names

- *metal first and then nonmetal*
- *Name the metal first. Do not change its name.*
- *Name nonmetal second; change the ending to -ide.*
- 

Writing Formulas

- *the charges must balance out; therefore there should be no charge on the compound*
- 

6. What type of bonding is occurring in these compounds? Explain how this holds the compound together.

*Ionic Bonding; Opposite charges attract; held together by charges*

Based on your rules, name these compounds.

- |                    |                          |                          |                        |
|--------------------|--------------------------|--------------------------|------------------------|
| 1. $\text{CaCl}_2$ | <u>calcium chloride</u>  | 4. $\text{Li}_2\text{S}$ | <u>lithium sulfide</u> |
| 2. $\text{BeO}$    | <u>beryllium oxide</u>   | 5. $\text{BaI}_2$        | <u>barium iodide</u>   |
| 3. $\text{SrBr}_2$ | <u>strontium bromide</u> | 6. $\text{Na}_3\text{N}$ | <u>sodium nitride</u>  |

Based on your rules, write the formulas for these compounds.

- lithium iodide  $\text{LiI}$
- magnesium bromide  $\text{MgBr}_2$
- cesium oxide  $\text{Cs}_2\text{O}$
- beryllium nitride  $\text{Be}_3\text{N}_2$
- calcium sulfide  $\text{CaS}$
- potassium chloride  $\text{KCl}$

## Part 2

Instructions: Study the following compound formulas and their corresponding names. Then answer the questions below.

You might need to refer to your Essentials Sheet.

### Formula

NaOH

Mg(OH)<sub>2</sub>

Ca(NO<sub>3</sub>)<sub>2</sub>

NaNO<sub>3</sub>

Mg<sub>3</sub>(PO<sub>4</sub>)<sub>2</sub>

### Name

sodium hydroxide

magnesium hydroxide

calcium nitrate

sodium nitrate

magnesium phosphate

### Formula

NH<sub>4</sub>Cl

Na<sub>2</sub>SO<sub>4</sub>

(NH<sub>4</sub>)<sub>2</sub>O

### Name

ammonium chloride

sodium sulfate

ammonium oxide

## Questions:

1. Are there similarities to the compounds in part 1? If so, what are they?

*metal and nonmetal; metal is still first*

2. Are there differences to the compounds in part 1? If so, what are they?

*more than two elements; polyatomic ions present- do not change their name; NH<sub>4</sub><sup>+</sup> can act as a metal*

3. What do the ( ) mean? Why are they needed?

*( ) are needed when more than one polyatomic ion is needed*

Based on the examples of formulas/names and the answers to your questions, come up with a set of rules for naming compounds. These will update the rules you came up with in part 1.

## Rules for Naming Ionic Compounds with More than 2 Elements

### Writing names

- *Do not change the name of the polyatomic ion*

•

•

•

### Writing Formulas

- *still need to balance formulas; if more than one polyatomic ion is needed, use ( )*

•

Based on your rules, name these compounds.

1.  $\text{NH}_4\text{NO}_3$  *ammonium nitrate*

4.  $\text{K}_2\text{SO}_4$  *potassium sulfate*

2.  $\text{MgSO}_4$  *magnesium sulfate*

5.  $\text{NaHCO}_3$  *sodium hydrogen carbonate*

3.  $\text{AlPO}_4$  *aluminum phosphate*

6.  $\text{LiCN}$  *lithium cyanide*

Based on your rules, write the formulas for these compounds.

1. ammonium nitrate  *$\text{NH}_4\text{NO}_3$*

2. calcium sulfate  *$\text{CaSO}_4$*

3. lithium phosphate  *$\text{Li}_3\text{PO}_4$*

4. magnesium carbonate  *$\text{MgCO}_3$*

5. calcium hydroxide  *$\text{Ca}(\text{OH})_2$*

6. calcium nitrite  *$\text{Ca}(\text{NO}_2)_2$*

4. How would the formulas of beryllium nitride and beryllium nitrate be different?



*Even the smallest change in the name can mean a big difference in the formula. It is very important to pay attention to detail.*

### Part 3

Instructions: Study the following compound formulas and their corresponding names. Then answer the questions below.

Formula	Name	Formula	Name
CuCl	copper (I) chloride	CuCl <sub>2</sub>	copper (II) chloride
Cu <sub>2</sub> O	copper (I) oxide	CuO	copper (II) oxide
FeF <sub>2</sub>	iron (II) fluoride	FeF <sub>3</sub>	iron (III) fluoride
FeO	iron (II) oxide	Fe <sub>2</sub> O <sub>3</sub>	iron (III) oxide
VF <sub>5</sub>	vandium (V) fluoride	CrCl <sub>3</sub>	chromium (III) chloride
CoCl <sub>2</sub>	cobalt (II) chloride	CoCl <sub>3</sub>	cobalt (III) chloride
AgCl	silver chloride	Ag <sub>2</sub> S	silver sulfide
ZnCl <sub>2</sub>	zinc chloride	ZnS	zinc sulfide
FeCO <sub>3</sub>	iron (II) carbonate	CuNO <sub>3</sub>	copper (I) nitrate

### Questions:

1. Are there similarities to the compounds in part 1 and 2? If so, what are they?

***metal and nonmetal; nonmetal is still first; nonmetal still ends in -ide unless polyatomic***

2. Are there differences to the compounds in part 1 and 2? If so, what are they?

***Roman numerals are present***

3. What group of elements is involved in these compounds?

***Transition metals***

4. How is the Roman numeral determined? What does the Roman numeral indicate?

***The Roman numeral is the charge of the transition metal, this needs to be indicated since transition metals can change charges.***

5. Which do not have a roman numeral in the name? Why?

***silver and zinc do not have roman numerals***

***Silver is always Ag<sup>+</sup> and zinc is always Zn<sup>+2</sup>. Since all chemist know this, there is no need to indicate the charge.***

Based on the examples of formulas/names and the answers to your questions, come up with a set of rules for naming compounds. These will update the rules you came up with in part 1 and 2.

### Rules for Naming Ionic Compounds

#### Writing names

- *Show the charge of the transition metal with a Roman numeral. This can be determined by looking at the nonmetal.*
- 
- 
- 

#### Writing Formulas

- *Balance the compound by using the charge indicated by the roman numeral in the name.*
- 

Based on your rules, name these compounds.

- |  |   |
|--|---|
| 1. $\text{CoCl}_3$ <u><i>cobalt (III) chloride</i></u> | 4. $\text{Fe}_2\text{O}_3$ <u><i>iron (III) oxide</i></u> |
| 2. $\text{CrF}_6$ <u><i>chromium (VI) fluoride</i></u> | 5. $\text{CrF}_3$ <u><i>chromium (III) fluoride</i></u>   |
| 3. $\text{AgBr}$ <u><i>silver bromide</i></u>          | 6. $\text{SnCl}_4$ <u><i>tin (IV) chloride</i></u>        |

Based on your rules, write the formulas for these compounds.

- |  |
|--|
| 1.     manganese (IV) oxide <u><i><math>\text{MnO}_2</math></i></u>          |
| 2.     nickel (II) chloride <u><i><math>\text{NiCl}_2</math></i></u>         |
| 3.     zinc chloride <u><i><math>\text{ZnCl}_2</math></i></u>                |
| 4.     lead (IV) sulfide <u><i><math>\text{PbS}_2</math></i></u>             |
| 5.     cobalt (III) oxide <u><i><math>\text{Co}_2\text{O}_3</math></i></u>   |
| 6.     chromium (III) oxide <u><i><math>\text{Cr}_2\text{O}_3</math></i></u> |

Explain how  $\text{FeO}$  and  $\text{Fe}_2\text{O}_3$  are named differently.


<i>iron (II) oxide</i> <i>iron (III) oxide</i>

#### Part 4

Instructions: Study the following compound formulas and their corresponding names. Then answer the questions below.

Formula	Name	Formula	Name
CO <sub>2</sub>	carbon dioxide	CO	carbon monoxide
SO <sub>2</sub>	sulfur dioxide	NO	nitrogen monoxide
N <sub>2</sub> O	dinitrogen monoxide	P <sub>2</sub> O <sub>5</sub>	diphosphorous pentoxide
P <sub>4</sub> O <sub>10</sub>	tetraphosphorous decoxide	CCl <sub>4</sub>	carbon tetrachloride
NBr <sub>3</sub>	nitrogen tribromide	SiO <sub>2</sub>	silicon dioxide
N <sub>2</sub> O <sub>4</sub>	dinitrogen tetroxide		

#### Questions:

1. What type of elements are in these compounds? Metals or Nonmetals?

***Nonmetals only***

2. How many different types of element are in each compound?

***2 elements***

3. Are there suffixes or prefixes used in the names? If so, is there a pattern to the usage?

***suffix: -ide is on the second element only***

***prefixes: tell how many of each element***

***mono- 1***

***hexa- 6***

***di- 2***

***hepta- 7***

***tri- 3***

***octa- 8***

***tetra- 4***

***nona- 9***

***penta- 5***

***deca- 10***

4. How are these different than the compounds used in parts 1-3? Discuss both the names and the formulas.

***just nonmetals; names tells how many of each element; not held together by charges***

Based on the examples of formulas/names and the answers to your questions, come up with a set of rules for naming compounds.

### Rules for Naming Covalent Compounds

#### Writing names

- *name first element in formula- do not change name*
- *name second element and change ending to -ide*
- *use prefixes to tell how many of each element*
- *no mono- on first element*

#### Writing Formulas

- *use prefixes to determine what subscripts should be*
- 

Based on your rules, name these compounds.

- |  |   |
|--|---|
| 1. $\text{OF}_2$ <u><i>oxygen difluoride</i></u>       | 4. $\text{NI}_3$ <u><i>nitrogen triiodide</i></u>     |
| 2. $\text{PCl}_3$ <u><i>phosphorus trichloride</i></u> | 5. $\text{SiBr}_2$ <u><i>silicon dibromide</i></u>    |
| 3. $\text{SO}_3$ <u><i>sulfur trioxide</i></u>         | 6. $\text{BrF}_5$ <u><i>bromine pentafluoride</i></u> |

Based on your rules, write the formulas for these compounds.

- |                             |  |
|-----------------------------|--|
| 1. disulfur dichloride      | <u><i><math>\text{S}_2\text{Cl}_2</math></i></u> |
| 2. xenon tetrafluoride      | <u><i><math>\text{XeF}_4</math></i></u>          |
| 3. phosphorous pentabromide | <u><i><math>\text{PBr}_5</math></i></u>          |
| 4. bromine monofluoride     | <u><i><math>\text{BrF}</math></i></u>            |
| 5. dinitrogen tetrafluoride | <u><i><math>\text{N}_2\text{F}_4</math></i></u>  |
| 6. diboron trioxide         | <u><i><math>\text{B}_2\text{O}_3</math></i></u>  |