

START WITH A CHEMICAL FORMULA

How to Name a Chemical Compound:

TYPE OF Compound

**IONIC-Metal and Nonmetal**

Does the formula have a transition metal

Normal metal 1, 2, 13

Transition metals 3-10

Metal Name STRAIGHT from periodic Table

Metal Name PLUS a Roman numeral = Oxid. # in Parentheses

Does it have a polyatomic ion?

ONLY 2 Elements

Name the number of charges ending to "IDE"

MORE than 2 Elements in formula

Name the polyatomic ion straight from the chart

**COVALENT-Two nonmetals**

How many of first Element do we have?

ONLY ONE? DO NOT USE PREFIX

MORE than one, USE PREFIX

How many of the second Element do I have?

Use the correct prefix.  
 1. mono  
 2. di  
 3. tri  
 4. tetra  
 5. penta  
 6. hexa  
 7. hepta  
 8. octa  
 9. nona  
 10. deca  
 Ends in -IDE

**Acids - Squares with a H atom**

Short or long formula? Is a polyatomic present?

Short formula -1 Element

Long Formula - Polyatomic for present

USE PREFIX "HYDRO" then name the non metal, and "ic" and "acid" + Acid

What is the ending on the polyatomic name?

Polyatomic -ate

Polyatomic -ite

-ic Acid (articles)

-ous Acid (spike-delta)

# How to Write a Chemical Formula:

**IONIC** - metal and a nonmetal

Does the Name have a transition metal (remember d-block)?

Normal Metal - Groups 1, 2, 13

Transition Metal Groups 3-12

Write the oxidation # from the group in the periodic table

Write the oxidation # from the Roman numeral

Does the name have a polyatomic ion?

ide endings NO Poly

-ate site Polyatomic ion

Find the oxidation # from the periodic table

Find oxidation number for polyatomic ion

1. CRSS CRSS Oxid # is  
2. SIMPLIFY if needed

# prescribed with a chemical name

What type of compound is it?

ADVANCEST-NOO nonmetals (will have prefix)

What is the prefix of the first atom (nonmetal)

Write symbol and add a subscript based upon the prefix

What is the prefix of the second nonmetal?

Write the symbol of the second nonmetal and follow it with subscript based upon prefix

- |         |         |
|---------|---------|
| 1 mono  | 6 hex   |
| 2 di    | 7 hept  |
| 3 tri   | 8 oct   |
| 4 tetra | 9 nona  |
| 5 penta | 10 deca |

**ACID** - starts with an H atom

IS hydro the prefix? Short name

SHORT NAME NO HYDRO

LONG NAME HAS HYDRO

What is the ending in the name? -ic -ous

-IC

-OUS

Polyatomic -ATE

Polyatomic -ITE

Write it first AND then the polyatomic symbol

NO Polyatomic Write H for 1st element + second element  
Write - second element  
Eg: HCl

(SOCS)  
3. CRSS CRSS  
4. Repeat if possible

Name: Key  
 Hour: \_\_\_\_\_ Date: \_\_\_\_\_

Hon Due 2/21  
 CP Due 2/21

**Chemistry: Ionic Binary Compounds: Single-Charge Cations**

Write the name of each of the following compounds.

1. Na<sub>2</sub>S
2. Al<sub>2</sub>O<sub>3</sub>
3. NaCl
4. RbI
5. ZnBr<sub>2</sub>
6. AgCl
7. BN
8. BaF<sub>2</sub>
9. Sr<sub>3</sub>N<sub>2</sub>
10. MgCl<sub>2</sub>

1. Sodium Sulfide
2. Aluminum oxide
3. Sodium Chloride
4. Rubidium Iodide
5. Zinc Bromide
6. Silver Chloride
7. ~~Barium~~ <sup>Boron</sup> Nitride
8. Barium Fluoride
9. Strontium Nitride
10. Magnesium Chloride

Write the chemical formula for each of the given names.

11. magnesium nitride <sup>+2 -3</sup>
12. calcium oxide
13. silver fluoride
14. beryllium chloride
15. potassium iodide
16. aluminum chloride
17. zinc oxide <sup>+2 -2</sup>
18. barium bromide <sup>+2 -1</sup>
19. lithium nitride <sup>+1 -3</sup>
20. potassium sulfide <sup>+1 -2</sup>

11. Mg<sub>3</sub>N<sub>2</sub>
12. CaO
13. AgF
14. BeCl<sub>2</sub>
15. KI
16. AlCl<sub>3</sub>
17. ZnO
18. BaBr<sub>2</sub>
19. Li<sub>3</sub>N
20. K<sub>2</sub>S

How did I do?  
 or how do I do?

Name: \_\_\_\_\_  
 Date: \_\_\_\_\_

**Chemistry: Ionic Binary Compounds: Multiple-Charge Cations**

Write the name of each of the following compounds

1.  $\overset{+1}{Cu}$ Cl
2.  $\overset{+2}{Cu}$ F<sub>2</sub>
3.  $\overset{+3}{Cr}$ Cl<sub>3</sub>
4.  $\overset{+1}{Pb}$ Cl
5.  $\overset{+2}{Pb}$ Cl<sub>2</sub>
6.  $\overset{+2}{Co}$ Cl<sub>2</sub>
7.  $\overset{+2}{Ni}$ Cl<sub>2</sub>
8.  $\overset{+2}{Ni}$ O
9.  $\overset{+2}{Ni}$ S
10.  $\overset{+2}{Sn}$ Cl<sub>2</sub>

1. Copper (I) chloride
2. Copper (II) fluoride
3. Chromium (III) chloride
4. Lead (I) chloride
5. Lead (II) chloride
6. Chromium (II) chloride
7. Nickel (II) chloride
8. Nickel (II) oxide
9. Nickel (II) sulfide
10. Tin (II) chloride

Write the chemical formula for each of the given names

11. manganese (II) oxide
12. mercury (I) chloride
13. lithium (II) phosphate
14. cadmium (II) sulfide
15. cobalt (II) fluoride
16. selenium (II) oxide
17. sodium (I) nitrate
18. cobalt (II) chloride
19. iron (III) sulfate
20. gold (III) chloride

11.  $\overset{+2}{Mn}$ O
12.  $\overset{+1}{Hg}$ Cl
13.  $\overset{+2}{Li}$ PO<sub>4</sub>
14.  $\overset{+2}{Cd}$ S
15.  $\overset{+2}{Co}$ F<sub>2</sub>
16.  $\overset{+2}{Se}$ O<sub>2</sub>
17.  $\overset{+1}{Na}$ NO<sub>3</sub>
18.  $\overset{+2}{Co}$ Cl<sub>2</sub>
19.  $\overset{+3}{Fe}$ (SO<sub>4</sub>)<sub>2</sub>
20.  $\overset{+3}{Au}$ Cl<sub>3</sub>

Name: \_\_\_\_\_  
Hour: \_\_\_\_\_ Date: \_\_\_\_\_

### Chemistry: Ionic Compounds: Polyatomic Ions

Write the name of each of the following compounds.

1.  $(\text{NH}_4)\text{Cl}$
2.  $\text{HClO}_2$
3.  $\text{Ca}(\text{BrO}_3)_2$
4.  $\text{BeSO}_4$
5.  $(\text{NH}_4)_3\text{N}$
6.  $(\text{NH}_4)\text{NO}_3$
7.  $\text{Sr}_3(\text{PO}_4)_2$
8.  $\text{Zn}(\text{ClO}_3)_2$
9.  $\text{Ag}(\text{IO}_3)$
10.  $\text{K}_2\text{Cr}_2\text{O}_7$

1. Ammonium Chloride
2. Hydrogen Chlorite
3. Calcium Bromate
4. Beryllium Sulfate
5. Ammonium Nitride
6. Ammonium Nitrate
7. Strontium Phosphate
8. Zinc (II) Chlorate
9. Silver (I) Iodate
10. Potassium Chromate

Write the chemical formula for each of the given names.

11. sodium chromate
12. barium nitrate
13. ammonium sulfate
14. aluminum hydroxide
15. calcium phosphate
16. cesium cyanide
17. sodium nitrite
18. calcium acetate
19. beryllium chlorite
20. rubidium sulfite

11.  $\text{Na}_2(\text{CrO}_4)$
12.  $\text{Ba}(\text{NO}_3)_2$
13.  $(\text{NH}_4)_2\text{SO}_4$
14.  $\text{Al}(\text{OH})_3$
15.  $\text{Ca}_3(\text{PO}_4)_2$
16.  $\text{Cs}(\text{CN})$
17.  $\text{Na}(\text{NO}_2)$
18.  $\text{Ca}(\text{C}_2\text{H}_3\text{O}_2)_2$
19.  $\text{Be}(\text{ClO}_2)_2$
20.  $\text{Rb}_2(\text{SO}_3)$

For the following compounds, give the formulas

Formula

- 22) sodium phosphide  $\text{Na}_3\text{P}$
- 23) magnesium nitrate  $\text{Mg}(\text{NO}_3)_2$
- \* 24) lead (II) sulfite  $\text{Pb}(\text{SO}_3)$
- 25) calcium phosphate  $\text{Ca}_3(\text{PO}_4)_2$
- 26) ammonium sulfate  $(\text{NH}_4)_2\text{SO}_4$
- \* 27) silver cyanide  $\text{Ag}^+ \text{CN}^- \rightarrow \text{AgCN}$
- 28) aluminum sulfide  $\text{Al}_2\text{S}_3$
- 29) beryllium chloride  $\text{BeCl}_2$
- 30) copper (I) arsenide  $\text{Cu}_3\text{As}$
- 31) iron (III) oxide  $\text{Fe}_2\text{O}_3$
- 32) gallium nitride  $\text{GaN}$
- 33) iron (II) bromide  $\text{FeBr}_2$
- 34) vanadium (V) phosphate  $\text{V}_3(\text{PO}_4)_5$
- 35) calcium oxide  $\text{CaO}$
- 36) magnesium acetate  $\text{Mg}(\text{C}_2\text{H}_3\text{O}_2)_2$
- 37) aluminum sulfate  $\text{Al}_2(\text{SO}_4)_3$
- 38) copper (I) carbonate  $\text{Cu}_2\text{CO}_3$
- 39) barium oxide  $\text{BaO}$
- 40) ammonium sulfite  $(\text{NH}_4)_2(\text{SO}_3)$
- 41) silver bromide  $\text{AgBr}$
- 42) lead (IV) nitrite  $\text{Pb}(\text{NO}_2)_4$

## Acid names and formulas

### Key ideas

- 1) An acid will always have hydrogen in its formula; the hydrogen will always be written first in the formula.
- 2) Use oxidation numbers (charges) as you have with ionic compounds when figuring out the formula for an acid. (It's done the same way)
- 3) All acids will have a name with the ending "ic", then the word "acid".
- 4) An acid may or may not have "hydro" at the beginning of its name.
  - a. If the acid has a polyatomic ion in it, then "hydro" will not be used.
  - b. Hydro is needed if the formula has hydrogen and only one other element present (in other words, when there isn't a polyatomic present).

### Examples:

$H_2S$  = hydrosulfuric acid (note: this one only has hydrogen and one other element present, so "hydro" is needed; it does not have a polyatomic)

$H_2SO_4$  = sulfuric acid (note: this one has a polyatomic ion, no need for "hydro")

Phosphoric acid =  $H_3PO_4$  (used oxidation numbers to get the formula)

Hydrophosphoric acid =  $H_3P$  (Do you remember why "hydro" was used in this case?)

### Long/short method of naming acids and writing acid formulas

#### Acid formulas

If the name of the acid is long..... the formula will be short (no polyatomic)  
 If the name of the acid is short..... the formula will be long (with a polyatomic)

#### Acid names

If the formula is short..... the name will be long (will contain "hydro")  
 If the formula is long..... the name will be short (will not contain hydro)

### Personal notes/practice below:

### Practice with acids

Name the following acids.

a.  $H_2SO_4$

b.  $HClO_3$

c.  $HNO_3$

d.  $H_2SO_4$

e.  $HBr$

f.  $HNO_3$

g.  $I_2$

h.  $H_2CO_3$

i.  $H_2S$

Write the formula for the following acid names  
 Scratch work (if needed)

final formula

j. chloric acid

k. hydrosulfuric acid

l. hydrobromic acid

m. phosphoric acid

n. acetic acid

o. hydrochloric acid

p. carbonic acid

q. hydroiodic acid

r. nitric acid

Hydro Fluoric acid  
 Chloric acid  
 Sulfuric Acid  
 Hydrobromic acid  
 Nitric acid  
 Hydro Iodic acid  
 Chromic acid  
 Hydrosulfuric acid

$HClO_3$   
 $H_2S$

$H_3PO_4$   
 $HC_2H_3O_2$

$H_2CO_3$   
 $HI$   
 $HNO_3$

$HClO_3$   
 $H_2S$   
 $H_3PO_4$   
 $HC_2H_3O_2$

Name \_\_\_\_\_

## Naming Acids

Name each acid.

1.  $\text{HNO}_3$  nitric acid
2.  $\text{HCl}$  hydrochloric acid
3.  $\text{H}_2\text{SO}_4$  sulfuric acid
4.  $\text{H}_2\text{SO}_3$  sulfurous acid
5.  $\text{HC}_2\text{H}_3\text{O}_2$  acetic acid
6.  $\text{HBr}$  hydrobromic acid
7.  $\text{HNO}_2$  nitrous acid
8.  $\text{H}_3\text{PO}_4$  phosphoric acid
9.  $\text{H}_2\text{S}$  hydrosulfuric acid
10.  $\text{H}_2\text{CO}_3$  carbonic acid

Write the formula of each acid.

11. sulfuric acid  $\text{H}_2\text{SO}_4$
12. nitric acid  $\text{HNO}_3$
13. hydrochloric acid  $\text{HCl}$
14. acetic acid  $\text{CH}_3\text{COOH}$
15. hydrofluoric acid  $\text{HF}$
16. phosphorous acid  $\text{H}_3\text{PO}_3$
17. carbonic acid  $\text{H}_2\text{CO}_3$
18. nitrous acid  $\text{HNO}_2$
19. phosphoric acid  $\text{H}_3\text{PO}_4$
20. hydrosulfuric acid  $\text{H}_2\text{S}$



## NAMING MOLECULAR COMPOUNDS

Use Greek prefixes to denote the number of atoms of each element present in the compound.

Mono—1	Tri—3	Penta—5	Hepta--	Nona—9
Di—2	Tetra—4	Hexa--6	Octa—8	Deca--10

To name a compound, use the name of the first element (using the prefix necessary) and change the second element's name to end in -ide (use the necessary prefix). DO NOT REDUCE THE COEFFICIENTS (see #1,2,4)

Examples: 1.  $C_3F_6$       tricarbon hexafluoride

2.  $N_2O_4$       dinitrogen tetraoxide

Drop the "o" from the prefix "mono-" when it is used with oxide.

3.  $N_2O$       dinitrogen monoxide

Drop the "a" from a prefix when it is combined with arsenide and astatide.

4.  $Se_2As_4$       diselenium tetraarsenide

5.  $Si_3At_8$       trisilicon octastatide

The prefix "mono-" should be omitted from the first element.

6.  $CO$       carbon monoxide

7.  $PBr_5$       phosphorus pentabromide

When the compound contains 3 or more elements, change only the last element's name to -ide.

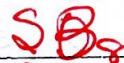
8.  $CH_4N$       carbon tetrahydrogen monoxide

9.  $B_2O_2Te$       diboron dioxide monotelluride

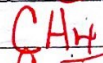
## MOLECULAR COMPOUNDS MORE PRACTICE

Write the formula for the following compounds:

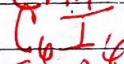
1. sulfur octabromide



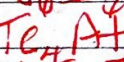
2. carbon tetrahydride



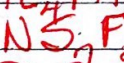
3. hexacarbon hexaiodide



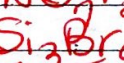
4. tetratellurium pentastatide



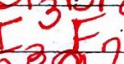
5. nitrogen heptasulfur difluoride



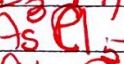
6. trisilicon nonabromide



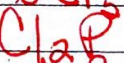
7. triiodine heptafluoride



8. arsenic pentachloride



9. dichlorine monophosphide



10. trinitrogen decabromide



Write the name for the following compounds:

11.  $P_2O_5$

Diphosphorous Pentoxide

12.  $BC_3$

Boron Tricarbide

13.  $ClBr$

Chlorine Monobromide

14.  $C_4H_{10}$

Tetracarbon Deca Hydride

15.  $CO_3$

16.  $N_7At_{10}$

17.  $Si_2H_2$

18.  $SAs_24$

19.  $P_2F_3C_6$

20.  $NO$

Block \_\_\_\_\_ Name \_\_\_\_\_

### Covalent compounds

Fill in the blanks with the proper name of each molecule.

- |                                  |                                 |                                   |                                 |
|----------------------------------|---------------------------------|-----------------------------------|---------------------------------|
| 1. NO                            | <u>nitrogen monoxide</u>        | 9. SO <sub>2</sub>                | <u>Sulfur Dioxide</u>           |
| 2. NO <sub>2</sub>               | <u>nitrogen dioxide</u>         | 10. IF <sub>7</sub>               | <u>Iodine heptafluoride</u>     |
| 3. N <sub>3</sub> O <sub>4</sub> | <u>trinitrogen tetroxide</u>    | 11. CF <sub>4</sub>               | <u>Carbon tetrafluoride</u>     |
| 4. N <sub>2</sub> O              | <u>dinitrogen monoxide</u>      | 12. H <sub>2</sub> O              | <u>Dihydrogen monoxide</u>      |
| 5. N <sub>2</sub> O <sub>5</sub> | <u>dinitrogen pentoxide</u>     | 13. N <sub>2</sub> H <sub>4</sub> | <u>DiNitrogen tetrahydride</u>  |
| 6. N <sub>2</sub> O <sub>7</sub> | <u>dinitrogen heptoxide</u>     | 14. PCl <sub>5</sub>              | <u>Phosphorus pentachloride</u> |
| 7. SO <sub>3</sub>               | <u>Sulfur trioxide</u>          | 15. SF <sub>4</sub>               | <u>Sulfur tetrafluoride</u>     |
| 8. P <sub>4</sub> O <sub>6</sub> | <u>Tetraphosphorus hexoxide</u> |                                   |                                 |

Fill in the blanks with the proper formula for each molecular name.

- |                              |                                    |                          |                        |
|------------------------------|------------------------------------|--------------------------|------------------------|
| 16. carbon tetrachloride     | <u>CCl<sub>4</sub></u>             | 28. nitrogen trichloride | <u>NCl<sub>3</sub></u> |
| 17. carbon dioxide           | <u>CO<sub>2</sub></u>              | 29. carbon tetrabromide  | <u>CBry</u>            |
| 18. oxygen difluoride        | <u>OF<sub>2</sub></u>              | 30. Silicon dioxide      | <u>SiO<sub>2</sub></u> |
| 19. diphosphorous trioxide   | <u>P<sub>2</sub>O<sub>3</sub></u>  |                          |                        |
| 20. diphosphorous pentoxide  | <u>P<sub>2</sub>O<sub>5</sub></u>  |                          |                        |
| 21. bromine trichloride      | <u>BrCl<sub>3</sub></u>            |                          |                        |
| 22. tetraphosphorus decoxide | <u>P<sub>4</sub>O<sub>10</sub></u> |                          |                        |
| 23. dicarbon heptoxide       | <u>C<sub>2</sub>O<sub>7</sub></u>  |                          |                        |
| 24. carbon monoxide          | <u>CO</u>                          |                          |                        |
| 25. silicon tetrachloride    | <u>SiCl<sub>4</sub></u>            |                          |                        |
| 26. sulfur tetrafluoride     | <u>SF<sub>4</sub></u>              |                          |                        |
| 27. phosphorous trichloride  | <u>PCl<sub>3</sub></u>             |                          |                        |

### Mixed metal compounds and molecules

It is helpful to label each compound as "A." for A-metals, "T." for T-metals or "C." for covalent molecules in the LEFT MARGIN. In the blank provided, for each name give a formula, for each formula give a name.

- |                                   |                          |                                  |                              |
|-----------------------------------|--------------------------|----------------------------------|------------------------------|
| 1. Ca <sub>3</sub> P <sub>2</sub> | <u>Calcium Phosphide</u> | 3. TiS <sub>2</sub>              | <u>Titanium disulfide</u>    |
| 2. SO <sub>2</sub>                | <u>Sulfur Dioxide</u>    | 4. P <sub>2</sub> O <sub>3</sub> | <u>Diphosphorus trioxide</u> |