

Chemistry

Formulas and Charges of Ions

Positive Ions

1+ Group IA (1)	2+ Group IIA (2)	3+ Group IIIA (3)	4+ Group IVA (4)	5+ Group VA (5)
Li ⁺ Lithium	Be ²⁺ Beryllium	Al ³⁺ Aluminum	Si ⁴⁺ Silicon (IV)	As ⁵⁺ Arsenic (V)
Na ⁺ Sodium	Mg ²⁺ Magnesium	Ga ³⁺ Gallium (III)	Ge ⁴⁺ Germanium (IV)	Bi ⁵⁺ Bismuth (V)
K ⁺ Potassium	Ca ²⁺ Calcium		Sn ⁴⁺ Tin (IV)	
Rb ⁺ Rubidium	Sr ²⁺ Strontium		Pb ⁴⁺ Lead (IV)	
Cs ⁺ Cesium	Ba ²⁺ Barium			
Fr ⁺ Francium	Ra ²⁺ Radium			
NH ₄ ⁺ Ammonium	Cd ²⁺ Cadmium	Bi ³⁺ Bismuth (III)		
Cu ⁺ Copper (I)	Cr ²⁺ Chromium (II)	Cr ³⁺ Chromium (III)		
H ⁺ Hydrogen	Co ²⁺ Cobalt (II)	Co ³⁺ Cobalt (III)		
H ₃ O ⁺ Hydronium	Cu ²⁺ Copper (II)	Fe ³⁺ Iron (III)		
Ag ⁺ Silver	Fe ²⁺ Iron (II)	Mn ³⁺ Manganese (III)		
	Pb ²⁺ Lead (II)	Ni ³⁺ Nickel (III)		
	Mn ²⁺ Manganese (II)			
	Hg ₂ ²⁺ Mercury (I)			
	Hg ²⁺ Mercury (II)			
	Ni ²⁺ Nickel (II)			
	Sn ²⁺ Tin (II)			
	Zn ²⁺ Zinc			

Negative Ions

1- Group VII (17)	2- Group VI (16)	3- Group VA (15)	4- Group IV (14)
F ⁻ Fluoride	O ²⁻ Oxide	N ³⁻ Nitride	C ⁴⁻ Carbide
Cl ⁻ Chloride	S ²⁻ Sulfide	P ³⁻ Phosphide	
I ⁻ Iodide	Se ²⁻ Selenide	As ³⁻ Arsenide	
C ₂ H ₃ O ₂ ⁻ Acetate (CH ₃ COO ⁻)	CO ₃ ²⁻ Carbonate		
CN ⁻ Cyanide	CrO ₄ ²⁻ Chromate	PO ₄ ³⁻ Phosphate	
H ⁻ Hydride	Cr ₂ O ₇ ²⁻ Dichromate	PO ₃ ³⁻ Phosphite	
OH ⁻ Hydroxide	C ₂ O ₄ ²⁻ Oxalate	AsO ₄ ³⁻ Arsenate	
NO ₃ ⁻ Nitrate	O ₂ ²⁻ Peroxide		
NO ₂ ⁻ Nitrite	SiO ₃ ²⁻ Silicate		
MnO ₄ ⁻ Permanganate	SO ₄ ²⁻ Sulfate		
ClO ₄ ⁻ Perchlorate	SO ₃ ²⁻ Sulfite		
ClO ₃ ⁻ Chlorate	HPO ₄ ²⁻ Hydrogen Phosphate		
ClO ₂ ⁻ Chlorite			
ClO ⁻ Hypochlorite			
Similar for bromine and Iodine:			
e.g., BrO ₃ ⁻ Bromate			
HCO ₃ ⁻ Hydrogen Carbonate (Bicarbonate)			
HSO ₄ ⁻ Hydrogen Sulfate (Bisulfate)			
HSO ₃ ⁻ Hydrogen Sulfite			

Chemistry Internet Nomenclature Worksheet

Name: _____

Period: _____

You may link from the chemistry webpage <http://skylinechemistry.weebly.com/> or type in following address, <http://www.chemteam.info/Nomenclature/Nomenclature.html> or search for “ChemTeam” and click on “Nomenclature.”

You will do 5 types of compounds listed on this page.

- Binary Compounds (Metal/Nonmetal) with Fixed Charge Cation
- Binary Compounds (Metal/Nonmetal) with Variable Charge Cation: Stock System
- Covalent Binary Compound (Two Nonmetals): Greek Prefix System
- Polyatomics (metal with fixed or variable charge/ Polyatomic
- Miscellaneous

For each of these sections you should be able to go both directions:
name → formula & formula → name

Click on ***Nomenclature Definition List*** (Listed under HTML Files)

1. Define CATION and ANION

cation: _____

anion: _____

2. Define Binary Compound

binary compound _____

Go to Tutorials: Binary Compounds with Fixed Charge Cation; 1. Given formula, write the name

QUIZ ON THIS SECTION WILL BE August 23 and 26th

The elements involved in this less only have _____

3. Complete the following points to remember:

- The order for names in a binary compound is _____
- Use the name of cation with a fixed oxidation state _____
- The name of the anion will be made from the _____

Rules for writing binary ionic compounds:

- ✓ write the name of the first element
- ✓ use the root of the second element but change the ending to “ide”

4. Show yourself two examples of how to write the name from the formula for these types of compounds.

5. Try these practice problems, then check your answers:

- a. MgS _____
- b. KBr _____
- c. Ba₃N₂ _____
- d. Al₂O₃ _____
- e. NaI _____

Go to Tutorials: *Binary Compounds with Fixed Charge Cation*; 2. Given name, write the formula

QUIZ ON THIS SECTION WILL BE AUGUST 23rd and 26th

6. Complete these points to remember:

- a. The order in a formula is _____
- b. You must know the charges associated with each cation and anion.
 - 1. The sum of the positive charge and the sum of the negative charges _____
 - 2. You _____ of the cations or anions to get a total charge of zero.
 - 3. You _____ to get a total charge of zero.

A summary of the rules is as follows:

- a. write the symbol and charge of the first word
- b. write the symbol and charge of the second word
- c. use the minimum number of cations and anions needed to make the sum of all the charges in the formula equal to zero

EX: Barium iodide: **Ba⁺² I⁻¹** Iodide's superscript 1 must be multiply by a number that will make the total sum of superscripts equal to zero. Multiplying by 2 (**Ba⁺² I⁻¹⁽²⁾**) will give you a sum of zero. (**+2 + -2 = 0**) **Answer: BaI₂**

7. Practice with these problems then check your answers:

- a. magnesium oxide _____
- b. lithium bromide _____
- c. calcium nitride _____
- d. aluminum sulfide _____
- e. potassium iodide _____

Go to Tutorials: *Binary Compounds with Variable Charge Cation (Stock)*; 1. Given formula, write the name

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8. Complete the following steps:

Step #1: first part of the name is the _____

Step #2: result from step one _____

Here is how to determine its value:

a. multiply _____

b. divide this result by _____

This is the value of the Roman numeral to use.

c. The value of the Roman number represents _____

Step #3: anion is named in the usual manner of stem plus “-ide”

***Hint, all metals except for those in column IA, IIA, and Al^{+3} , Cd^{+2} , Zn^{+2} and Ag^{+1} require roman numerals in their names. The reason the above metals do not have roman numerals is because they only have one charge.**

9. Name following examples:

CuCl_2 _____

Fe_2O_3 _____

10. Practice with these then check the answers:

a. CuS _____

b. PbBr_4 _____

c. Pb_3N_2 _____

d. Fe_2O_3 _____

e. FeI_2 _____

11. What is unusual about Mercury I? Peroxide?

Go to Tutorials: Binary Compounds with Variable Charge Cation(Stock); 2. Given name, write the formula

QUIZ ON THIS SECTION WILL BE AUGUST 29th and 30th

What is the following steps:

Step#1: the first word tells you the _____

Step #2: the Roman numeral WILL tell you _____

Step #3: the anion symbol and charge comes from the second name _____

Step #4: remembering the rule that a formula _____

12. Write yourself examples of :

Copper (I) oxide _____

Iron (III) sulfide _____

13. Practice with these, then check your answers:

- a. iron (II) chloride _____
- b. copper (I) sulfide _____
- c. lead (IV) iodide _____
- d. tin (II) fluoride _____
- e. mercury (I) bromide _____

Go to Tutorials: Covalent Binary Compounds (Greek Prefix); 1. Given formula, write the name

QUIZ ON THIS SECTION WILL BE SEPTEMBER 13th and 16th

14. How will you recognize these compounds?

15. Write the Greek prefixes for 1-10.

16. Write yourself rules for naming binary molecular compounds.

17. Give yourself two examples (you choose!)

18. Practice with these, then check your answers.

- a. As_4O_{10} _____
- b. BrO_3 _____
- c. BN _____
- d. N_2O_3 _____

Go to Tutorials: Covalent Binary Compounds (Greek Prefix); 2. Given name, write the formula

QUIZ ON THIS SECTION WILL BE SEPTEMBER 13th and 16th

19. Write yourself steps for determining formulas of these compounds.

20. Give yourself two examples (you choose!)

21. What rule can you make about the use of the prefix MONO-?

22. Practice with these, then check your answers.

- a. chlorine monoxide _____
- b. oxygen difluoride _____
- c. boron phosphide _____
- d. dinitrogen monoxide _____

Go to Tutorials: Polyatomics 1. Given formula, write the name

QUIZ ON THIS SECTION WILL BE SEPTEMBER 25th and 26th

23. How will you recognize this type of compound?

24. How should parentheses be used?

25. Write two steps for determining the formula:

Step 1:

Step 2:

26. Give yourself the examples: (note use or absence of parentheses)

$\text{Fe}(\text{NO}_3)_2$ _____

$\text{Ca}(\text{ClO}_3)_2$ _____

27. Practice with these, then check your answers:

- a. AlPO_4 _____
- b. KNO_2 _____
- c. NaHCO_3 _____
- d. CaCO_3 _____

- e. $\text{Mg}(\text{OH})_2$ _____
- f. Na_2CrO_4 _____

Go to Tutorials: Polyatomics; 2. Given name, write the formula

QUIZ ON THIS SECTION WILL BE SEPTEMBER 25th and 26th

28. Write yourself a set of steps for determining the formula.

29. Give yourself two examples:

Copper (II) chlorate _____

Sodium phosphate _____

30. Practice with these, then check your answers:

a. Silver carbonate _____

b. potassium hydrogen phosphate _____

c. aluminum hydroxide _____

d. sodium hydrogen carbonate _____

e. calcium acetate _____

f. potassium permanganate _____

Go to Tutorials: Miscellaneous 1. Acid Nomenclature

QUIZ ON THIS SECTION WILL BE OCTOBER 10th and 11th

31. How do you recognize an acid?

32. Fill in the steps for naming a BINARY ACID

a. _____ is used.

b. _____ is used.

c. _____ is used.

d. The word "acid" is used as the second word in the name.

33. Give an example.

34. What are the changes to be made if the acid is ternary (contains a polyatomic ion)?

-ate ion → _____ acid

-ite ion → _____ acid

IMPORTANT: NEVER USE THE PREFIX HYDRO- IF THE ACID HAS A POLYATOMIC!!!!

35. Practice with these, then check answers.

- a. H_3PO_4 _____
- b. H_2CO_3 _____
- c. H_2SO_4 _____
- d. HIO_3 (IO_3 is iodate ion) _____
- e. HF _____
- f. HNO_2 _____

36. Write the formula for these acids:

- a. hydrobromic acid _____
- b. hydrocyanic acid (cyanide is CN^-) _____
- c. nitric acid _____
- d. sulfurous acid _____
- e. phosphorous acid _____
- f. acetic acid _____

Now try it on your own. (Hint: Determine whether it's an acid, molecular or ionic compound.)

1. Write the formulas for the following compounds:

- a. sulfurous acid _____
- b. sodium bromide _____
- c. calcium chloride _____
- d. phosphorus pentafluoride _____
- e. hydrochloric acid _____
- f. iron II oxide _____

2. Write the name of the following compounds:

- a. Mg_3PO_4 _____
- b. H_2S _____
- c. CO _____
- d. NH_4NO_3 _____
- e. H_2O_2 _____
- f. Hg_2O _____
- g. Ag_2SO_4 _____

