

WORKSHEET 3: Naming Compounds and Nomenclature

Rules to apply:

A. Binary compounds – Metals + Nonmetals

A binary compound is one containing only two elements.

1. The element with the lower electronegativity is named first, followed by the element with higher electronegativity. Metal is named first, usually.

2. The suffix of the second element is changed to -ide.

CaO = Calcium oxide

CaCl₂ = Calcium chloride

CaS = Calcium sulfide

CaH₂ = Calcium hydride

3. The ammonium ion, NH₄⁺, the hydroxide ion, OH⁻; and the cyanide ion, CN⁻ retain their -ide suffix.

NH₄OH = Ammonium hydroxide

NaCN = Sodium cyanide

4. Transition metal capable of more than one oxidation state use roman numerals in their name to indicate their oxidation state. Place in ().

FeCl₃ = Iron (III) chloride

CuO = Copper (II) oxide

FeCl₂ = Iron (II) chloride

Cu₂O = Copper (I) oxide

5. Mercury I is a diatomic ion; therefore, it is found in the Hg₂⁺² form only. Mercury II is Hg⁺².

Apply the above rules as you name the following compounds:

1. Ca(OH)₂ _____

11. K(CN) _____

2. AlCl₃ _____

12. MgO _____

3. FeI₂ _____

13. PbCl₂ _____

4. Hg₂Cl₂ _____

14. Fe(OH)₃ _____

5. NaH _____

15. Ag₂O _____

6. MgCl₂ _____

16. HgO _____

7. ZnBr₂ _____

17. (NH₄)I _____

8. MnCl₂ _____

18. Cu₂O _____

9. NH₄Cl _____

19. Cs₃N _____

10. PbS _____

20. CuS _____

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B. Binary Compounds – Nonmetal + Nonmetal

1. Compounds formed by two non-metals sharing electrons named by using the prefixes **mono-, di-, tri-, tetra-, penta-, hexa-, hepta-, and octa-, non-, and deca-** to indicate the number of atoms involved.
2. The least electronegative is named first.
 - a. if MORE THAN ONE ATOM, give it a prefix
 - b. If only one atom, it is not given a prefix.
 - c. element name is not changed
 - d. use above prefixes
3. The more electronegative is named second – drop ending and add *-ide*. Second element always has prefix.

Examples:

N_2O = Dinitrogen monoxide

NO = Nitrogen monoxide

N_2O_3 = Dinitrogen trioxide

NO_2 = Nitrogen dioxide

N_2O_4 = Dinitrogen tetraoxide

N_2O_5 = Dinitrogen pentoxide

Apply all rules as you name the following compounds

1. CO _____

2. PBr_3 _____

3. CCl_4 _____

4. NCl_3 _____

5. SeO_2 _____

6. P_2O_3 _____

7. SO_3 _____

8. P_2O_5 _____

9. CO_2 _____

10. PI_5 _____

11. SeO_3 _____

12. SiO_2 _____

13. Cl_2O_7 _____

14. SO_2 _____

15. N_2O_3 _____

16. N_3P_2 _____

17. SCl_2 _____

18. SeF_6 _____

19. N_2O_4 _____

20. CS_2 _____

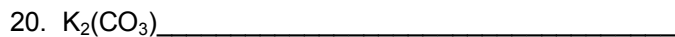
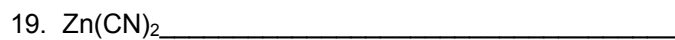
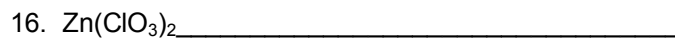
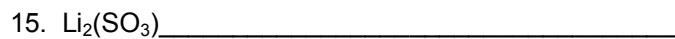
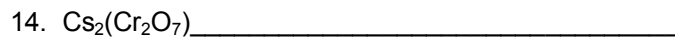
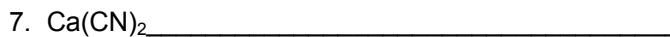
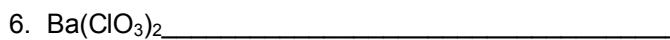
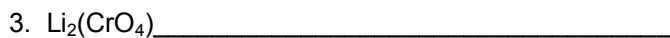
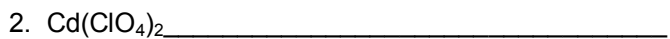
21. H_2S _____

22. CF_4 _____

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C. Tertiary Compounds:

1. Compounds containing polyatomic ions (more than 2 elements)
2. Polyatomic ion retains its name whether it is positive or negative.
3. Metals and nonmetals are names the same as before.



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D. Variations of Polyatomic Ions:

1. Polyatomic ions with oxygen included have multiple variations. The number of oxygen atoms included determines the naming scheme.
2. The charge of the ion is always the same as the main version no matter the number of oxygen atoms.
3. Main versions of ion always have: **base root of ion** and end with **-ate**
examples: SO_4^{-2} (sulfate); NO_3^{-1} (nitrate)
4. One more oxygen than the main version always has: **per- base root of ion -ate**
examples: SO_5^{-2} (persulfate); NO_4^{-1} (pernitrate)
5. One less oxygen than the main version always have: **base root of ion** and end with **-ite**
examples: SO_3^{-2} (sulfite); NO_2^{-1} (nitrite)
6. Two less oxygens than the main version always has: **hypo- base root of ion -ite**
examples: SO_2^{-2} (hyposulfite); NO^{-1} (hyponitrite)

7. How to determine what is a main version of a polyatomic ion:

$\text{B}_4\text{O}_7^{-2}$	CO_3^{-2}	NO_3^{-1}	$\text{C}_2\text{O}_4^{-2}$	FO_3^{-1}
	SiO_4^{-4}	PO_4^{-3}	SO_4^{-2}	ClO_3^{-1}
		AsO_4^{-3}	SeO_4^{-2}	BrO_3^{-1}
Inside of chart <u>always</u> has four (4) oxygen atoms for the main version. Notice charges.			TeO_4^{-2}	IO_3^{-1}
				AtO_3^{-1}

Outside of chart always has three (3) oxygen atoms for the main version.

Notice the patterns of charges.

Main Versions of Polyatomic Ions

1. PbSO_2 _____
2. $\text{Cd}(\text{ClO}_2)_2$ _____
3. $\text{Ca}_3(\text{PO}_5)_2$ _____
4. Na_3AsO_3 _____
5. $\text{Ba}(\text{ClO})_2$ _____
6. $\text{Cd}(\text{NO})_2$ _____
7. $\text{Al}(\text{IO}_3)_3$ _____
8. $\text{Fe}(\text{SO}_2)_3$ _____
9. $(\text{NH}_4)_2\text{SO}_4$ _____
10. $\text{Zn}(\text{BrO})_2$ _____
11. $\text{Sn}(\text{CO}_4)$ _____
12. CaCO_2 _____
13. $\text{Ni}_2(\text{SO}_4)_3$ _____
14. $\text{Zn}(\text{ClO}_4)_2$ _____
15. $\text{Cd}(\text{C}_2\text{H}_3\text{O}_2)_2$ _____
16. AuPO_2 _____
17. Hg_2SeO_5 _____
18. Pb_2SiO_3 _____
19. $\text{Ti}(\text{AtO}_3)_3$ _____
20. $\text{Sn}(\text{NO}_4)_2$ _____