

Exercise 3-3: Write formulas for the following substances.

1. vanadium(V) oxide V_2O_5
2. dihydrogen monoxide H_2O
3. ammonium oxalate $(NH_4)_2C_2O_4$
4. polonium(VI) thiocyanate $Po(CNS)_6$
5. tetraphosphorus decaoxide P_4O_{10}
6. zinc hydroxide ~~Zn(OH)~~ $Zn(OH)_2$
7. potassium cyanide KCN
8. cesium tartrate $C_2C_4H_4O_6$
9. oxygen molecule O_2
10. mercury(II) acetate $Hg_2(CH_3COO)_2$
11. silver chromate Ag_2CrO_4
12. tin(II) carbonate $SnCO_3$
13. sodium hydrogen carbonate $NaHCO_3$
14. manganese(VII) oxide Mn_2O_7
15. copper(II) dihydrogen phosphate $Cu(H_2PO_4)_2$
16. francium dichromate $Fr_2Cr_2O_7$
17. calcium carbide Ca_2C_2 or Ca_2C
18. mercury(I) nitrate $HgNO_3$
19. cerium(IV) benzoate $Ce(C_7H_5O_2)_6$
20. potassium hydrogen phthalate $KC_8H_5KO_4$

To determine the second word in the compound's name:

3. Give the prefix designating the number of atoms of the second element present.

CO₂: carbon **di**

N₂O₃: dinitrogen **tri**

4. Name the root of the second element. *Note:* The root is the base name that designates the element.

CO₂: carbon diox

N₂O₃: dinitrogen triox

5. Add the suffix *-ide* to the root of the second element.

CO₂: carbon dioxide (official name)

N₂O₃: dinitrogen trioxide (official name)

B. Binary Salts (Metal + Nonmetal) i.e., CaCl₂

Prefixes giving the number of atoms of each element present are *never* used to name an ionic salt. Salts exhibit ionic bonding between a metal and a nonmetal, while molecular substances exhibit covalent bonding between two nonmetals.

Name the following binary salt — CaCl₂

By convention, the metal is written before the nonmetal. To identify the first word in the name:

1. Name the first element (metal).

CaCl₂: **calcium**

To determine the second word in the name of the compound:

2. Name the root of the second element (nonmetal).

CaCl₂: calcium **chlor**

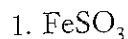
3. Add the suffix *-ide* to the root of the second element.

CaCl₂: calcium **chloride**

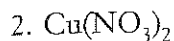
Exercise 2-1: In column 1, classify each of the following compounds as binary molecules (M) or binary ionic salts (I). Then in column 2, use the rules to name each binary compound.

- | | | | | | |
|------------------------------------|----------|--------------------------------|------------------------------------|----------|-----------------------------------|
| 1. CaF ₂ | <u>I</u> | <u>Calcium Fluoride</u> | 10. SrI ₂ | <u>I</u> | <u>Strontium Iodide</u> |
| 2. P ₄ O ₁₀ | <u>M</u> | <u>Tetraphosphorus Deoxide</u> | 11. CO | <u>M</u> | <u>Carbon Monoxide</u> |
| 3. K ₂ S | <u>I</u> | <u>Potassium Sulfide</u> | 12. Cs ₂ PO | <u>I</u> | <u>Cesium polonide</u> |
| 4. NaH | <u>I</u> | <u>Sodium Hydride</u> | 13. ZnAt ₂ | <u>M</u> | <u>Zinc astatide</u> |
| 5. Al ₂ Se ₃ | <u>I</u> | <u>Aluminum Selenide</u> | 14. P ₄ S ₃ | <u>I</u> | <u>Tetraphosphorus trisulfide</u> |
| 6. N ₂ O | <u>M</u> | <u>Dinitrogen monoxide</u> | 15. AgCl | <u>M</u> | <u>Silver chloride</u> |
| 7. O ₂ F | <u>M</u> | <u>Dioxide monofluoride</u> | 16. Na ₃ N | <u>I</u> | <u>Sodium nitride</u> |
| 8. SBr ₆ | <u>M</u> | <u>Monosulfur Hexabromide</u> | 17. Mg ₃ P ₂ | <u>M</u> | <u>Magnesium phosphide</u> |
| 9. Li ₂ Te | <u>I</u> | <u>Lithium Telluride</u> | 18. XeF ₆ | <u>I</u> | <u>Xenon Hexafluoride</u> |

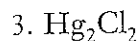
Exercise 3-2: Name the following substances.



Iron (II) Sulfite



Copper (II) nitrate



Mercury (II) Chloride



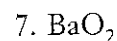
Silver Bromide



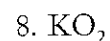
Potassium Chlorate



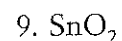
Magnesium Carbonate



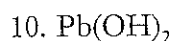
Barium oxide



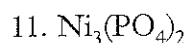
Potassium oxide



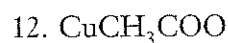
Tin (IV) oxide



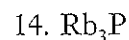
Lead (II) hydroxide



Nickel (II) Phosphate



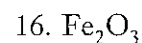
Copper (I) acetate

Dinitrogen ~~peroxide~~ Tetraoxide

Rubidium phosphide



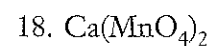
Sulfur



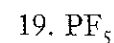
Iron (III) oxide



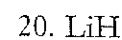
Ammonium sulfite



Calcium permanganate



Phosphorus Pentafluoride



Lithium hydride

Many common acids contain only oxygen, hydrogen, and a nonmetallic ion or a polyatomic ion. Such acids are called *oxyacids*. The suffixes *-ous* and *-ic* give the oxidation state of the atom bonded to the oxygen and the hydrogen. The *-ous* suffix always indicates the lower oxidation state and *-ic* the higher.

Common Oxyacids

Formula	Name	Anion
HClO ₄	<i>perchloric acid</i>	ClO ₄ ⁻ <i>perchlorate</i>
HClO ₃	<i>chloric acid</i>	ClO ₃ ⁻ <i>chlorate</i>
HClO ₂	<i>chlorous acid</i>	ClO ₂ ⁻ <i>chlorite</i>
HClO	<i>hypochlorous acid</i>	ClO ⁻ <i>hypochlorite</i>
HNO ₃	<i>nitric acid</i>	NO ₃ ⁻ <i>nitrate</i>
HNO ₂	<i>nitrous acid</i>	NO ₂ ⁻ <i>nitrite</i>
H ₂ SO ₄	<i>sulfuric acid</i>	SO ₄ ²⁻ <i>sulfate</i>
H ₂ SO ₃	<i>sulfurous acid</i>	SO ₃ ²⁻ <i>sulfite</i>
CH ₃ COOH or HC ₂ H ₃ O ₂	<i>acetic acid</i>	CH ₃ COO ⁻ or C ₂ H ₃ O ₂ ⁻ <i>acetate</i>
H ₂ CO ₃	<i>carbonic acid</i>	CO ₃ ²⁻ <i>carbonate</i>
H ₂ C ₂ O ₄	<i>oxalic acid</i>	C ₂ O ₄ ²⁻ <i>oxalate</i>
H ₃ PO ₄	<i>phosphoric acid</i>	PO ₄ ³⁻ <i>phosphate</i>

Exercise 4-1: Name the following compounds.

- HIO₃ *Iodic acid*
- NaBrO₂ *Sodium bromine dioxide*
- Ca₃(PO₄)₂ *Calcium phosphate*
- HIO₄ *periodic acid*
- Fe(IO₂)₃ *Iron (II)*
- HAt(aq) *hydroastatic acid*
- C₆H₅COOH *benzoic acid*
- Hg₂(IO)₂ *Mercury (II) hypoiodous*
- H₃PO₃ *Phosphoric acid*
- NH₄BrO₃ *Ammonium bromine trioxide*

Exercise 4-2: Write formulas for the following compounds.

- tartaric acid *C₄H₆O₆ (ignore)*
- calcium hypochlorite *Ca(ClO)₂*
- hydrotelluric acid *H₂Te*
- copper(II) nitrite *Cu(NO₂)₂*
- carbonic acid *H₂CO₃*
- hypoiodous acid *HIO*
- cyanic acid *HCN*
- phthalic acid *Ignore*
- tin(IV) chromate *Sn(CrO₄)₂*
- selenic acid *H₂Se*

DO YOU KNOW YOUR ACIDS?

-IC from -ATE

-OUS from -ITE

HYDRO-, -IC, -IDE

Exercise 4-3: Complete the following table.

Name of Acid	Formula of Acid	Name of Anion
hydrochloric acid	HCl	chloride
sulfuric acid	H ₂ SO ₄	sulfate
Hydroiodic acid	HI	iodide
Sulfurous acid	H ₂ SO ₃	sulfite
chlorous acid	HClO ₂	chlorite
Nitric Acid	HNO ₃	nitrate
Acetic acid	CH ₃ COOH or HC ₂ H ₃ O ₂	acetate
hydrobromic acid	HBr	bromide
hydro sulfuric acid	H ₂ S	sulfide
Nitrous acid	HNO ₂	nitrite
chromic acid	H ₂ CrO ₄	Chromate
Phosphoric acid	H ₃ PO ₄	phosphate