

ANIONS

2 kinds

①

Main-group nonmetals

- Use the STEM NAME of the element, then add "-ide" suffix

 N^{3-} : "nitride" ion P^{3-} : "phosphide" ion S^{2-} : sulfide ion O^{2-} : "oxide" ion F^{-} : "fluoride" ion

②

Polyatomic ions

- Memorize list.(see web site)

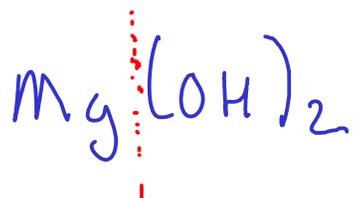
 $\text{C}_2\text{H}_3\text{O}_2^-$: "acetate ion" SO_4^{2-} : "sulfate ion" NO_3^- : "nitrate ion" SO_3^{2-} "sulfite ion" NO_2^- : "nitrite ion"

* Polyatomic ions ending in "-ate" and "-ite" suffixes always contain oxygen! "-ate" ions have more oxygen atoms than their "-ite" counterparts.

NAMING IONIC COMPOUNDS

- The name of the compound is based on the name of the ions in the compound
- Cation first, anion second

Examples:



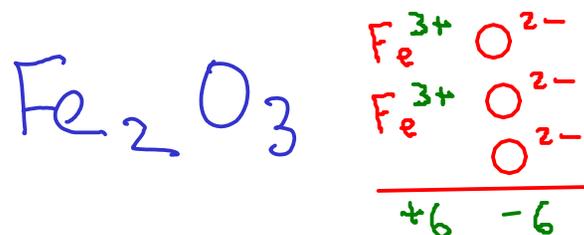
magnesium hydroxide



sodium sulfide



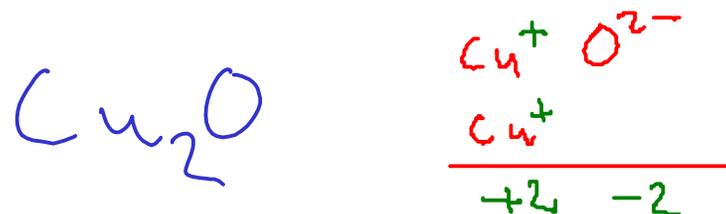
beryllium bromide



iron(III) oxide



copper(II) oxide

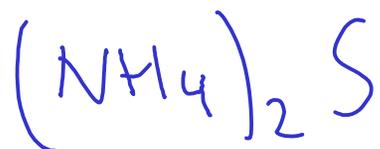


copper(I) oxide

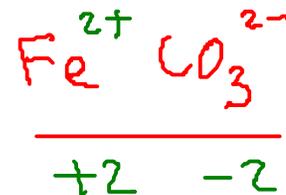
Remember to include the Roman numeral for CHARGE in the name of transition metal compounds!

Page 63 (9th edition): Chart of polyatomic ions

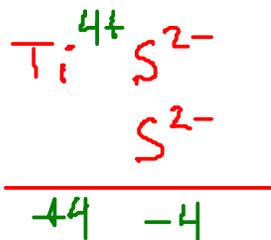
NAMING IONIC COMPOUNDS



ammonium sulfide



iron(II) carbonate

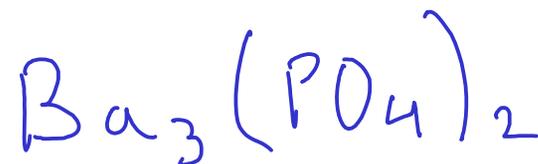


titanium(IV) sulfide

(titanium(II) sulfide: $Ti^{2+} S^{2-}$, so TiS)



calcium nitrate



barium phosphate



barium phosphide

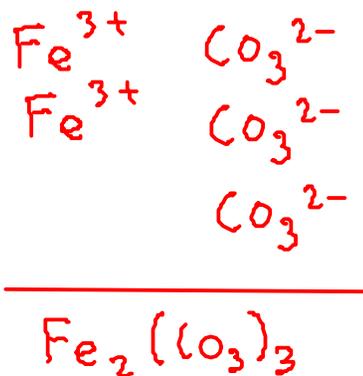
Spelling matters!

DETERMINING THE FORMULA OF AN IONIC COMPOUND FROM THE NAME

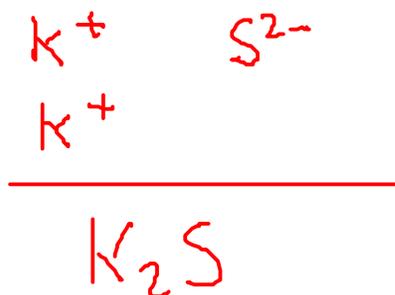
- The name of an ionic compound is made of the names of the CATION and ANION in the compound.
 - To get the FORMULA, you must figure out the SMALLEST RATIO of cation to anion that makes the charges balance out
-

Examples:

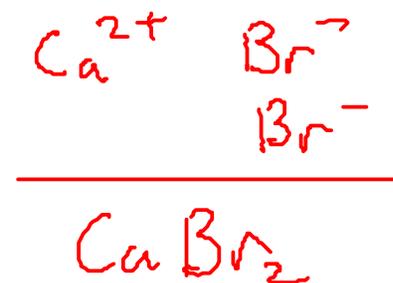
iron(III) carbonate



potassium sulfide



calcium bromide



DETERMINING IONIC FORMULAS

sodium sulfate



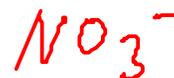
strontium oxide



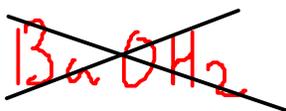
tin(II) phosphate



chromium(III) nitrate



barium hydroxide



titanium(IV) chloride

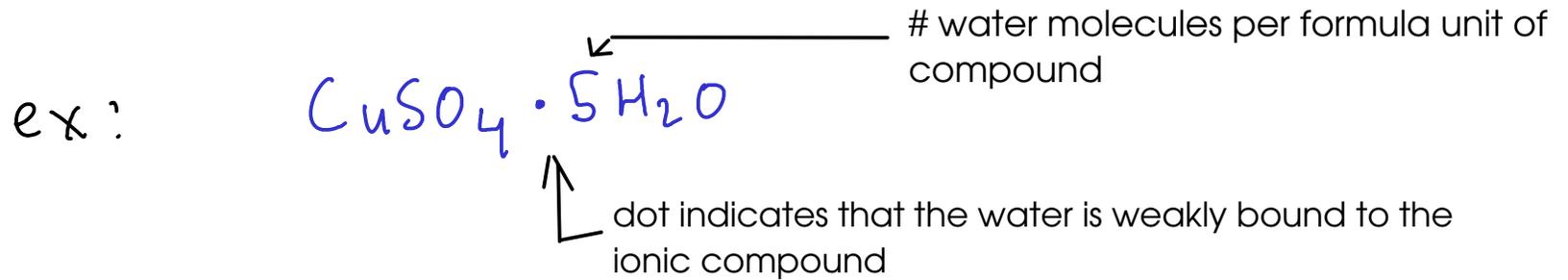


Don't forget the parenthesis when you have more than one hydroxide ion!

HYDRATES

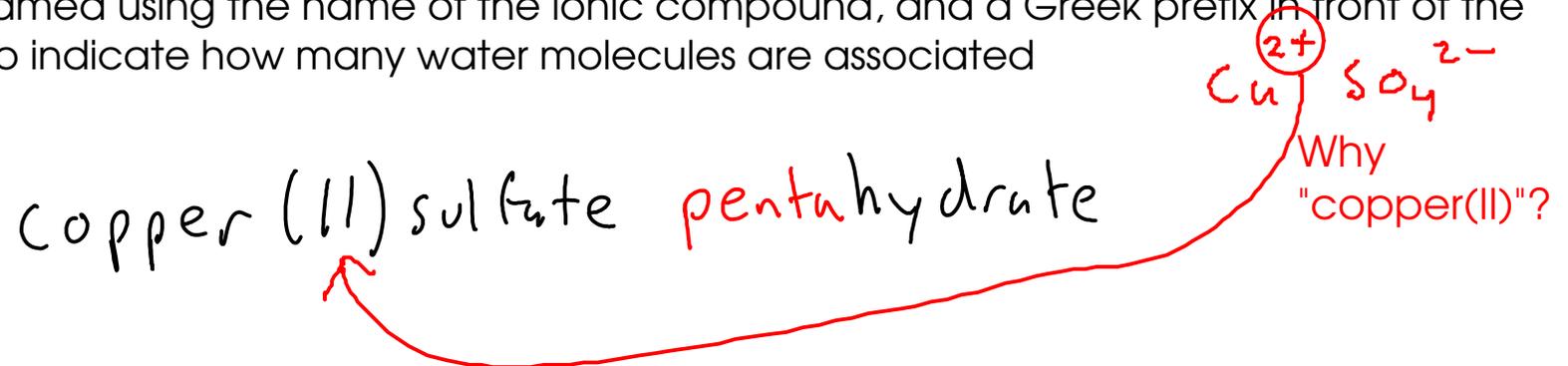
- many ionic compounds are formed by crystallizing the compound from water. Sometimes, this causes water molecules to become part of the crystal structure.

- This water is present in a definite ratio to the ions in the compound. Can be removed by heating, but will NOT evaporate if the compound is left standing.



- many DESSICANTS are hydrates that have had their water molecules driven off. They will slowly reabsorb water from the air (and keep the environment in a dessicator at a low humidity)

- Hydrates are named using the name of the ionic compound, and a Greek prefix in front of the word "hydrate" to indicate how many water molecules are associated



MOLECULAR COMPOUNDS

- There are several kinds of molecular compound. We will learn to name two simple but important classes

① BINARY MOLECULAR COMPOUNDS

- molecular compounds containing only two elements

② ACIDS

- molecular compounds that dissolve in water to release H^+ ions
- corrosive to metals (react with many to produce hydrogen gas)
- contact hazard: can cause chemical burns to eyes and skin
- sour taste
- turn litmus indicator RED
- two kinds of acids:

① BINARY ACIDS

- contain hydrogen and one other element

② OXYACIDS

- contain hydrogen, OXYGEN, and another element

Usually from
Group VIIA

BINARY MOLECULAR COMPOUNDS

- Named based on the elements they contain, plus prefixes to indicate the number of atoms of each element in each molecule

① FIRST ELEMENT

- Add a GREEK PREFIX to the name of the element.
- Omit the "MONO-" (1) prefix if there is only one atom of the first element

② SECOND ELEMENT

- Add a GREEK PREFIX to the STEM NAME of the element
- Add the suffix "-ide" (as if you were naming an anion)
- DO NOT omit the "mono-" prefix if there is only one atom of the second element

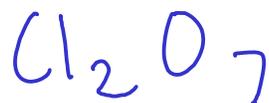
**MEMORIZE THE GREEK PREFIXES. SEE COURSE WEB SITE FOR A LIST!
THESE ARE THE SAME PREFIXES USED FOR THE HYDRATES!**

BINARY MOLECULAR COMPOUNDS

Examples:



boron trifluoride

dichlorine heptaoxide
(or dichlorine heptoxide)

carbon monoxide



carbon dioxide

*Note: metalloids like boron behave chemically like nonmetals do.

carbon tetrachloride



dihydrogen monoxide



dinitrogen tetrafluoride



MgCl_2 : magnesium CHLORIDE (NOT magnesium Dichloride!) Magnesium chloride is an ionic compound and is named using the system we discussed for naming ionic compounds.

How can we tell that this compound is ionic? It's a metal joined with a nonmetal.