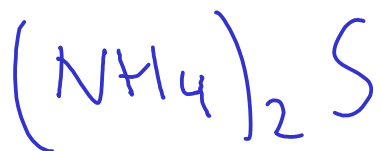


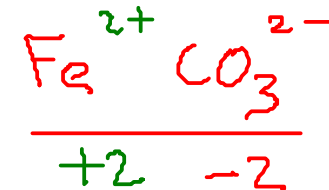
## NAMING IONIC COMPOUNDS



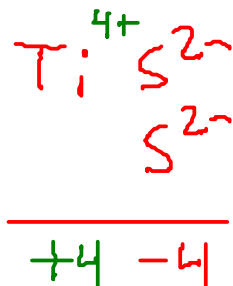
ammonium sulfide



iron(II) carbonate



titanium(IV) sulfide



barium phosphate



barium phosphide

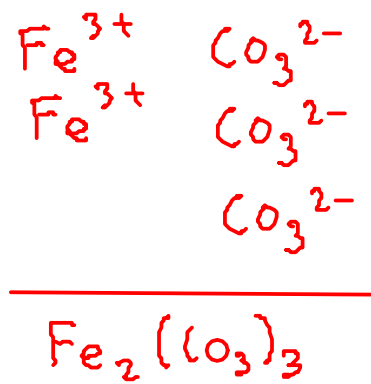
Spelling matters!

## DETERMINING THE FORMULA OF AN IONIC COMPOUND FROM THE NAME

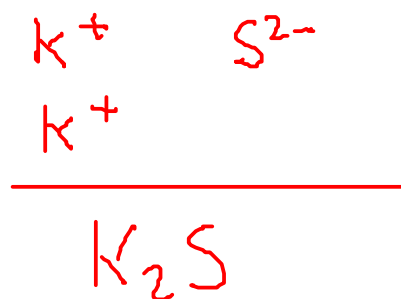
- The name of an ionic compound is made of the names of the CATION and ANION in the compound.
  - To get the FORMULA, you must figure out the SMALLEST RATIO of cation to anion that makes the charges balance out
- 

Examples:

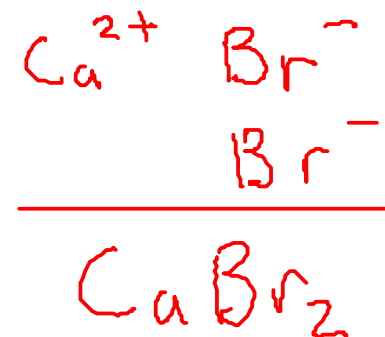
iron(III) carbonate



potassium sulfide

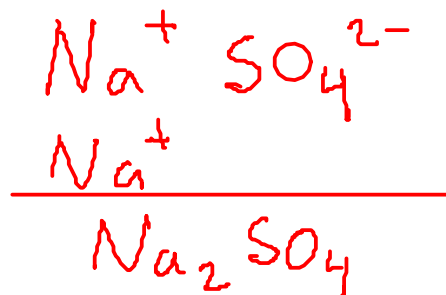


calcium bromide

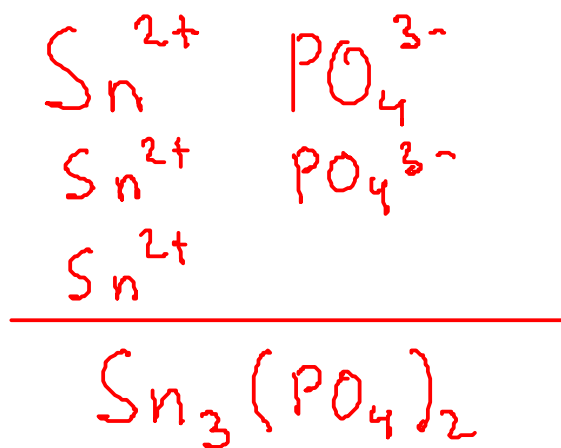


## DETERMINING IONIC FORMULAS

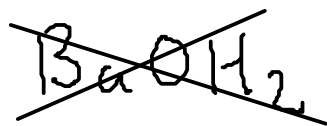
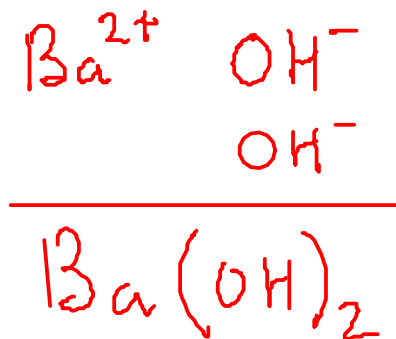
sodium sulfate



tin(II) phosphate

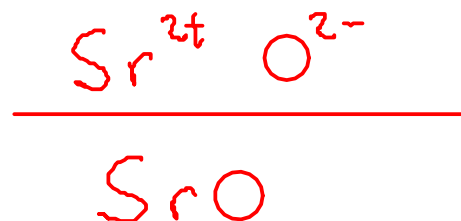


barium hydroxide

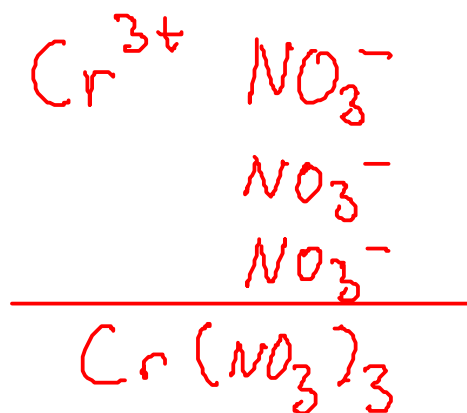


Don't forget the parenthesis when you have more than one hydroxide ion!

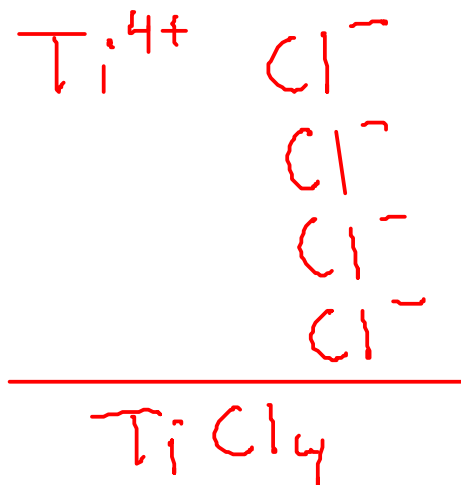
strontium oxide



chromium(III) nitrate



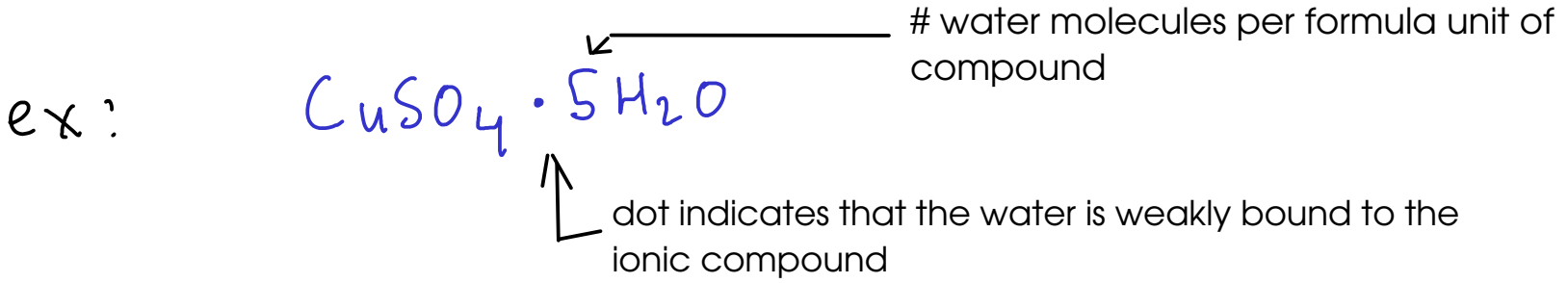
titanium(IV) chloride



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

copper (II) sulfate pentahydrate

$Cu^{2+} SO_4^{2-}$

Why "copper(II)"?

## 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

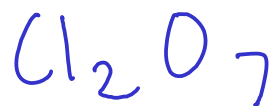
**MEMORIZE THE GREEK PREFIXES. SEE COURSE WEB SITE FOR A LIST!  
THESE ARE THE SAME PREFIXES USED FOR THE HYDRATES!**

## BINARY MOLECULAR COMPOUNDS

Examples:



boron trifluoride

dichlorine heptaoxide  
(OR dichlorine heptoxide)carbon  
monoxidecarbon  
dioxide

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

carbon tetrachloride



dihydrogen monoxide



dinitrogen tetrafluoride



$\text{MgCl}_2$ : magnesium CHLORIDE (\*not\* magnesium DICHLORIDE) Why not? Magnesium chloride is an ionic compound, and is named using the system we discussed for ionic compounds.

How can we tell magnesium chloride is ionic? It contains a metal combined with a nonmetal, and this combination usually produces an ionic compound.

## ACIDS

## ① BINARY ACIDS

- named after the element (other than hydrogen) they contain
- common binary acids include a Group VIIA element
- named: "Hydro-" + STEM NAME OF ELEMENT+ "-ic acid"

Four  
common  
binary  
acids

$\text{HF}$  : hydrofluoric acid ✖ dissolves glass!

$\text{HCl}$  : hydrochloric acid ✖ most common binary acid!

$\text{HBr}$  : hydrobromic acid

$\text{HI}$  : hydroiodic acid



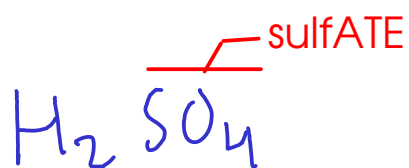
## ACIDS

## ② OXYACIDS

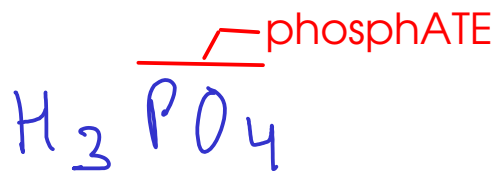
- Easy to think about as HYDROGEN IONS combined with POLYATOMIC IONS
- These acids are not true ionic compounds, but they interact with water to PRODUCE ions!
- named based on the polyatomic ion they contain, with an ending change:

① - ions ending in -ATE form acids ending in -IC

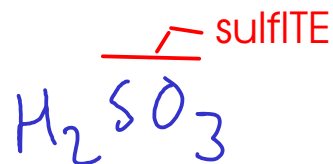
② - ions ending in -ITE form acids ending in -OUS



sulfuric acid



phosphoric acid



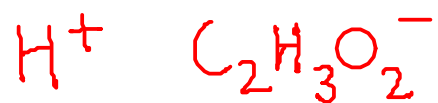
sulfurous acid



nitric acid

## OXYACID EXAMPLES

acetic acid

based on acetate

nitrous acid

based on nitrite ion

carbonic acid

based on carbonate



Basically, the number of hydrogens at the beginning of the formula equals the charge of the anion the acid is based on!