

EXAMPLES

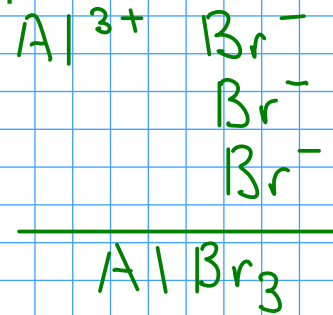
													VIII A				
IA												III A	IV A	V A	VIA	VII A	VIII A
H	II A											B	C	N	O	F	He
Li	Be											Al	Si	P	S	Cl	Ar
Na	Mg	IIIB	IVB	VB	VIB	VII B	VIII B	IB	IIB								
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La*	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac*	Rf	Db	Sg	Bh	Hs	Mt	*"inner" transition metals go here								

Find the formulas of:

- (1) an ionic compound containing Al and Br
- (2) an ionic compound containing Mg and O
- (3) an ionic compound containing S and K

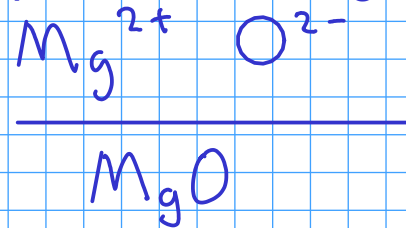
Find the formula of:

* an ionic compound containing Al and Br



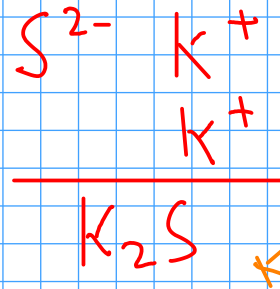
Find the formula of:

* an ionic compound containing Mg and O



Find the formula of:

* an ionic compound containing S and K



Remember! When writing the formula of an ionic compound, always put the cation (+) first!

TRANSITION METAL IONS

IA		TRANSITION METAL IONS										VIII A					
H	IIA											III A	IV A	V A	VIA	VII A	He
Li	Be											B	C	N	O	F	Ne
Na	Mg	IIIB	IVB	VB	VIB	VII B	VIII B		IB	IIB	Al	Si	P	S	Cl	Ar	
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	* La	Hf	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	* Ac	Rf	Db	Sg	Bh	Hs	Mt	*"inner" transition metals go here								

The transition metals always form CATIONS!

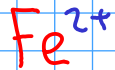
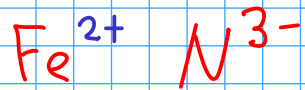
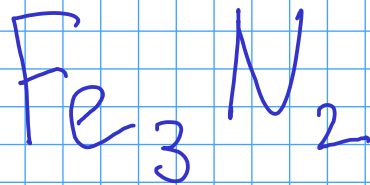
However, many transition metals are capable of forming SEVERAL DIFFERENT CATIONS!

Example: Iron (Fe) forms two cations, depending on the situation: Fe²⁺ or Fe³⁺

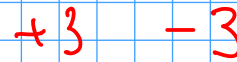
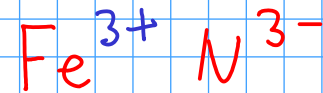
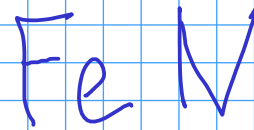
TRANSITION METAL CATIONS

- So how do you know which cation you're dealing with? For now, you'll have to be told
- Either the chemical formula of an ionic compound or the name of an ionic compound can tell you what charge is on the transition metal cation.

Examples:



This compound has iron ions with a +2 charge. This form of iron is called "iron(II)" pronounced "iron two"!



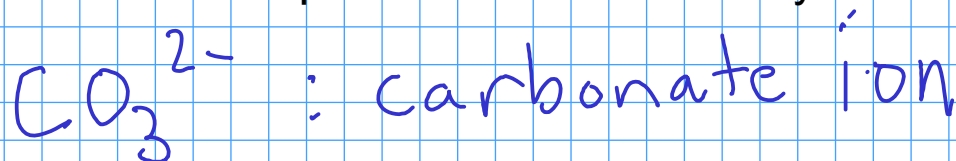
This compound has iron ions with a +3 charge. This form of iron is called "iron(III)" pronounced "iron three"!

POLYATOMIC IONS

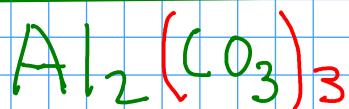
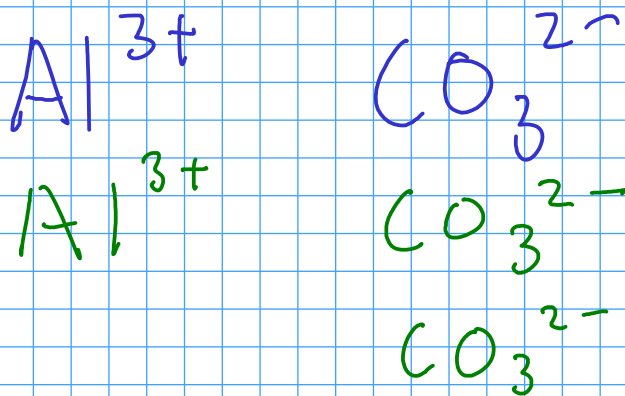
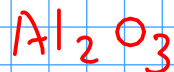
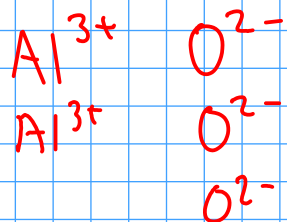
- Some MOLECULES can gain or lose electrons to form CATIONS or ANIONS. These are called POLYATOMIC IONS

- Polyatomic ions form ionic compounds in the same way that single-element ions do.

Example:



Compare these formulas!



* Use parenthesis when an ionic compound's formula contains more than one of a polyatomic ion.

YOU MUST MEMORIZE THE NAMES AND FORMULAS OF THE MOST COMMON POLYATOMIC IONS. CHECK THE COURSE WEB SITE FOR A LIST!

NAMES OF IONS

- To properly discuss ions and ionic compounds, we have to know how to name them!

CATIONS

3 kinds:

① Main group cations (metals that take only one charge when forming ions)

- The element's name is the same as the ion's name!



② Transition metal cations (from metals that can form several cations)

- The CHARGE of the cation must be given. Use a ROMAN NUMERAL after the element name to indicate charge!



③ Polyatomic cations

- Memorize list.



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, also see Ebbing/Wentworth p133)

$\text{C}_2\text{H}_3\text{O}_2^-$: "acetate ion"

SO_4^{2-} : "sulfate ion"

NO_3^- : "nitrate ion"

SO_3^{2-} "sulfite ion"

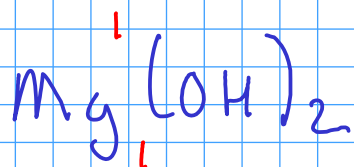
NO_2^- : "nitrite ion"

* 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

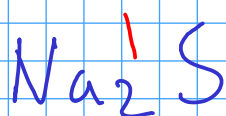
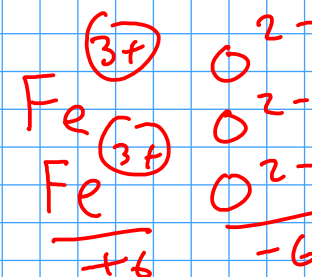
Examples:



magnesium hydroxide



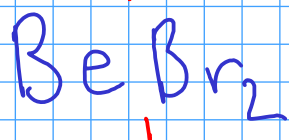
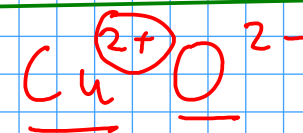
iron(III) oxide



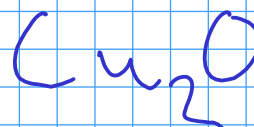
sodium sulfide



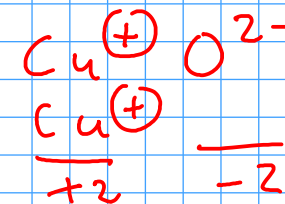
copper(II) oxide



beryllium bromide

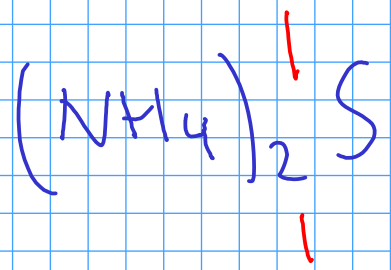


copper(I) oxide

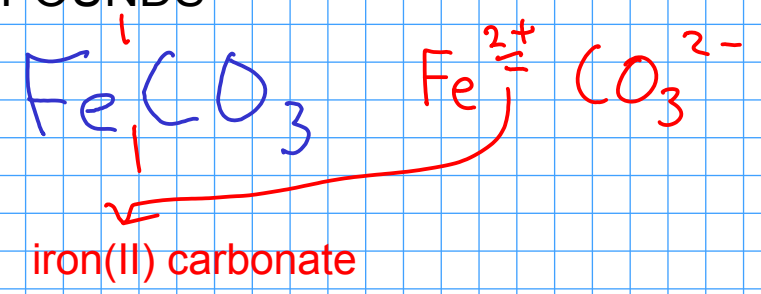


Remember to include the Roman numeral for CHARGE in the name of transition metal compounds!

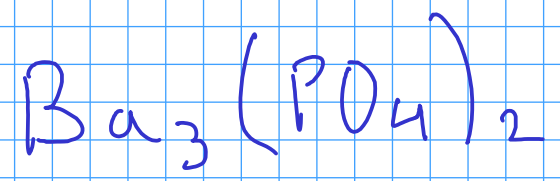
NAMING IONIC COMPOUNDS



ammonium sulfide

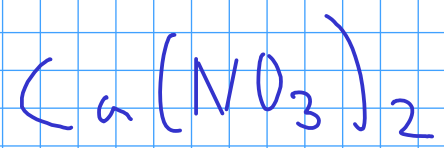


titanium(IV) sulfide

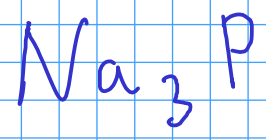


barium phosphate

Na_3PO_4 : sodium phosphate



calcium nitrate



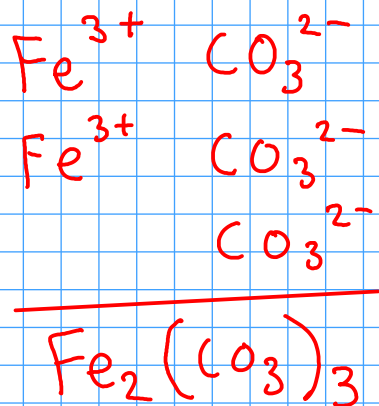
sodium phosphide

DETERMINING THE FORMULA OF AN IONIC COMPOUND FROM THE NAME

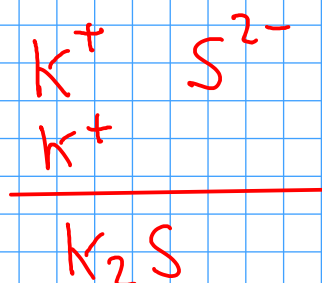
- The name of an ionic compound is made of the names of the CATION and ANION in the compound.
 - To get the FORMULA, you must figure out the SMALLEST RATIO of cation to anion that makes the charges balance out
-

Examples:

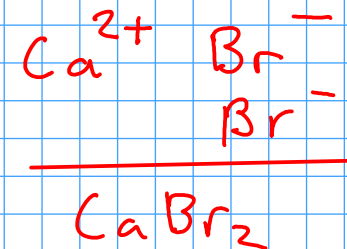
iron(III) carbonate



potassium sulfide

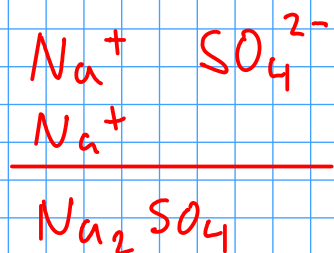


calcium bromide

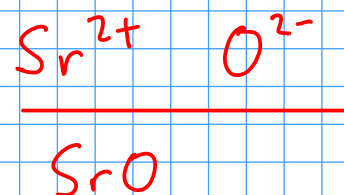


DETERMINING IONIC FORMULAS

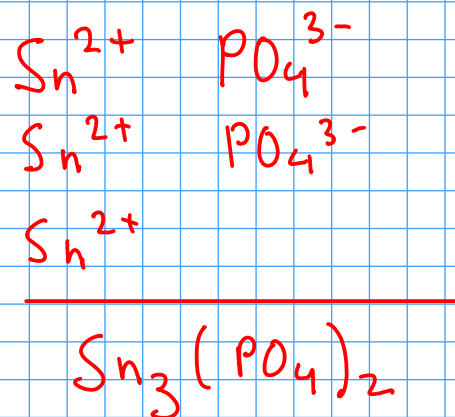
sodium sulfate



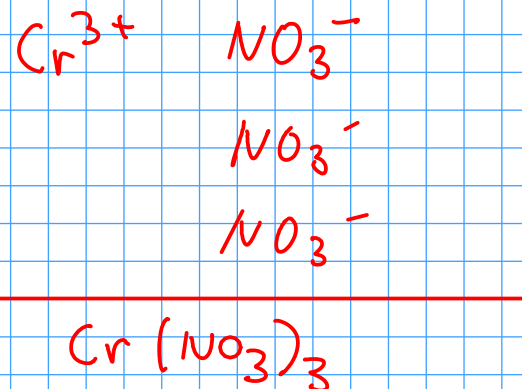
strontium oxide



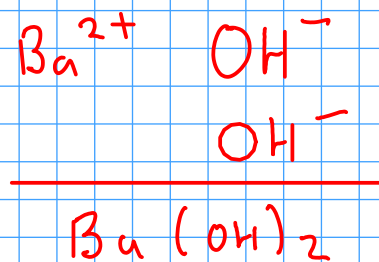
tin(II) phosphate



chromium(III) nitrate



barium hydroxide



titanium(IV) chloride

