

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!

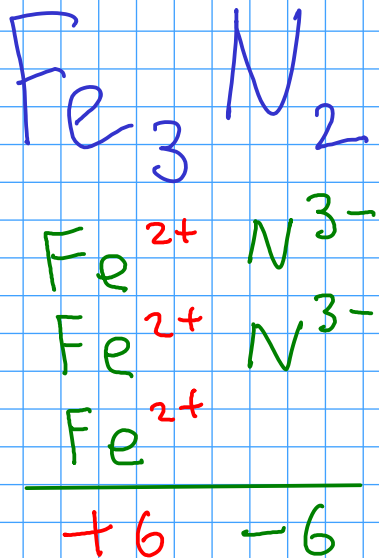
Example: Iron (Fe) forms two cations, depending on the situation: Fe²⁺ or Fe³⁺

TRANSITION METAL CATIONS

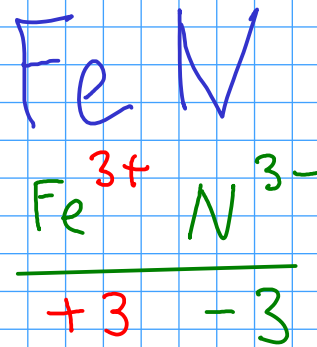
- So how do you know which cation you're dealing with? For now, you'll have to be told

- 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 form of iron has a +2 charge and is called "iron(II)"!



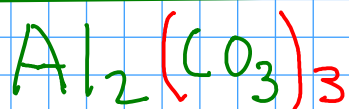
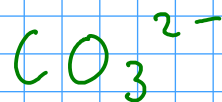
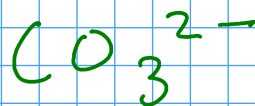
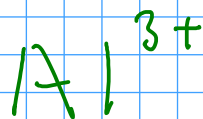
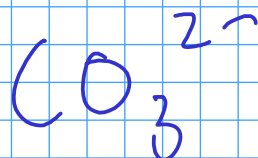
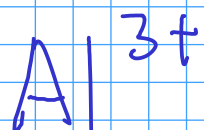
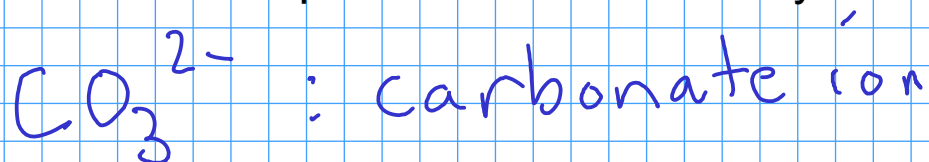
* This form of iron has a +3 charge and is called "iron(III)"!

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:



* 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"

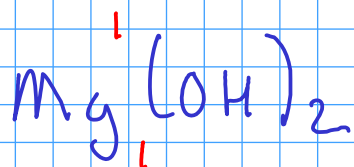
NO_2^- : "nitrite ion"

* 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

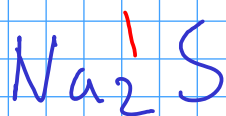
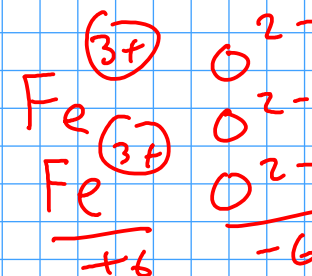
Examples:



magnesium hydroxide



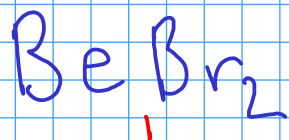
iron(III) oxide



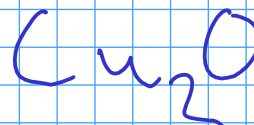
sodium sulfide



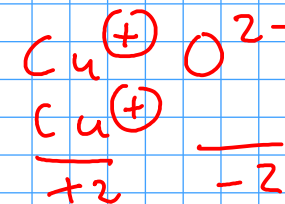
copper(II) oxide



beryllium bromide



copper(I) oxide



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