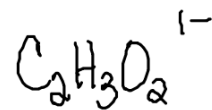
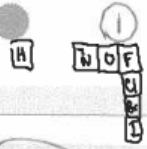


| Name | Formula | charge |
|-----------------|-------------|--------|
| acetate | $C_2H_3O_2$ | 1- |
| <u>chlorate</u> | ClO_3 | 1- |
| <u>nitrate</u> | NO_3 | 1- |
| <u>Cyanide</u> | CN | 1- |
| hydroxide | OH | 1- |
| <u>sulfate</u> | SO_4 | 2- |
| carbonate | CO_3 | 2- |
| peroxide | O_2 | 2- |
| phosphate | PO_4 | 3- |
| ammonium | NH_4 | 1+ |



Oxidation & Nomenclature Notes



Oxidation

* HINT: ions \pm go behind #
oxidation \pm goes in front of #

Rules:

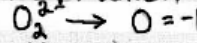
1. A pure, unreacted element or diatomic molecule = zero
 $H_2, N_2, O_2, F_2, U_2, Br_2, I_2$
2. An ion w/ a given charge = the oxidation #
example: $Ca^{2+} \rightarrow Ca = +2$

Polyatomic ions - the sum of the oxidation # = the charge for the whole polyatomic ion.

3. The sum of the oxidation # for a compound = zero
example: H_2O $2(H=+1) + (O=-2) = 0$
4. There can only be one negative oxidation # in a compound or polyatomic ion
example: KNO_3 $(K=+1) + (N=+5) + 3(O=-2) = 0$
 $1+x+6=0$

Exceptions

Oxygen is generally -2, except when peroxide

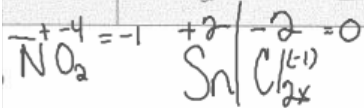


Hydrogen can be +1 or -1 depending on what H is bonded to.

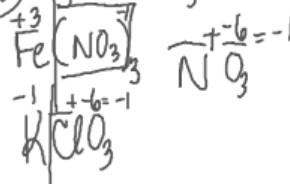
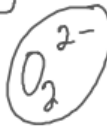
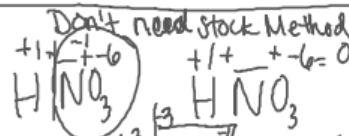
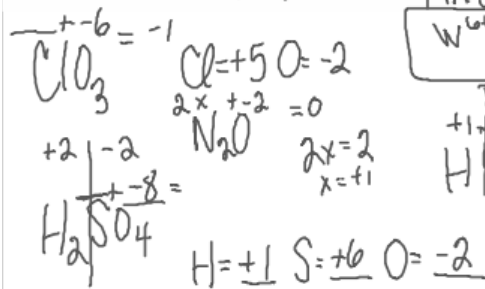
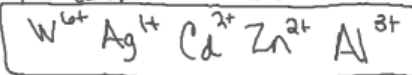
- H = +1 if bonded to a nonmetal
- H = -1 if bonded to a metal (hydride)

Practice

- | | | | |
|------------------|-----------------|------------------|-----------------------|
| 1. Ag | Ag = 0 | 9. Hg_2Cl_2 | Hg = +1 Cl = -1 |
| 2. I_2 | I = 0 | 10. $H(NO_3)$ | H = +1 N = +5 O = -2 |
| 3. CdS | Cd = +2 S = -2 | 11. $Na(OH)$ | Na = +1 O = -2 H = +1 |
| 4. $SnCl_4^{2-}$ | Sn = +2 Cl = -1 | 12. H_2O_2 | H = +1 O = -1 |
| 5. $SnCl_4^{2+}$ | Sn = +4 Cl = -1 | 13. LiH | Li = +1 H = -1 |
| 6. NO_3^- | N = +3 O = -2 | 14. $H_2(SO_4)$ | H = +1 S = +6 O = -2 |
| 7. ClO_3^- | Cl = +5 O = -2 | 15. $Fe(NO_3)_3$ | Fe = +3 N = +5 O = -2 |
| 8. NaO | N = +1 O = -2 | 16. $K(ClO_3)$ | K = +1 Cl = +5 O = -2 |



tin (II) chloride } Stock Method
tin (IV) chloride }
H/H vary



Nomenclature - the process of naming a compound

More about POLYATOMIC IONS

| | | |
|--------------------------|-----------------------|-----------------------|
| Acetate $C_2H_3O_2^{1-}$ | Sulfate SO_4^{2-} | Phosphate PO_4^{3-} |
| Chlorate ClO_3^{1-} | Carbonate CO_3^{2-} | |
| Nitrate NO_3^{1-} | Peroxide O_2^{2-} | |
| Cyanide CN^{1-} | | Ammonium NH_4^+ |
| hydroxide OH^{1-} | | |

Polyatomic Family Rules:

- The prefix PER denotes adding another oxygen to -ate
- * The suffix -ATE denotes the main poly all are based on
- The suffix -ITE denotes removing an oxygen from -ate
- The prefix HYPO denotes removing another oxygen

example: ClO_4^{1-} perchlorate
 * ClO_3^{1-} chlorate ← memorize
 ClO_2^{1-} chlorite
 ClO^{1-} hypochlorite
 Keep the same charge for all.

Practice: Complete for the nitrate family

| | |
|-------------|--------------------|
| NO_4^{1-} | <u>pernitrate</u> |
| NO_3^{1-} | <u>nitrate</u> |
| NO_2^{1-} | <u>nitrite</u> |
| NO^{1-} | <u>hyponitrite</u> |

IONIC COMPOUNDS

The name consists of the name of the metal followed by the "-ide" form of the nonmetal or the name of the polyatomic ion.

Ex: $MgO \rightarrow$ magnesium oxide $Ca(C_2H_3O_2)_2 \rightarrow$ calcium acetate

Practice:

| | |
|----------------|------------------|
| CaO | $BaCl_2$ |
| $Al_2(CO_3)_3$ | $(NH_4)_2(SO_4)$ |

| | | | |
|-------------------------------|-----------------------|-----------------------|--------------------------|
| <small>BSHR-52 (3/09)</small> | CO_3^{2-} carbonate | SO_4^{2-} sulfate | acetate $C_2H_3O_2^{1-}$ |
| WAAAA | ClO_3^{1-} chlorate | PO_4^{3-} phosphate | |
| | NO_3^{1-} nitrate | | |

* Compounds w/ Metals that have multiple Oxidation State

1st The oxidation state of the transition or inner transition metal must be found.

EX

FeCl₂ we know Cl has a 1- charge. i.e. $2 \times 1^- = 2^-$, so that Fe + (2-) = zero
Fe = 2+

2nd Before the name of the metal w/ the charge written in Roman Numerals, so from the example: Iron(II) Chloride

Practice

Name the following compounds

- 1.) Fe(OH)₃ _____
- 2.) Cu₂(SO₄) _____
- 3.) PbS _____
- 4.) Sn(NO₃)₂ _____

Write the formula for the following compounds.

- 1.) Mercury(I) chloride _____
- 2.) Iron(II) phosphate _____
- 3.) Copper(I) selenide _____
- 4.) Cobalt(III) nitride _____

Binary Compounds Containing Two Nonmetals

The nonmetal with the lower electronegativity is named 1st followed by the "-ide" form of the nonmetal w/ the higher electronegativity.

Example: dinitrogen monoxide = N₂O
* PREFIXES = subscript

Practice:

- | | |
|--|------------------------------------|
| 1.) PBr ₃ _____ | 6.) Dibromine tetroxide _____ |
| 2.) CS ₂ _____ | 7.) Phosphorous triiodide _____ |
| 3.) Cl ₂ O ₇ _____ | 8.) Tetrasulfur tetranitride _____ |
| 4.) SiO ₂ _____ | 9.) Sulfur hexafluoride _____ |
| 5.) N ₂ O ₅ _____ | 10.) dibromide monoxide _____ |

ACIDS

Binary & Ternary Inorganic Acids

* All acids contain hydrogen! * All must be aqueous *

Acid Flow Chart

? Polyatomic Ion Present

No - Binary Acid

Yes - Ternary Acid

? ate, ide, or ite?

Name: hydro-ic acid

Formula = H + nonmetal
(Quantities are based on oxidation #)

EX:

$HCl(aq) \rightarrow$ hydrochloric acid

$H_2S(aq) \rightarrow$ hydrosulfuric acid

-ATE

name: change poly ending to -ic acid

-ITE

name: change poly ending to -ous acid

-IDE

name: hydro-ic acid

Formula = H + polyatomic ion
(Quantities are based on ox#)

EX:

$HClO_3(aq) \rightarrow$ chloric acid

$HNO_2(aq) \rightarrow$ nitrous acid

$HCN(aq) \rightarrow$ hydrocyanic acid

Practice:

- 1.) $H(C_2H_3O_2)(aq)$ _____
- 2.) $HF(aq)$ _____
- 3.) $HBr(aq)$ _____
- 4.) $H_2SO_4(aq)$ _____
- 5.) phosphoric acid _____
- 6.) hydroiodic acid _____
- 7.) chlorous acid _____
- 8.) carbonic acid _____

Hydrates - compounds that have water weakly bonded to their crystals

* when these compounds lose the water molecule they are called anhydrous.

Naming Hydrates - name the ionic compound followed by a prefix + hydrate. (the prefix tells the # of water molecules)

EX. $Cu(SO_4) \cdot 5 H_2O \rightarrow$ copper(II) sulfate pentahydrate

Practice:

- 1.) $Na_2CO_3 \cdot 10 H_2O$ _____
- 2.) $BaCl_2 \cdot 2 H_2O$ _____
- 3.) magnesium sulfate heptahydrate _____
- 4.) iron(III) nitrate trihydrate _____