Acids

Read from **Lesson 3: Acids** in the **Chemistry Tutorial Section, Chapter 4** of **The Physics Classroom**:
Part a: Naming Acids (no O Atoms) **Part b:** Naming Acids Containing Oxyanions

Acids are molecular compounds that contain hydrogen atoms and produce hydrogen ions when dissolved in water. There are two categories of acids: binary acids and oxyacids. Binary acids contain two types of elements: hydrogen and another nonmetal. Hydrogen, oxygen, and a nonmetallic element form an oxyacid.

Binary Acids
When *naming* a binary acid, you name the hydrogen ion and the nonmetal. The acid name is based on "hydro" for hydrogen, then the root of the second element's name, followed by "*ic acid*."
For example, HCl is made of **hydro**gen and **chlor**ine, so as an acid, it is named **hydrochlor**ic acid. And H**Br** is hydro**brom**ic acid, H_2**S** is hydro**sulfur**ic acid.

1. Name these binary acids.
   a. HF

   b. HI

   c. HAt

   d. H_3N

   e. H_2Se

When *writing the formula* for a binary acid, you **crisscross** the charges of the ions – just like in writing formulas for binary ionic compounds. Remember, the net charge must equal zero.
Hydrochloric acid is made of hydrogen and chlorine. H^+ and Cl^- form HCl.
Hydrosulfuric acid is made of hydrogen and sulfur. H^+ and S^{2-} form H_2S.

2. Write the formula for these binary acids.
   a. hydrobromic acid

   b. hydroiodic acid

   c. hydroselenic acid

   d. hydrophosphoric acid

   e. hydroastatic acid

Names and Formulas

Oxyacids

When *naming* an oxyacid, the name is based on the hydrogen and the polyatomic ion. In the name of the acid, the polyatomic ion will have a new ending, and the "*hydro*" prefix will **never** be used in the name of the acid.
For example,

1. The polyatomic ion with ending –*ite* becomes -*ous* acid

NO_2^- is the nitr**ite** ion. When it combines with hydrogen to form an acid:
HNO_2 is nitr**ous** acid.

SO_3^{2-} is the sulf**ite** ion. When it combines with hydrogen to form an acid:
H_2SO_3 is sulfur**ous** acid.

2. The polyatomic ion with ending –*ate* becomes -*ic* acid

NO_3^- is the nitr**ate** ion. When it combines with hydrogen to form an acid:
HNO_3 is nitr**ic** acid.

SO_4^{2-} is the sulf**ate** ion. When it combines with hydrogen to form an acid:
H_2SO_4 is sulfur**ic** acid.

3. Name these oxyacids.
   a. H_2CO_3

   b. $H_2Cr_2O_7$

   c. $HClO_4$

   d. H_3PO_3

   e. $HMnO_4$

When *writing the formula* for an oxyacid, you **crisscross** the charges of the ions – just like in writing formulas for binary acids. Remember, the net charge must equal zero.
Chlor**ous** acid is made of hydrogen and chlor**ite** . H^+ and ClO_2^{--} form $HClO_2$.
Chrom**ic** acid is made of hydrogen and chrom**ate** . H^+ and CrO_4^{2--} form H_2CrO_4.

4. Write the formula for these oxyacids.
   a. acetic acid

   b. phosphoric acid

   c. arsenous acid

   d. oxalic acid

   e. hypochlorous acid (Note: the prefix is hypo, not hydro)