

## 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 **hydrogen** and **chlorine**, so as an acid, it is named **hydrochloric acid**. And **HBr** is **hydrobromic acid**, **H<sub>2</sub>S** is **hydrosulfuric acid**.

1. Name these binary acids.
  - a. HF
  - b. HI
  - c. HAt
  - d. H<sub>3</sub>N
  - e. H<sub>2</sub>Se

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<sup>+</sup> and Cl<sup>-</sup> form HCl.

Hydrosulfuric acid is made of hydrogen and sulfur. H<sup>+</sup> and S<sup>2-</sup> form H<sub>2</sub>S.

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

$\text{NO}_2^-$  is the nitrite ion. When it combines with hydrogen to form an acid:

$\text{HNO}_2$  is nitrous acid.

$\text{SO}_3^{2-}$  is the sulfite ion. When it combines with hydrogen to form an acid:

$\text{H}_2\text{SO}_3$  is sulfurous acid.

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

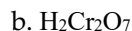
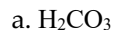
$\text{NO}_3^-$  is the nitrate ion. When it combines with hydrogen to form an acid:

$\text{HNO}_3$  is nitric acid.

$\text{SO}_4^{2-}$  is the sulfate ion. When it combines with hydrogen to form an acid:

$\text{H}_2\text{SO}_4$  is sulfuric acid.

3. Name these oxyacids.



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.

Chlorous acid is made of hydrogen and chlorite .  $\text{H}^+$  and  $\text{ClO}_2^-$  form  $\text{HClO}_2$ .

Chromic acid is made of hydrogen and chromate .  $\text{H}^+$  and  $\text{CrO}_4^{2-}$  form  $\text{H}_2\text{CrO}_4$ .

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)