

## Acids



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

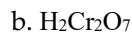
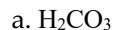
$\text{NO}_3^-$  is the nitrate ion. When it combines with hydrogen to form an acid:

$\text{HNO}_3$  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)