

Three Types of Acids



- Binary acids, such as hydrochloric acid, $\text{HCl}(aq)$.
- Oxyacids, such as sulfuric acid, H_2SO_4 , and nitric acid, HNO_3 .
- Organic acids (most often called carboxylic acids), such as acetic acid, $\text{HC}_2\text{H}_3\text{O}_2$.

Names and Formulas of Binary Acids



- The names have the general form of *hydro(root)ic acid*, such as hydrochloric acid.
- The formulas have the general form of $HX(aq)$ (where X is F, Cl, Br, or I) or $H_2X(aq)$ (where X is S or Se) The formulas are usually followed by (aq), such as HCl(aq).

Binary Acids

Formula	Named as Binary Covalent Compound	Acid Formula	Named as Binary acid
HF or HF(<i>g</i>)	hydrogen monofluoride or hydrogen fluoride	HF(<i>aq</i>)	hydrofluoric acid
HCl or HCl(<i>g</i>)	hydrogen monochloride or hydrogen chloride	HCl(<i>aq</i>)	hydrochloric acid
HBr or HBr(<i>g</i>)	hydrogen monobromide or hydrogen bromide	HBr(<i>aq</i>)	hydrobromic acid
HI or HI(<i>g</i>)	hydrogen moniodide or hydrogen iodide	HI(<i>aq</i>)	hydriodic acid

Binary Acid Names to Formulas

- Halogen atoms and hydrogen atoms usually form one covalent bond, so they combine in a 1:1 ratio with the general formula of $\text{HX}(\text{aq})$.
 - Hydrofluoric acid is $\text{HF}(\text{aq})$
 - Hydrochloric acid is $\text{HCl}(\text{aq})$
 - Hydrobromic acid is $\text{HBr}(\text{aq})$
 - Hydroiodic acid or hydriodic acid is $\text{HI}(\text{aq})$
- Sulfur and selenium atoms usually form two bonds, so when they combine with hydrogen, they have formulas with the form $\text{H}_2\text{X}(\text{aq})$.
 - Hydrosulfuric acid is $\text{H}_2\text{S}(\text{aq})$
 - Hydroselenic acid is $\text{H}_2\text{Se}(\text{aq})$

Names and Formulas of Oxyacids

- The names for oxyacids that we will see have the general form of *(root)ic acid*, such as nitric acid. (There are other oxyacids with slightly different names.)
- The formulas have the general form of $H_aX_bO_c$ or $H_aX_bO_c(aq)$, such as H_2SO_4 or $H_2SO_4(aq)$.

Names and Formulas for Oxyacids

- If enough H^+ ions are added to a (root)ate polyatomic ion to completely neutralize its charge, the (root)ic acid is formed.
 - Nitrate, NO_3^- , goes to nitric acid, HNO_3 .
 - Sulfate, SO_4^{2-} , goes to sulfuric acid, H_2SO_4 . (Note the -ur- in the name.)
 - Phosphate, PO_4^{3-} , goes to phosphoric acid, H_3PO_4 . (Note the -or- in the name.)

Acids Names

Oxyanion Formula	Oxyanion Name	Oxyacid Formula	Oxyacid Name
NO_3^-	nitrate	HNO_3	nitric acid
$\text{C}_2\text{H}_3\text{O}_2^-$	acetate	$\text{HC}_2\text{H}_3\text{O}_2$	acetic acid
SO_4^{2-}	sulfate	H_2SO_4	sulfuric acid (Note that the whole name <i>sulfur</i> is used in the oxyacid name.)
CO_3^{2-}	carbonate	H_2CO_3	carbonic acid
PO_4^{3-}	phosphate	H_3PO_4	phosphoric acid (Note that the root of phosphorus in an oxyacid name is <i>phosphor-</i> .)