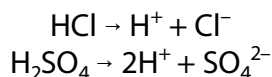


Naming Inorganic Acids

Acids are important hydrogen-containing molecular compounds, whose names follow special rules. For the moment, we can define an acid as a compound that in water can produce electrically equivalent numbers of hydrogen ions and anions; e.g.,



In general, the formulas of inorganic acids have H written first, whereas hydrogen-containing inorganic compounds that are not acids do not have H written first.

Acids: HCl, HCN, HNO₃, H₂SO₄, H₃PO₄
Not acids: LiH, BeH₂, NH₃, PH₃

An **oxoacid** is an acid containing hydrogen, oxygen, and another element. The anion produced when an oxoacid dissolves in water is an **oxoanion**. The names of oxoacids follow the following rules:

1. If a central atom can form two different oxoanions, the one with more oxygen atoms is named with the *-ate* suffix, and the one with fewer oxygen atoms is named with the *-ite* suffix.

Anion	Name	Anion	Name
NO ₃ ⁻	nitrate ion	NO ₂ ⁻	nitrite ion
SO ₄ ²⁻	sulfate ion	SO ₃ ²⁻	sulfite ion

2. If the anion name ends in *-ate*, the corresponding acid name ends in *-ic*.

Anion	Name	Acid	Name
NO ₃ ⁻	nitrate ion	HNO ₃	nitric acid
SO ₄ ²⁻	sulfate ion	H ₂ SO ₄	sulfuric acid

3. If the anion name ends in *-ite*, the corresponding acid name ends in *-ous*.

Anion	Name	Acid	Name
NO ₂ ⁻	nitrite ion	HNO ₂	nitrous acid
SO ₃ ²⁻	sulfite ion	H ₂ SO ₃	sulfurous acid

4. When a central atom can form three or four oxoacids, both the anions and the oxoacids are distinguished with the prefix *hypo-* and *per-* for the species with the fewest and most oxygen atoms, respectively.

Anion	Name	Acid	Name
ClO^-	<i>hypochlorite ion</i>	HClO	<i>hypochlorous acid</i>
ClO_2^-	<i>chlorite ion</i>	HClO_2	<i>chlorous acid</i>
ClO_3^-	<i>chlorate ion</i>	HClO_3	<i>chloric acid</i>
ClO_4^-	<i>perchlorate</i>	HClO_4	<i>perchloric acid</i>

Acid anions have H atoms that they can lose as H^+ in water. The names of these ions add *hydrogen* in front of the name of the corresponding ion that does not have H in it. If the acid anion has two or more hydrogen atoms capable to forming H^+ , the appropriate Greek prefix is used to indicate the number. *Mono-* is omitted if only one acid anion is possible.

Acid Ion	Name
HCO_3^-	hydrogen carbonate ion
HSO_4^-	hydrogen sulfate ion
HPO_4^{2-}	monohydrogen phosphate ion
H_2PO_4^-	dihydrogen phosphate ion

Binary hydrogen compounds with nonmetals may form H^+ and an anion when dissolved in water. The acidic solutions are named as if they were molecular acids, using the usual name for the compound itself, replacing *hydrogen* with *hydro-* and the suffix *-ide* with *-ic*. The word *acid* is then added. The formula for such a compound in water is often distinguished from the compound itself by *(aq)*, indicating water (aqueous) solution.

Compound	Name	Acid Solution	Name
HCl	hydrogen chloride	$\text{HCl}(aq)$	hydrochloric acid
HCN	hydrogen cyanide	$\text{HCN}(aq)$	hydrocyanic acid
H_2S	hydrogen sulfide	$\text{H}_2\text{S}(aq)$	hydrosulfuric acid

HCN , although not a binary compound, is analogous to the binary hydrogen halides (HCl , HBr , HI), and so as an acid is named in a similar manner. The name of $\text{H}_2\text{S}(aq)$ as an acid is slightly irregular in using the full stem name of the element.