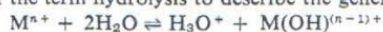


Acid	Equilibrium equation	$K^\dagger$	pK
Acetic	$\text{CH}_3\text{CO}_2\text{H} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CH}_3\text{CO}_2^-$	$1.80 \times 10^{-5} (K_a)$	4.7
Aluminum hydroxide	$\text{Al}(\text{OH})_3 \rightleftharpoons \text{H}_3\text{O}^+ + \text{AlO}_2^-$	$4 \times 10^{-13} (K_a)$	12.4
Aluminum ion	$\text{Al}^{3+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{AlOH}^{2+}$	$1.4 \times 10^{-5} (K_{h1})$	4.9
Ammonium ion	$\text{NH}_4^+ + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NH}_3$	$5.6 \times 10^{-10} (K_h)$	9.3
Antimony(III) hydroxide	$\text{SbOOH} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{SbO}_2^-$	$1 \times 10^{-11} (K_a)$	11.0
Arsenic (ortho)	$\text{H}_3\text{AsO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{H}_2\text{AsO}_4^-$	$5.0 \times 10^{-3} (K_{a1})$	2.3
	$\text{H}_2\text{AsO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HAsO}_4^{2-}$	$1.6 \times 10^{-7} (K_{a2})$	6.8
	$\text{HAsO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{AsO}_4^{3-}$	$2.5 \times 10^{-12} (K_{a3})$	11.6
Arsenous (meta)	$\text{HAsO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{AsO}_2^-$	$6 \times 10^{-10} (K_a)$	9.2
Benzoic	$\text{C}_6\text{H}_5\text{CO}_2\text{H} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{C}_6\text{H}_5\text{CO}_2^-$	$6.6 \times 10^{-5} (K_a)$	4.2
Bismuth(III) ion	$\text{Bi}^{3+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{BiOH}^{2+}$	$1 \times 10^{-2} (K_{h1})$	2.0
Boric (ortho)	$\text{H}_3\text{BO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{H}_2\text{BO}_3^-$	$6.0 \times 10^{-10} (K_{a1})$	9.2
Carbonic	$\text{H}_2\text{CO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HCO}_3^-$	$4.2 \times 10^{-7} (K_{a1})$	6.4
	$\text{HCO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CO}_3^{2-}$	$4.8 \times 10^{-11} (K_{a2})$	10.3
Chromic	$\text{H}_2\text{CrO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HCrO}_4^-$	$1.8 \times 10^{-1} (K_{a1})$	0.74
	$\text{HCrO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CrO}_4^{2-}$	$3.2 \times 10^{-7} (K_{a2})$	6.5
	$2\text{HCrO}_4^- \rightleftharpoons \text{Cr}_2\text{O}_7^{2-} + \text{H}_2\text{O}$	$4.3 \times 10^{+1} (K)$	-0.4
		(approx)	(approx)
Chromium(III) hydroxide	$\text{Cr}(\text{OH})_3 \rightleftharpoons \text{H}_3\text{O}^+ + \text{CrO}_2^-$	$9 \times 10^{-17} (K_a)$	16.1
Chromium(III) ion	$\text{Cr}^{3+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CrOH}^{2+}$	$1 \times 10^{-4} (K_{h1})$	4.0
Copper(II) hydroxide	$\text{Cu}(\text{OH})_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HCuO}_2^-$	$1 \times 10^{-19} (K_{a1})$	19.0
	$\text{HCuO}_2^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CuO}_2^{2-}$	$7.9 \times 10^{-14} (K_{a2})$	13.1
Copper(II) ion	$\text{Cu}^{2+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CuOH}^+$	$1 \times 10^{-8} (K_{h1})$	8.0
Formic	$\text{HCO}_2\text{H} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HCO}_2^-$	$2.1 \times 10^{-4} (K_a)$	3.7
Iodidic	$\text{HI} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{I}^-$	$3.2 \times 10^9 (K_a)$	-9.5
Hydrobromic	$\text{HBr} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Br}^-$	$1 \times 10^9 (K_a)$	-9
		(approx)	(approx)
Hydrochloric	$\text{HCl} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{Cl}^-$	$1 \times 10^6 (K_a)$	-6
			(approx)
Hydrocyanic	$\text{HCN} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CN}^-$	$4.8 \times 10^{-10} (K_a)$	9.3
Hydrofluoric	$\text{HF} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{F}^-$	$6.9 \times 10^{-4} (K_a)$	3.2
Hydrogen peroxide	$\text{H}_2\text{O}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HO}_2^-$	$2.4 \times 10^{-12} (K_{a1})$	11.6
Hydrogen sulfide	$\text{H}_2\text{S} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HS}^-$	$1 \times 10^{-7} (K_{a1})$	7.0
	$\text{HS}^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{S}^{2-}$	$1.3 \times 10^{-13} (K_{a2})$	12.9
Hypochlorous	$\text{HClO} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{ClO}^-$	$3.2 \times 10^{-8} (K_a)$	7.5
Iron(III) ion	$\text{Fe}^{3+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{FeOH}^{2+}$	$4.0 \times 10^{-3} (K_{h1})$	2.4
Iron(II) ion	$\text{Fe}^{2+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{FeOH}^+$	$1.2 \times 10^{-6} (K_{h1})$	5.9
Lead(II) hydroxide	$\text{Pb}(\text{OH})_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HPbO}_2^-$	$4.6 \times 10^{-16} (K_{a1})$	15.3
Magnesium ion	$\text{Mg}^{2+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{MgOH}^+$	$2 \times 10^{-12} (K_{h1})$	11.7
Mercury(II) ion	$\text{Hg}^{2+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HgOH}^+$	$2 \times 10^{-3} (K_{h1})$	2.7
Nitric	$\text{HNO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NO}_3^-$	$2.3 \times 10 (K_a)$	-1.37
Nitrous	$\text{HNO}_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NO}_2^-$	$4.5 \times 10^{-4} (K_a)$	3.4
Oxalic	$\text{H}_2\text{C}_2\text{O}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HC}_2\text{O}_4^-$	$6.3 \times 10^{-2} (K_{a1})$	1.2
	$\text{HC}_2\text{O}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{C}_2\text{O}_4^{2-}$	$6.3 \times 10^{-5} (K_{a2})$	4.2
Perchloric	$\text{HClO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{ClO}_4^-$	$2.0 \times 10^7 (K_a)$	-7.3
Permanganic	$\text{HMnO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{MnO}_4^-$	$2.0 \times 10^3 (K_a)$	-2.3
Phosphoric (ortho)	$\text{H}_3\text{PO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{H}_2\text{PO}_4^-$	$7.5 \times 10^{-3} (K_{a1})$	2.1
	$\text{H}_2\text{PO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HPO}_4^{2-}$	$6.2 \times 10^{-8} (K_{a2})$	7.2
	$\text{HPO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{PO}_4^{3-}$	$2.0 \times 10^{-13} (K_{a3})$	12.7
Propionic	$\text{CH}_3\text{CH}_2\text{CO}_2\text{H} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{CH}_3\text{CH}_2\text{CO}_2^-$	$1.4 \times 10^{-5} (K_a)$	4.9
Silicic (meta)	$\text{H}_2\text{SiO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HSiO}_3^-$	$3.2 \times 10^{-10} (K_{a1})$	9.5
	$\text{HSiO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{SiO}_3^{2-}$	$6.3 \times 10^{-12} (K_{a2})$	11.8
Sulfuric	$\text{H}_2\text{SO}_4 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HSO}_4^-$	Large (K_{a1})	Neg
	$\text{HSO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{SO}_4^{2-}$	$1.26 \times 10^{-2} (K_{a2})$	1.9
Sulfurous	$\text{H}_2\text{SO}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HSO}_3^-$	$1.6 \times 10^{-2} (K_{a1})$	1.8
	$\text{HSO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{SO}_3^{2-}$	$1.3 \times 10^{-7} (K_{a2})$	6.9
Thiocyanic	$\text{HNCS} + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{NCS}^-$	Large (K_a)	Neg
Thiosulfuric	$\text{H}_2\text{S}_2\text{O}_3 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HS}_2\text{O}_3^-$	$2.0 \times 10^{-2} (K_{a1})$	1.7
	$\text{HS}_2\text{O}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{S}_2\text{O}_3^{2-}$	$3.2 \times 10^{-3} (K_{a2})$	2.5
Tin(IV) hydroxide	$\text{Sn}(\text{OH})_4 + 4\text{H}_2\text{O} \rightleftharpoons 2\text{H}_3\text{O}^+ + [\text{Sn}(\text{OH})_6]^{2-}$	$10^{-32} (K_a)$	32
		(approx)	(approx)
Tin(II) hydroxide	$\text{Sn}(\text{OH})_2 + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{HSnO}_2^-$	$3.8 \times 10^{-15} (K_{a1})$	14.4
Zinc hydroxide	$\text{Zn}(\text{OH})_2 + 2\text{H}_2\text{O} \rightleftharpoons 2\text{H}_3\text{O}^+ + \text{ZnO}_2^{2-}$	$1.0 \times 10^{-29} (K_a)$	29.0
Zinc ion	$\text{Zn}^{2+} + 2\text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{O}^+ + \text{ZnOH}^+$	$2.5 \times 10^{-10} (K_{h1})$	9.6

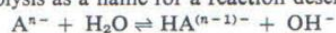
*Constants for anionic and molecular acids are indicated as K_a ; those for cationic acids as K_h . The K_h notation emphasizes the common use of the term hydrolysis to describe the general process



Distinction between the two is a matter of convention only (page 75). All numerical values in this and subsequent tables are for room temperature (about 20 to 25°C).

Base	Equilibrium equation	K	pK
Acetate ion	$\text{CH}_3\text{CO}_2^- + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{CO}_2\text{H} + \text{OH}^-$	$5.6 \times 10^{-10} (K_h)$	9.3
Ammonia	$\text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^-$	$1.80 \times 10^{-5} (K_b)$	4.7
Aniline	$\text{C}_6\text{H}_5\text{NH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{C}_6\text{H}_5\text{NH}_3^+ + \text{OH}^-$	$3.8 \times 10^{-10} (K_b)$	9.4
Arsenate ion (ortho)	$\text{AsO}_4^{3-} + \text{H}_2\text{O} \rightleftharpoons \text{HAsO}_4^{2-} + \text{OH}^-$	$1.7 \times 10^{-3} (K_{h1})$	2.4
	$\text{HAsO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{AsO}_4^- + \text{OH}^-$	$6.3 \times 10^{-8} (K_{h2})$	7.2
	$\text{H}_2\text{AsO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{AsO}_4 + \text{OH}^-$	$2.0 \times 10^{-12} (K_{h3})$	11.7
Arsenate ion (meta)	$\text{AsO}_2^- + \text{H}_2\text{O} \rightleftharpoons \text{HASO}_2 + \text{OH}^-$	$1.6 \times 10^{-5} (K_h)$	4.8
Borate ions	$\text{H}_2\text{BO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{BO}_3 + \text{OH}^-$	$1.6 \times 10^{-5} (K_{h1})$	4.8
	$\text{B}_4\text{O}_7^{2-} + 5\text{H}_2\text{O} \rightleftharpoons 2\text{H}_2\text{BO}_3^- + 2\text{H}_3\text{BO}_3$	$10^{-3} (K)$	3
		(approx)	(approx)
Bromide ion	$\text{Br}^- + \text{H}_2\text{O} \rightleftharpoons \text{HBr} + \text{OH}^-$	$1.0 \times 10^{-23} (K_h)$	23
Carbonate ion	$\text{CO}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HCO}_3^- + \text{OH}^-$	$2.1 \times 10^{-4} (K_{h1})$	3.7
	$\text{HCO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{CO}_3 + \text{OH}^-$	$2.4 \times 10^{-8} (K_{h2})$	7.6
Chloride ion	$\text{Cl}^- + \text{H}_2\text{O} \rightleftharpoons \text{HCl} + \text{OH}^-$	$1.0 \times 10^{-20} (K_h)$	20
Chromate ion	$\text{CrO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HCrO}_4^- + \text{OH}^-$	$3 \times 10^{-8} (K_{h1})$	7.5
Cyanide ion	$\text{CN}^- + \text{H}_2\text{O} \rightleftharpoons \text{HCN} + \text{OH}^-$	$2.1 \times 10^{-5} (K_h)$	4.7
Diethylamine	$(\text{C}_2\text{H}_5)_2\text{NH} + \text{H}_2\text{O} \rightleftharpoons (\text{C}_2\text{H}_5)_2\text{NH}_2^+ + \text{OH}^-$	$9.6 \times 10^{-4} (K_b)$	3.0
Dimethylamine	$(\text{CH}_3)_2\text{NH} + \text{H}_2\text{O} \rightleftharpoons (\text{CH}_3)_2\text{NH}_2^+ + \text{OH}^-$	$5.1 \times 10^{-4} (K_b)$	3.3
Ethylamine	$\text{C}_2\text{H}_5\text{NH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{C}_2\text{H}_5\text{NH}_3^+ + \text{OH}^-$	$5.6 \times 10^{-4} (K_b)$	3.3
Fluoride ion	$\text{F}^- + \text{H}_2\text{O} \rightleftharpoons \text{HF} + \text{OH}^-$	$1.5 \times 10^{-11} (K_h)$	10.8
Iodide ion	$\text{I}^- + \text{H}_2\text{O} \rightleftharpoons \text{HI} + \text{OH}^-$	$3.2 \times 10^{-24} (K_h)$	23.5
Methylamine	$\text{CH}_3\text{NH}_2 + \text{H}_2\text{O} \rightleftharpoons \text{CH}_3\text{NH}_3^+ + \text{OH}^-$	$5.0 \times 10^{-4} (K_b)$	3.3
Nitrate ion	$\text{NO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{HNO}_3 + \text{OH}^-$	$4.0 \times 10^{-16} (K_h)$	15.4
Nitrite ion	$\text{NO}_2^- + \text{H}_2\text{O} \rightleftharpoons \text{HNO}_2 + \text{OH}^-$	$2.2 \times 10^{-11} (K_h)$	10.7
Oxalate ion	$\text{C}_2\text{O}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HC}_2\text{O}_4^- + \text{OH}^-$	$1.6 \times 10^{-10} (K_h)$	9.8
Permanganate ion	$\text{MnO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{HMnO}_4 + \text{OH}^-$	$5.0 \times 10^{-17} (K_h)$	16.3
Phosphate ion (ortho)	$\text{PO}_4^{3-} + \text{H}_2\text{O} \rightleftharpoons \text{HPO}_4^{2-} + \text{OH}^-$	$5.0 \times 10^{-2} (K_{h1})$	1.3
	$\text{HPO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{PO}_4^- + \text{OH}^-$	$1.6 \times 10^{-7} (K_{h2})$	6.8
	$\text{H}_2\text{PO}_4^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{PO}_4 + \text{OH}^-$	$1.3 \times 10^{-12} (K_{h3})$	11.9
Silicate ion (meta)	$\text{SiO}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HSiO}_3^- + \text{OH}^-$	$1.6 \times 10^{-3} (K_{h1})$	2.8
	$\text{HSiO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{SiO}_3 + \text{OH}^-$	$3.1 \times 10^{-5} (K_{h2})$	4.5
Sulfate ion	$\text{SO}_4^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HSO}_4^- + \text{OH}^-$	$8.0 \times 10^{-13} (K_{h1})$	12.1
Sulfite ion	$\text{SO}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HSO}_3^- + \text{OH}^-$	$1.3 \times 10^{-8} (K_{h1})$	7.1
	$\text{HSO}_3^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{SO}_3 + \text{OH}^-$	$6.3 \times 10^{-13} (K_{h2})$	12.2
Sulfide ion	$\text{S}^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HS}^- + \text{OH}^-$	$7.7 \times 10^{-2} (K_{h1})$	1.1
	$\text{HS}^- + \text{H}_2\text{O} \rightleftharpoons \text{H}_2\text{S} + \text{OH}^-$	$1 \times 10^{-7} (K_{h2})$	7.0
Thiocyanate ion	$\text{NCS}^- + \text{H}_2\text{O} \rightleftharpoons \text{HNCS} + \text{OH}^-$	Very small (K_h)	Large
Thiosulfate ion	$\text{S}_2\text{O}_3^{2-} + \text{H}_2\text{O} \rightleftharpoons \text{HS}_2\text{O}_3^- + \text{OH}^-$	$3.1 \times 10^{-12} (K_{h1})$	11.5
Triethylamine	$(\text{C}_2\text{H}_5)_3\text{N} + \text{H}_2\text{O} \rightleftharpoons (\text{C}_2\text{H}_5)_3\text{NH}^+ + \text{OH}^-$	$5.8 \times 10^{-4} (K_b)$	3.2
Trimethylamine	$(\text{CH}_3)_3\text{N} + \text{H}_2\text{O} \rightleftharpoons (\text{CH}_3)_3\text{NH}^+ + \text{OH}^-$	$5.3 \times 10^{-5} (K_b)$	4.3

* Constants for molecular bases are indicated as K_b ; those for anionic bases as K_h . Again the K_h notation is a conventional emphasis upon hydrolysis as a name for a reaction described by the type equation



The solubility-product-constant data for metal hydroxides (Appendix E) are pertinent also.