

Table 17.3 Ionization Constants for Some Acids and Their Conjugate Bases at 25 °C

Acid Name	Acid	K_a	Base	K_b	Base Name
Perchloric acid	HClO ₄	large	ClO ₄ ⁻	very small	perchlorate ion
Sulfuric acid	H ₂ SO ₄	large	HSO ₄ ⁻	very small	hydrogen sulfate ion
Hydrochloric acid	HCl	large	Cl ⁻	very small	chloride ion
Nitric acid	HNO ₃	large	NO ₃ ⁻	very small	nitrate ion
Hydronium ion	H ₃ O ⁺	1.0	H ₂ O	1.0×10^{-14}	water
Sulfurous acid	H ₂ SO ₃	1.2×10^{-2}	HSO ₃ ⁻	8.3×10^{-13}	hydrogen sulfite ion
Hydrogen sulfate ion	HSO ₄ ⁻	1.2×10^{-2}	SO ₄ ²⁻	8.3×10^{-13}	sulfate ion
Phosphoric acid	H ₃ PO ₄	7.5×10^{-3}	H ₂ PO ₄ ⁻	1.3×10^{-12}	dihydrogen phosphate ion
Hexaaquairon(III) ion	[Fe(H ₂ O) ₆] ³⁺	6.3×10^{-2}	[Fe(H ₂ O) ₅ OH] ²⁺	1.6×10^{-12}	pentaaquahydroxoiron(III) ion
Hydrofluoric acid	HF	7.2×10^{-4}	F ⁻	1.4×10^{-11}	fluoride ion
Nitrous acid	HNO ₂	4.5×10^{-4}	NO ₂ ⁻	2.2×10^{-11}	nitrite ion
Formic acid	HCO ₂ H	1.8×10^{-4}	HCO ₂ ⁻	5.6×10^{-11}	formate ion
Benzoic acid	C ₆ H ₅ CO ₂ H	6.3×10^{-5}	C ₆ H ₅ CO ₂ ⁻	1.6×10^{-10}	benzoate ion
Acetic acid	CH ₃ CO ₂ H	1.8×10^{-5}	CH ₃ CO ₂ ⁻	5.6×10^{-10}	acetate ion
Propanoic acid	CH ₃ CH ₂ CO ₂ H	1.3×10^{-5}	CH ₃ CH ₂ CO ₂ ⁻	7.7×10^{-10}	propanoate ion
Hexaaquaaluminum ion	[Al(H ₂ O) ₆] ³⁺	7.9×10^{-6}	[Al(H ₂ O) ₅ OH] ²⁺	1.3×10^{-9}	pentaaquahydroxoaluminum ion
Carbonic acid	H ₂ CO ₃	4.2×10^{-7}	HCO ₃ ⁻	2.4×10^{-8}	hydrogen carbonate ion
Hexaaquacopper(II) ion	[Cu(H ₂ O) ₆] ²⁺	1.6×10^{-7}	[Cu(H ₂ O) ₅ OH] ⁺	6.3×10^{-8}	pentaaquahydroxocopper(II) ion
Hydrogen sulfide	H ₂ S	1×10^{-7}	HS ⁻	1×10^{-7}	hydrogen sulfide ion
Dihydrogen phosphate ion	H ₂ PO ₄ ⁻	6.2×10^{-8}	HPO ₄ ²⁻	1.6×10^{-7}	hydrogen phosphate ion
Hydrogen sulfite ion	HSO ₃ ⁻	6.2×10^{-8}	SO ₃ ²⁻	1.6×10^{-7}	sulfite ion
Hypochlorous acid	HClO	3.5×10^{-8}	ClO ⁻	2.9×10^{-7}	hypochlorite ion
Hexaaqualead(II) ion	[Pb(H ₂ O) ₆] ²⁺	1.5×10^{-8}	[Pb(H ₂ O) ₅ OH] ⁺	6.7×10^{-7}	pentaaquahydroxolead(II) ion
Hexaaquacobalt(II) ion	[Co(H ₂ O) ₆] ²⁺	1.3×10^{-9}	[Co(H ₂ O) ₅ OH] ⁺	7.7×10^{-6}	pentaaquahydroxocobalt(II) ion
Boric acid	B(OH) ₃ (H ₂ O)	7.3×10^{-10}	B(OH) ₄ ⁻	1.4×10^{-5}	tetrahydroxoborate ion
Ammonium ion	NH ₄ ⁺	5.6×10^{-10}	NH ₃	1.8×10^{-5}	ammonia
Hydrocyanic acid	HCN	4.0×10^{-10}	CN ⁻	2.5×10^{-5}	cyanide ion
Hexaaquairon(II) ion	[Fe(H ₂ O) ₆] ²⁺	3.2×10^{-10}	[Fe(H ₂ O) ₅ OH] ⁺	3.1×10^{-5}	pentaaquahydroxoiron(II) ion
Hydrogen carbonate ion	HCO ₃ ⁻	4.8×10^{-11}	CO ₃ ²⁻	2.1×10^{-4}	carbonate ion
Hexaaquanickel(II) ion	[Ni(H ₂ O) ₆] ²⁺	2.5×10^{-11}	[Ni(H ₂ O) ₅ OH] ⁺	4.0×10^{-4}	pentaaquahydroxonickel(II) ion
Hydrogen phosphate ion	HPO ₄ ²⁻	3.6×10^{-13}	PO ₄ ³⁻	2.8×10^{-2}	phosphate ion
Water	H ₂ O	1.0×10^{-14}	OH ⁻	1.0	hydroxide ion
Hydrogen sulfide ion*	HS ⁻	1×10^{-19}	S ²⁻	1×10^5	sulfide ion
Ethanol	C ₂ H ₅ OH	very small	C ₂ H ₅ O ⁻	large	ethoxide ion
Ammonia	NH ₃	very small	NH ₂ ⁻	large	amide ion
Hydrogen	H ₂	very small	H ⁻	large	hydride ion

Increasing Acid Strength ↑

↑ Increasing Base Strength