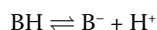


## DISSOCIATION CONSTANTS OF INORGANIC ACIDS AND BASES

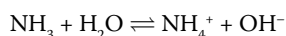
The data in this table are presented as values of  $pK_a$ , defined as the negative logarithm of the acid dissociation constant  $K_a$  for the reaction



Thus  $pK_a = -\log K_a$ , and the hydrogen ion concentration  $[H^+]$  can be calculated from

$$K_a = \frac{[H^+][B^-]}{[BH]}$$

In the case of bases, the entry in the table is for the conjugate acid; e.g., ammonium ion for ammonia. The  $OH^-$  concentration in the system



can be calculated from the equation

$$K_b = K_{\text{water}}/K_a = \frac{[OH^-][NH_4^+]}{[NH_3]}$$

where  $K_{\text{water}} = 1.01 \times 10^{-14}$  at 25 °C. Note that  $pK_a + pK_b = pK_{\text{water}}$ .

All values refer to dilute aqueous solutions at zero ionic strength at the temperature indicated. The table is arranged alphabetically by compound name.

### Reference

- Perrin, D. D., *Ionization Constants of Inorganic Acids and Bases in Aqueous Solution, Second Edition*, Pergamon, Oxford, 1982.

Name	Formula	Step	t/°C	pK <sub>a</sub>
Aluminum(III) ion	Al <sup>3+</sup>		25	5.0
Ammonia	NH <sub>3</sub>		25	9.25
Arsenic acid	H <sub>3</sub> AsO <sub>4</sub>	1	25	2.26
		2	25	6.76
		3	25	11.29
Arsenious acid	H <sub>2</sub> AsO <sub>3</sub>		25	9.29
Barium(II) ion	Ba <sup>2+</sup>		25	13.4
Boric acid	H <sub>3</sub> BO <sub>3</sub>	1	20	9.27
		2	20	>14
Calcium(II) ion	Ca <sup>2+</sup>		25	12.6
Carbonic acid	H <sub>2</sub> CO <sub>3</sub>	1	25	6.35
		2	25	10.33
Chlorous acid	HClO <sub>2</sub>		25	1.94
Chromic acid	H <sub>2</sub> CrO <sub>4</sub>	1	25	0.74
		2	25	6.49
Cyanic acid	HCNO		25	3.46
Germanic acid	H <sub>2</sub> GeO <sub>3</sub>	1	25	9.01
		2	25	12.3
Hydrazine	N <sub>2</sub> H <sub>4</sub>		25	8.1
Hydrazoic acid	HN <sub>3</sub>		25	4.6
Hydrocyanic acid	HCN		25	9.21
Hydrofluoric acid	HF		25	3.20
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>		25	11.62
Hydrogen selenide	H <sub>2</sub> Se	1	25	3.89
		2	25	11.0
Hydrogen sulfide	H <sub>2</sub> S	1	25	7.05
		2	25	19
Hydrogen telluride	H <sub>2</sub> Te	1	18	2.6
		2	25	11
Hydroxylamine	NH <sub>2</sub> OH		25	5.94
Hypobromous acid	HBrO		25	8.55
Hypochlorous acid	HClO		25	7.40
Hypoiodous acid	HIO		25	10.5
Iodic acid	HIO <sub>3</sub>		25	0.78
Lithium ion	Li <sup>+</sup>		25	13.8
Magnesium(II) ion	Mg <sup>2+</sup>		25	11.4
Nitrous acid	HNO <sub>2</sub>		25	3.25
Perchloric acid	HClO <sub>4</sub>		20	-1.6
Periodic acid	HIO <sub>4</sub>		25	1.64
Phosphoric acid	H <sub>3</sub> PO <sub>4</sub>	1	25	2.16

Name	Formula	Step	$t/^\circ\text{C}$	$\text{p}K_a$
Phosphorous acid	$\text{H}_3\text{PO}_3$	2	25	7.21
		3	25	12.32
		1	20	1.3
Pyrophosphoric acid	$\text{H}_4\text{P}_2\text{O}_7$	2	20	6.70
		1	25	0.91
		2	25	2.10
		3	25	6.70
Selenic acid	$\text{H}_2\text{SeO}_4$	4	25	9.32
		2	25	1.7
Selenious acid	$\text{H}_2\text{SeO}_3$	1	25	2.62
		2	25	8.32
Silicic acid	$\text{H}_4\text{SiO}_4$	1	30	9.9
		2	30	11.8
		3	30	12
		4	30	12
Sodium ion	$\text{Na}^+$		25	14.8
Strontium(II) ion	$\text{Sr}^{+2}$		25	13.2
Sulfamic acid	$\text{NH}_2\text{SO}_3\text{H}$		25	1.05
Sulfuric acid	$\text{H}_2\text{SO}_4$	2	25	1.99
Sulfurous acid	$\text{H}_2\text{SO}_3$	1	25	1.85
		2	25	7.2
Telluric acid	$\text{H}_2\text{TeO}_4$	1	18	7.68
		2	18	11.0
Tellurous acid	$\text{H}_2\text{TeO}_3$	1	25	6.27
		2	25	8.43
Tetrafluoroboric acid	$\text{HBF}_4$		25	0.5
Thiocyanic acid	$\text{HSCN}$		25	-1.8
Water	$\text{H}_2\text{O}$		25	13.995