Author: montserrat.filella@unige.ch
Last update: 03/12/2024
Source: Compilation COST Action 1802

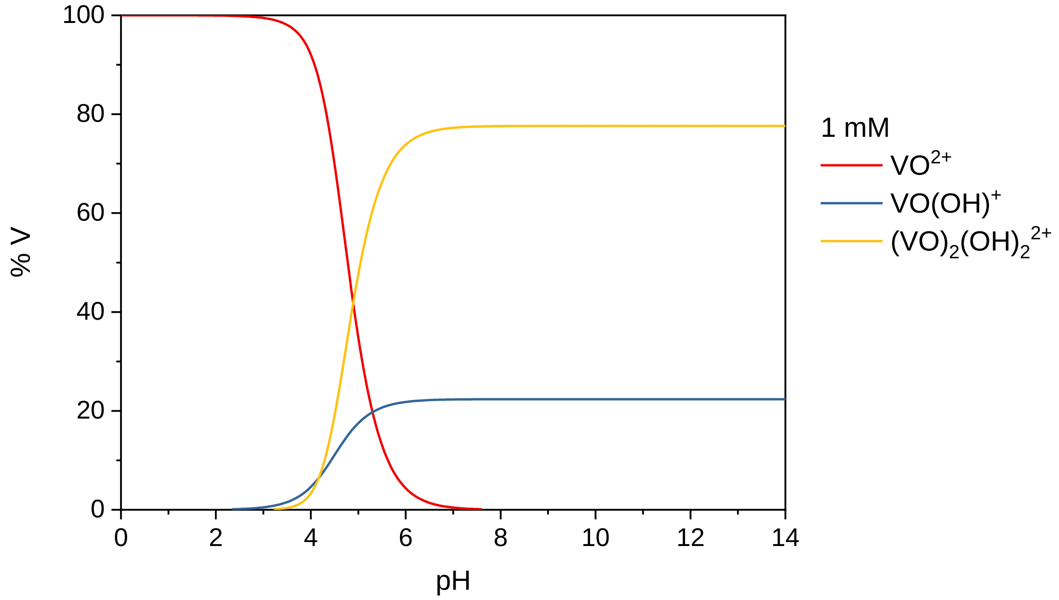
Vanadium(IV)

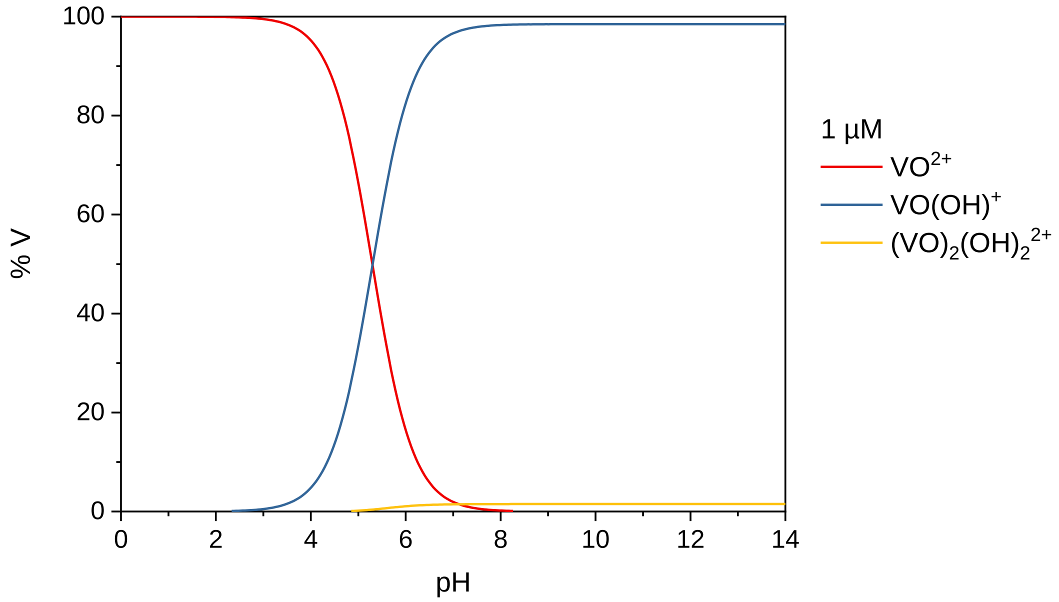
Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K
	Brown and Ekberg, 2016
$VO^{2+} + H_2O \rightleftharpoons VO(OH)^{+} + H^{+}$	–5.30 ± 0.13
$2\ VO^{2+} + 2\ H_2O \rightleftharpoons (VO)_2(OH)_2^{2+} + 2\ H^{+}$	–6.71 ± 0.10

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 568–570.

Distribution diagrams

These diagrams have been computed at two V(IV) concentrations (1 mM = 1x10^{-3} mol L^{-1} and 1 μM = 1x10^{-6} mol L^{-1}) with the 'best' equilibrium constants above. Calculations assume T = 298 K for the limiting case of zero ionic strength (*i.e.*, even neglecting plotted ions).





Author: montserrat.filella@unige.ch
Last update: 03/12/2024
Source: Compilation COST Action 1802

Equilibrium constants for hydrolysis and associated equilibria in critical compilations

Vanadium(V)

Equilibrium reaction	lg*K* at infinite dilution and *T* = 298 K	
	Baes and Mesmer, 1976	Brown and Ekberg, 2016
$VO_2^+ + 2\ H_2O \rightleftharpoons VO(OH)_3 + H^+$	–3.3	
$VO_2^+ + 2\ H_2O \rightleftharpoons VO_2(OH)_2^- + 2H^+$	–7.3	–7.18 ± 0.12
$10\ VO_2^+ + 8\ H_2O \rightleftharpoons V_{10}O_{26}(OH)_2^{4-} + 14\ H^+$	–10.7	
$VO_2(OH)_2^- \rightleftharpoons VO_3(OH)^{2-} + H^+$	–8.55	
$2\ VO_2(OH)_2^- \rightleftharpoons V_2O_6(OH)_2^{3-} + H^+ + H_2O$	–6.53	
$VO_3(OH)^{2-} \rightleftharpoons VO_4^{3-} + H^+$	–14.26	
$2\ VO_3(OH)^{2-} \rightleftharpoons V_2O_7^{4-} + H_2O$	0.56	
$3\ VO_3(OH)^{2-} + 3\ H^+ \rightleftharpoons V_3O_9^{3-} + 3\ H_2O$	31.81	
$V_{10}O_{26}(OH)_2^{4-} \rightleftharpoons V_{10}O_{27}(OH)^{5-} + 3\ H^+$	–3.6	
$V_{10}O_{27}(OH)^{5-} \rightleftharpoons V_{10}O_{28}^{6-} + H^+$	–6.15	
$VO_2^+ + H_2O \rightleftharpoons VO_2OH + H^+$		–3.25 ± 0.11
$VO_2^+ + 3\ H_2O \rightleftharpoons VO_2(OH)_3^{2-} + 3\ H^+$		–15.74 ± 0.19

$VO_2^+ + 4\ H_2O \rightleftharpoons VO_2(OH)_4^{3-} + 4\ H^+$		−30.03 ± 0.24
$2\ VO_2^+ + 4\ H_2O \rightleftharpoons (VO_2)_2(OH)_4^{2-} + 4\ H^+$		−11.66 ± 0.53
$2\ VO_2^+ + 5\ H_2O \rightleftharpoons (VO_2)_2(OH)_5^{3-} + 5\ H^+$		−20.91 ± 0.22
$2\ VO_2^+ + 6\ H_2O \rightleftharpoons (VO_2)_2(OH)_6^{4-} + 6\ H^+$		−32.43 ± 0.30
$4\ VO_2^+ + 8\ H_2O \rightleftharpoons (VO_2)_4(OH)_8^{4-} + 8\ H^+$		−20.78 ± 0.33
$4\ VO_2^+ + 9\ H_2O \rightleftharpoons (VO_2)_4(OH)_9^{5-} + 9\ H^+$		−31.85 ± 0.26
$4\ VO_2^+ + 10\ H_2O \rightleftharpoons (VO_2)_4(OH)_{10}^{6-} + 10\ H^+$		−45.85 ± 0.26
$5\ VO_2^+ + 10\ H_2O \rightleftharpoons (VO_2)_5(OH)_{10}^{5-} + 10\ H^+$		−27.02 ± 0.34
$10\ VO_2^+ + 14\ H_2O \rightleftharpoons (VO_2)_{10}(OH)_{14}^{4-} + 14\ H^+$		−10.5 ± 0.3
$10\ VO_2^+ + 15\ H_2O \rightleftharpoons (VO_2)_{10}(OH)_{15}^{5-} + 15\ H^+$		−15.73 ± 0.33
$10\ VO_2^+ + 16\ H_2O \rightleftharpoons (VO_2)_{10}(OH)_{16}^{6-} + 16\ H^+$		−23.90 ± 0.35
$\frac{1}{2}\ V_2O_5(c) + H^+ \rightleftharpoons VO_2^+ + \frac{1}{2}\ H_2O$	−0.66	
$V_2O_5(s) + 2\ H^+ \rightleftharpoons 2\ VO_2^+ + H_2O$		−0.64 ± 0.09

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 209.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 517–541.

Distribution diagrams

These diagrams have been computed at two V(V) concentrations (1 mM = 1×10^{-3} mol L^{-1} and 1 μM = 1×10^{-6} mol L^{-1}) with the 'best' equilibrium constants above (in green). Calculations assume T = 298 K for the limiting case of zero ionic strength (*i.e.*, even neglecting plotted ions).