

Lucija Knežević

14 October 2022

Vanadium(IV)

Reaction	Brown and Ekberg, 2016
$\text{VO}^{2+} + \text{H}_2\text{O} \rightleftharpoons \text{VO}(\text{OH})^+ + \text{H}^+$	-5.30 ± 0.13
$2 \text{VO}^{2+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{VO}_2(\text{OH})_2^{2+} + 2 \text{H}^+$	-6.71 ± 0.10

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

Vanadium(V)

IMPORTANT: Different criteria have been used by Baes and Mesmer (1976) and Brown and Ekberg (2016) concerning how to write the SAME species. For instance, H_3VO_4 and VO_2OH is the same species differing by a water molecule; obviously, the value of the constant is the same. The same applies to the rest of the species but it is less straightforward to spot the correspondence because of the different criteria adopted to write the reactions (i.e., deprotonation versus hydrolysis).

Reaction	Baes and Mesmer, 1976	Brown and Ekberg, 2016
$\text{VO}_2^+ + 2 \text{H}_2\text{O} \rightleftharpoons \text{H}_3\text{VO}_4 + \text{H}^+$	-3.3 ± 0.1	
$\text{H}_3\text{VO}_4 \rightleftharpoons \text{H}_2\text{VO}_4^- + \text{H}^+$	-4.30 ± 0.1	
$\text{H}_2\text{VO}_4 \rightleftharpoons \text{HVO}_4^{2-} + \text{H}^+$	-8.55 ± 0.15	

$\text{HVO}_4^{2-} \rightleftharpoons \text{VO}_4^{3-} + \text{H}^+$	-14.26 ± 0.10	
$\text{VO}_2^+ + 2 \text{H}_2\text{O} \rightleftharpoons \text{VO}_4^{3-} + 4 \text{H}^+$	-30.0 ± 0.2	
$\text{VO}_2^+ + \text{H}_2\text{O} \rightleftharpoons \text{VO}_2\text{OH} + \text{H}^+$		-3.25 ± 0.11
$\text{VO}_2^+ + 2 \text{H}_2\text{O} \rightleftharpoons \text{VO}_2(\text{OH})_2^- + 2\text{H}^+$		-7.18 ± 0.12
$\text{VO}_2^+ + 3 \text{OH}^- \rightleftharpoons \text{VO}_2(\text{OH})_3^{2-}$		5.43 ± 0.15
$\text{VO}_2^+ + 4 \text{OH}^- \rightleftharpoons \text{VO}_2(\text{OH})_4^{3-}$		0.30 ± 0.14
$\text{V}_2\text{O}_5(\text{s}) + 2 \text{H}^+ \rightleftharpoons 2 \text{VO}_2^+ + \text{H}_2\text{O}$		-0.64 ± 0.09

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

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 135–145.