

Niobium

Reaction	Baes and Mesmer, 1976	Filella and May, 2020
$\text{Nb(OH)}_5 + \text{H}^+ \rightleftharpoons \text{Nb(OH)}_4^+ + \text{H}_2\text{O}$	~-0.6	1.603
$\text{Nb(OH)}_5 + \text{H}_2\text{O} \rightleftharpoons \text{Nb(OH)}_6^- + \text{H}^+$	~-4.8	-4.951
$\text{Nb}_6\text{O}_{19}^{8-} + \text{H}^+ \rightleftharpoons \text{HNb}_6\text{O}_{19}^{7-}$		14.95
$\text{HNb}_6\text{O}_{19}^{7-} + \text{H}^+ \rightleftharpoons \text{H}_2\text{Nb}_6\text{O}_{19}^{6-}$		13.23
$\text{H}_2\text{Nb}_6\text{O}_{19}^{6-} + \text{H}^+ \rightleftharpoons \text{H}_3\text{Nb}_6\text{O}_{19}^{5-}$		11.73
$1/2 \text{Nb}_2\text{O}_5(\text{act}) + 5/2 \text{H}_2\text{O} \rightleftharpoons \text{Nb(OH)}_5$	~-7.4	
$\text{Nb(OH)}_5(\text{am,s}) \rightleftharpoons \text{Nb(OH)}_5$		-7.510
$\text{Nb}_2\text{O}_5(\text{s}) + 5 \text{H}_2\text{O} \rightleftharpoons 2 \text{Nb(OH)}_5$		-18.31

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

M. Filella and P.M. May, The aqueous solution thermodynamics of niobium under conditions of environmental and biological interest. *Applied Geochemistry*, 122, 104729 (2020). doi:10.1016/j.apgeochem.2020.104729