

Hafnium

Reaction	Baes and Mesmer, 1976	Brown and Ekberg, 2016
$\text{Hf}^{4+} + \text{H}_2\text{O} \rightleftharpoons \text{HfOH}^{3+} + \text{H}^+$	-0.25 ± 0.3	-0.26 ± 0.10
$\text{Hf}^{4+} + 2 \text{H}_2\text{O} \rightleftharpoons \text{Hf}(\text{OH})_2^{2+} + 2 \text{H}^+$	-2.4	
$\text{Hf}^{4+} + 3 \text{H}_2\text{O} \rightleftharpoons \text{Hf}(\text{OH})_3^+ + 3 \text{H}^+$	-6.0	
$\text{Hf}^{4+} + 4 \text{H}_2\text{O} \rightleftharpoons \text{Hf}(\text{OH})_4 + \text{H}^+$	$-10.7 \pm 1^*$	$-3.75 \pm 0.34^*$
$\text{Hf}^{4+} + 5 \text{H}_2\text{O} \rightleftharpoons \text{Hf}(\text{OH})_5^- + 5 \text{H}^+$	~ -17.2	
$3 \text{Hf}^{4+} + 4 \text{H}_2\text{O} \rightleftharpoons \text{Hf}_3(\text{OH})_4^{8+} + 4 \text{H}^+$		0.55 ± 0.30

$4 \text{Hf}^{4+} + 8 \text{H}_2\text{O} \rightleftharpoons \text{Hf}_4(\text{OH})_8^{8+} + 8 \text{H}^+$		6.00 ± 0.30
$\text{HfO}_2(\text{s}) + 4 \text{H}^+ \rightleftharpoons \text{Hf}^{4+} + 2 \text{H}_2\text{O}$	$\sim -1.2^*$	$-5.56 \pm 0.15^*$
$\text{HfO}_2(\text{am}) + 4 \text{H}^+ \rightleftharpoons \text{Hf}^{4+} + 2 \text{H}_2\text{O}$		-3.11 ± 0.20

*Errors in compilations concerning equilibrium and/or data elaboration. Data not recommended. Strongly suggested to refer to the original papers.

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 158.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 460-463.