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## Equilibrium constants for hydrolysis and associated equilibria in critical compilations

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# Germanium

Equilibrium reactions	lgK at infinite dilution and $T = 298\text{ K}$		
	Baes and Mesmer, 1976	Wood and Samson, 2006	Filella and May, 2023
$\text{Ge(OH)}_4 \rightleftharpoons \text{GeO(OH)}_3^- + \text{H}^+$	-9.31	$-9.32 \pm 0.05$	-9.099
$\text{Ge(OH)}_4 \rightleftharpoons \text{GeO}_2(\text{OH})_2^{2-} + 2\text{H}^+$	-21.9		
$\text{GeO}_2(\text{OH})_2^{2-} + \text{H}^+ \rightleftharpoons \text{GeO(OH)}_3^-$			12.76
$8\text{ Ge(OH)}_4 \rightleftharpoons \text{Ge}_8\text{O}_{16}(\text{OH})_3^{3-} + 13\text{ H}_2\text{O} + 3\text{ H}^+$	-14.24		
$8\text{ Ge(OH)}_4 + 3\text{ OH}^- \rightleftharpoons \text{Ge}_8(\text{OH})_{35}^{3-}$			28.33
$\text{GeO}_2(\text{s, hexa}) + 2\text{ H}_2\text{O} \rightleftharpoons \text{Ge(OH)}_4$		-1.35	-1.373
$\text{GeO}_2(\text{s, tetra}) + 2\text{ H}_2\text{O} \rightleftharpoons \text{Ge(OH)}_4$	-4.37	-5.02	-4.999

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 349.

M. Filella and P.M. May, The aqueous solution chemistry of germanium under conditions of environmental and biological interest: inorganic ligands. Applied Geochemistry, 155, 105631 (2023).  
 doi:10.1016/j.apgeochem.2023.105631

S.A. Wood and I.M. Samson, The aqueous geochemistry of gallium, germanium, indium and scandium. Ore Geol. Rev., 28, 57–102 (2006).

# Distribution diagrams

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

