Plutonium(III)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$Pu^{3+} + H_2O \rightleftharpoons PuOH^{2+} + H^+$		–7.0	–6.9 ± 0.2	–6.9 ± 0.3
$Pu^{3+} + 3\ H_2O \rightleftharpoons Pu(OH)_3(cr) + 3\ H^+$	–19.65		–15.8 ± 0.8	–15 ± 1

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 186–187.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 396–397.

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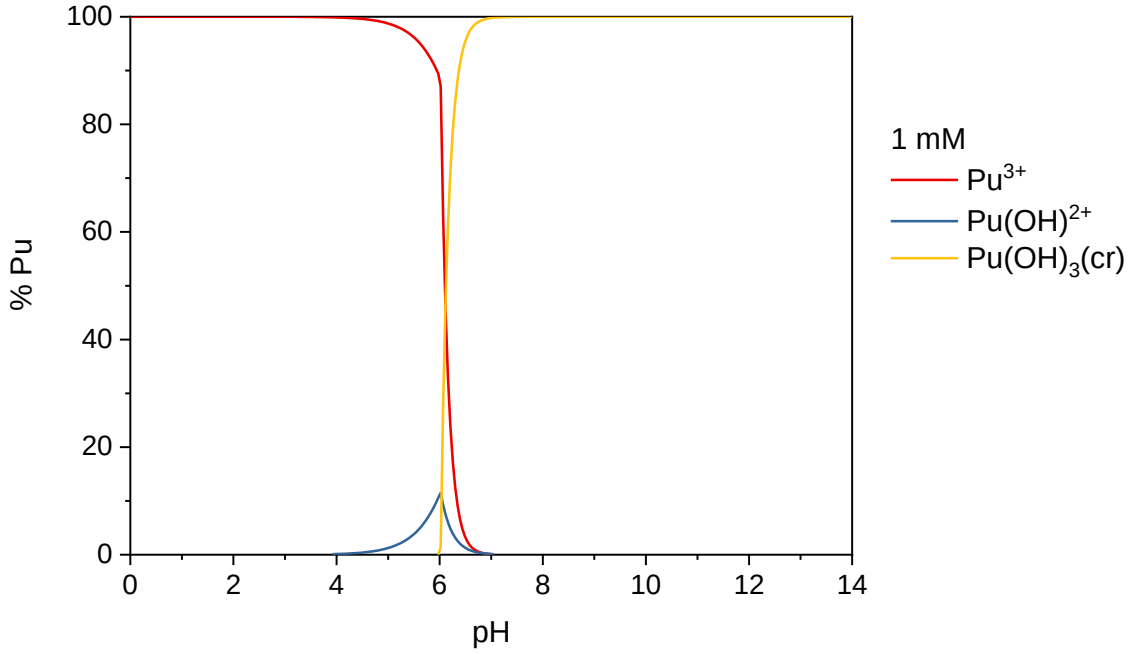
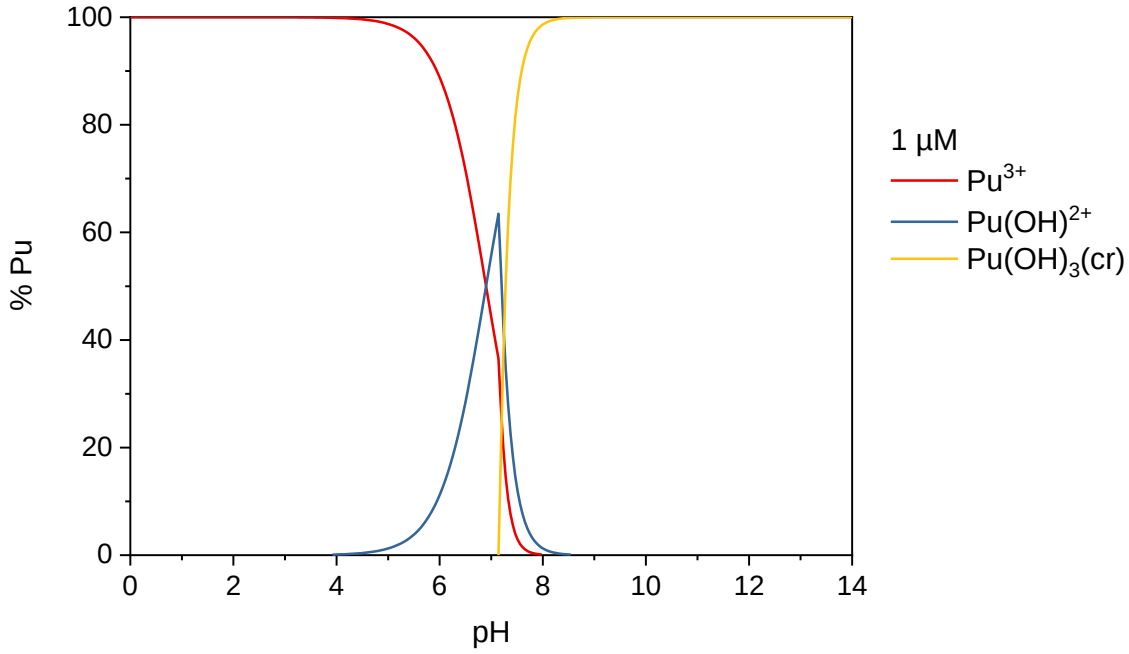
Distribution diagrams

These diagrams have been computed at two Pu(III) concentrations (1 mM = 1x10^{-3} mol L^{-1} and 1 μM = 1x10^{-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).





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Plutonium(IV)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$Pu^{4+} + H_2O \rightleftharpoons PuOH^{3+} + H^+$	–0.5	–0.5	–0.7 ± 0.1	0.6 ± 0.2
$Pu^{4+} + 2\ H_2O \rightleftharpoons Pu(OH)_2^{2+} + 2\ H^+$	(–2.3)			0.6 ± 0.3
$Pu^{4+} + 3\ H_2O \rightleftharpoons Pu(OH)_3^{+} + 3\ H^+$	(–5.3)			–2.3 ± 0.4
$Pu^{4+} + 4\ H_2O \rightleftharpoons Pu(OH)_4 + 4\ H^+$	–9.5		–12.5 ± 0.7	–8.5 ± 0.5
$Pu^{4+} + 4\ OH^- \rightleftharpoons PuO_2$(am, hyd) $+ 2\ H_2O$	49.5		47.9 ± 0.4 (0w) 53.8 ± 0.5 (1w)	58.3 ± 0.5

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 187–189.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 397–401.

I. Grenthe, X. Gaona, A.V.Plyasunov, L. Rao, W.H. Runde, B. Grambow, R.J.M. Konings, A. L. Smith and E.E. Moore, Second Update on the Chemical Thermodynamics of Uranium, Neptunium, Plutonium, Americium and Technetium, OECD Publishing, Paris 2020.

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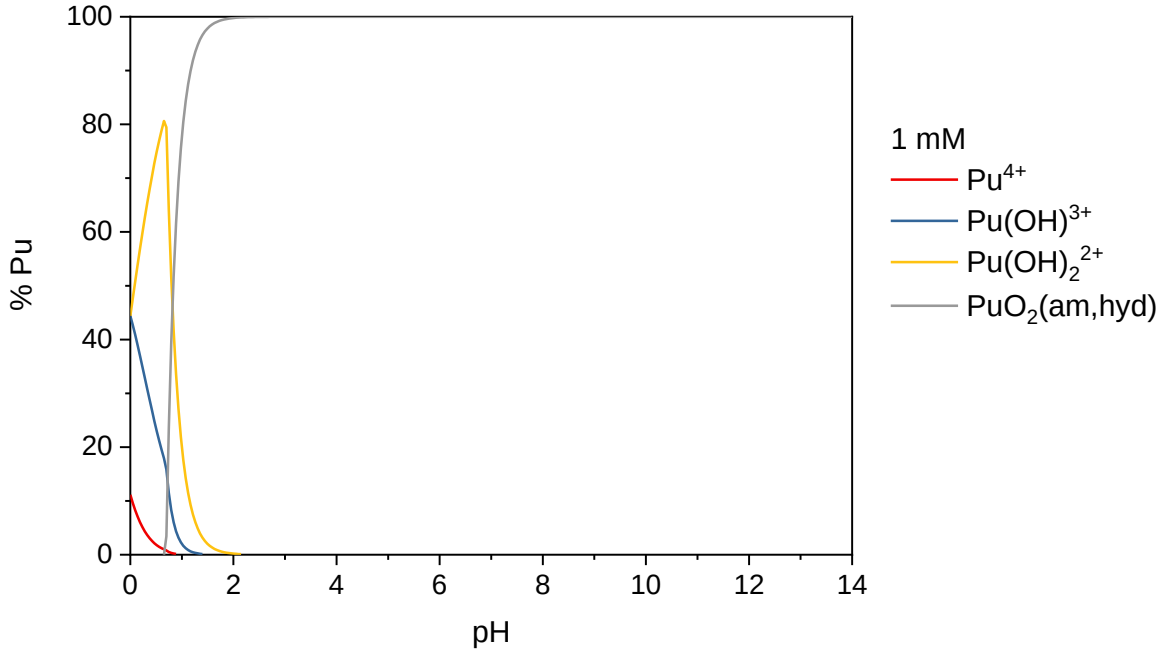
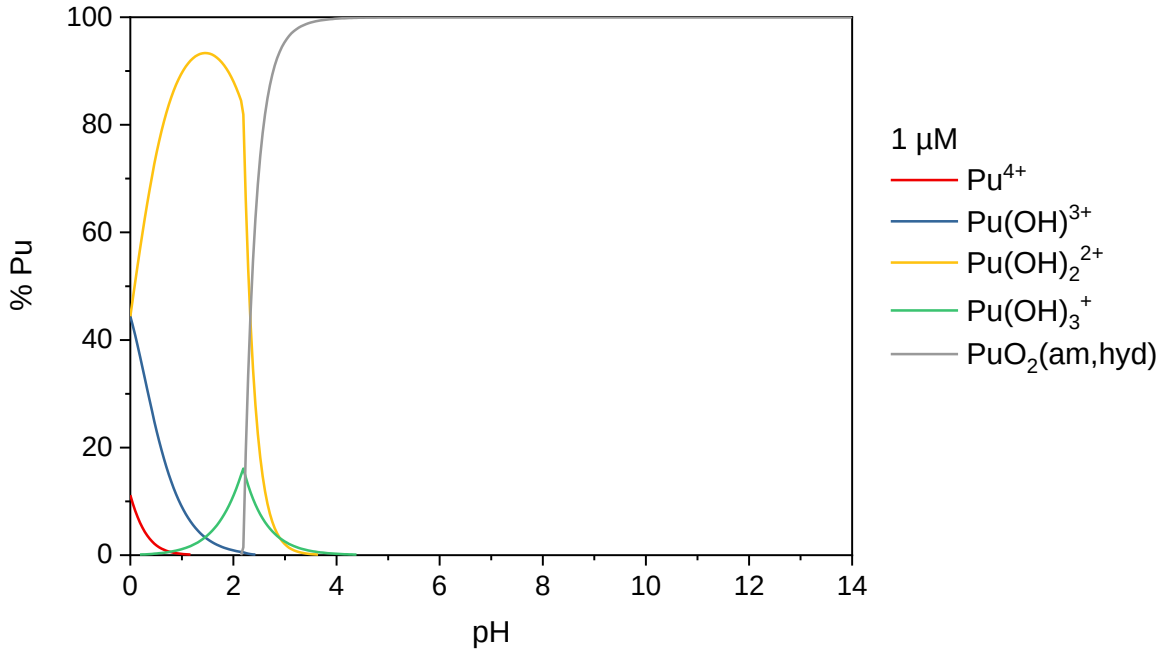
Distribution diagrams

These diagrams have been computed at two Pu(IV) concentrations (1 mM = $1x10^{-3}$ mol L^{-1} and 1 μM = $1x10^{-6}$ 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).





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Plutonium(V)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$PuO_2^+ + H_2O \rightleftharpoons PuO_2(OH) + H^+$	–9.7	–9.7		≤ –9.73
$PuO_2^+ + H_2O \rightleftharpoons PuO_2(OH)(am) + H^+$	≥ –5.4	–5.4	–5.0 ± 0.3	–5.0 ± 0.5

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 189–190.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 401–403.

I. Grenthe, X. Gaona, A.V.Plyasunov, L. Rao, W.H. Runde, B. Grambow, R.J.M. Konings, A. L. Smith and E.E. Moore, Second Update on the Chemical Thermodynamics of Uranium, Neptunium, Plutonium, Americium and Technetium, OECD Publishing, Paris 2020.

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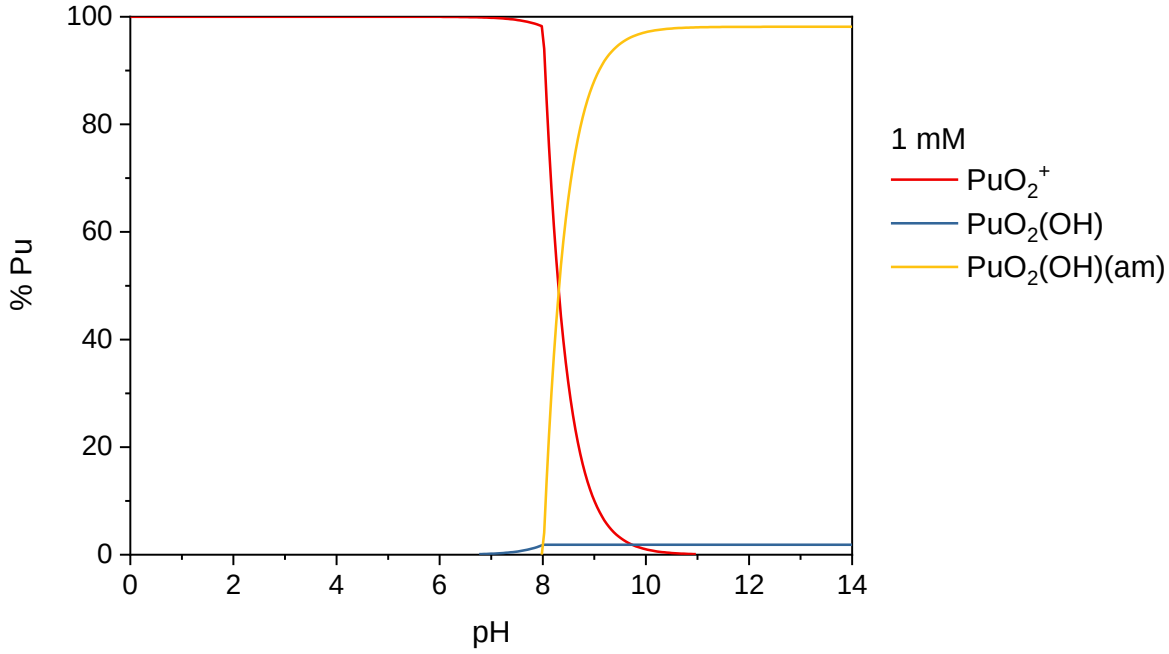
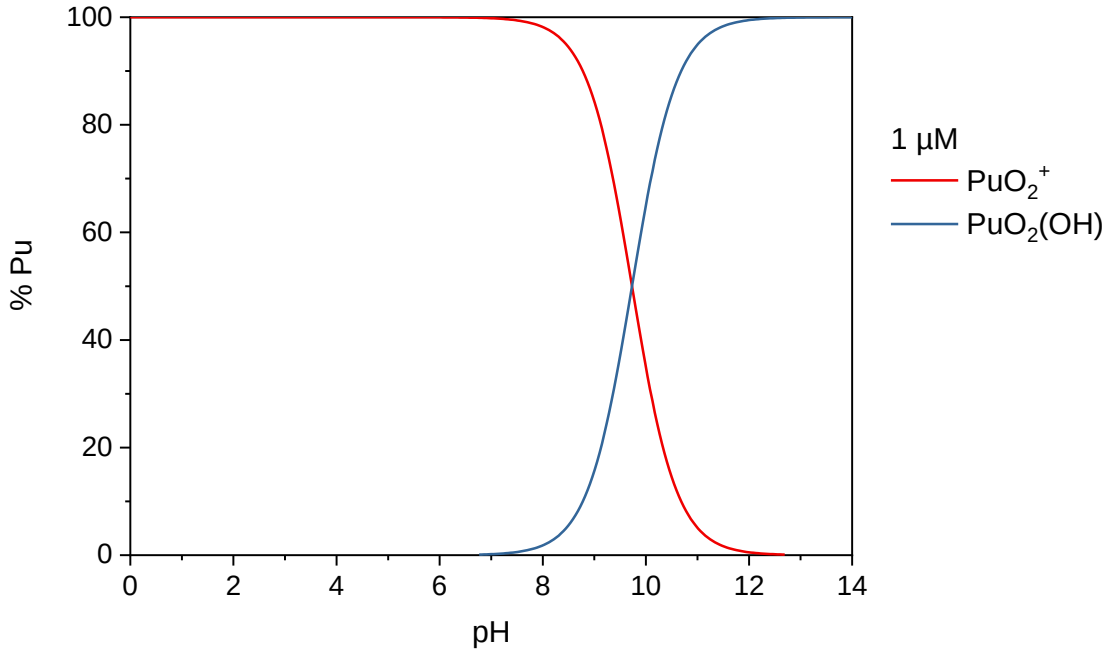
Distribution diagrams

These diagrams have been computed at two Pu(V) concentrations (1 mM = 1x10^{-3} mol L^{-1} and 1 µM = 1x10^{-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).





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Plutonium(VI)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K			
	Baes and Mesmer, 1976	NIST46	Brown and Ekberg, 2016	Grenthe et al., 2020
$PuO_2^{2+} + H_2O \rightleftharpoons PuO_2(OH)^+ + H^+$	–5.6	–5.6	–5.36 ± 0.09	–5.5 ± 0.5
$PuO_2^{2+} + 2\ H_2O \rightleftharpoons PuO_2(OH)_2 + 2\ H^+$			–12.9 ± 0.2	–13 ± 1
$PuO_2^{2+} + 3\ H_2O \rightleftharpoons PuO_2(OH)_3^- + 3\ H^+$				–24 ± 1
$2\ PuO_2^{2+} + 2\ H_2O \rightleftharpoons (PuO_2)_2(OH)_2^{2+} + 2\ H^+$	–8.36	–8.36	–7.8 ± 0.5	–7 ± 1
$3\ PuO_2^{2+} + 5\ H_2O \rightleftharpoons (PuO_2)_3(OH)_5^+ + 5\ H^+$	–21.65	–21.65		
$PuO_2^{2+} + 2\ OH^- \rightleftharpoons PuO_2(OH)_2$(am, hyd)				22.8 ± 0.6

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 190–191.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 403–405.

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Distribution diagrams

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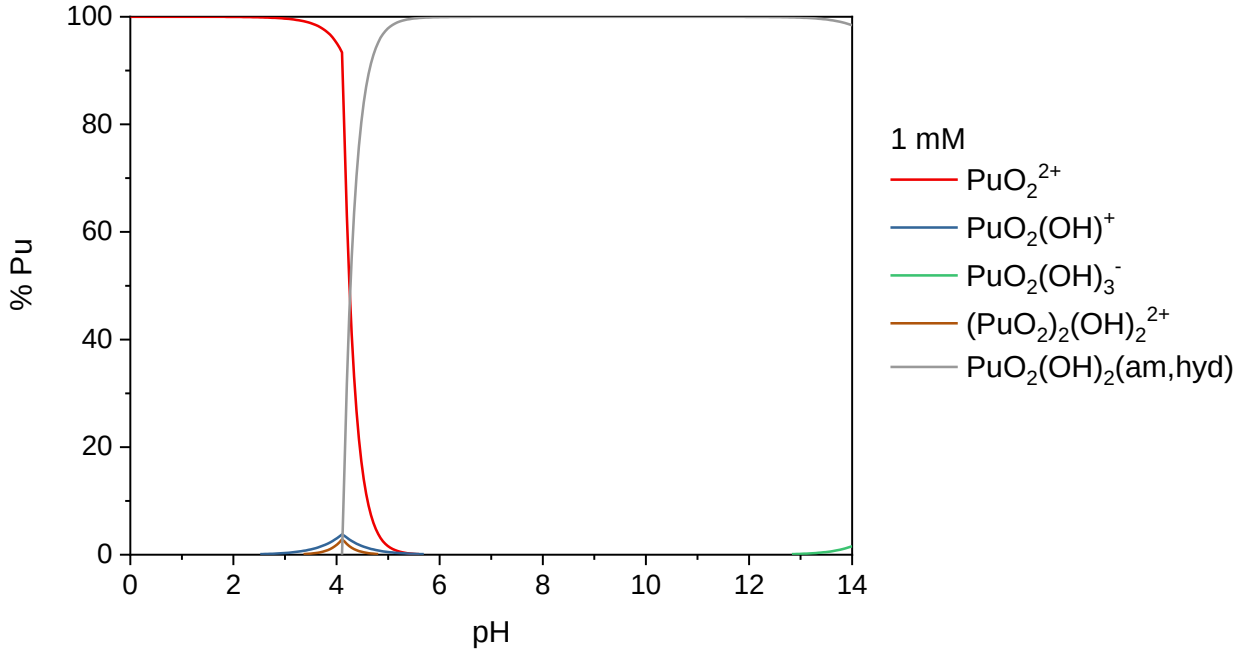

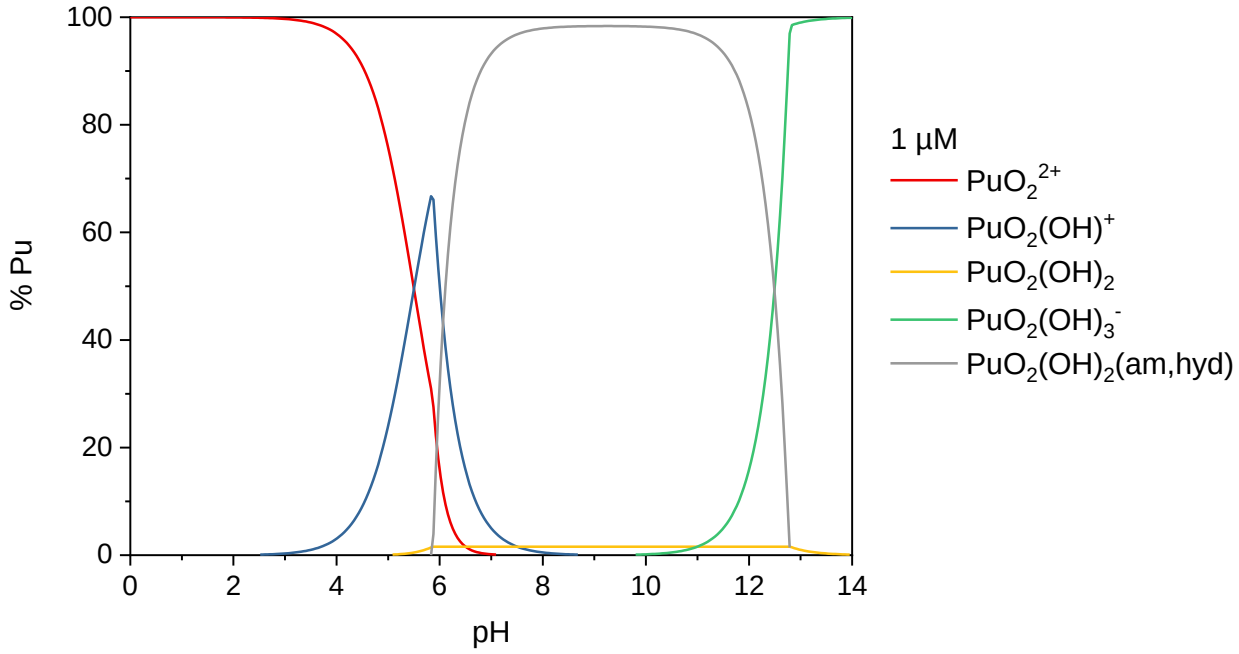

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