Neptunium(III)

Equilibrium reaction	lg*K* at infinite dilution and *T* = 298 K	
	Brown and Ekberg, 2016	Grenthe et al., 2020
$Np^{3+} + H_2O \rightleftharpoons Np(OH)^{2+} + H^+$	-7.3 ± 0.5	–6.8 ± 0.3

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, p. 380.

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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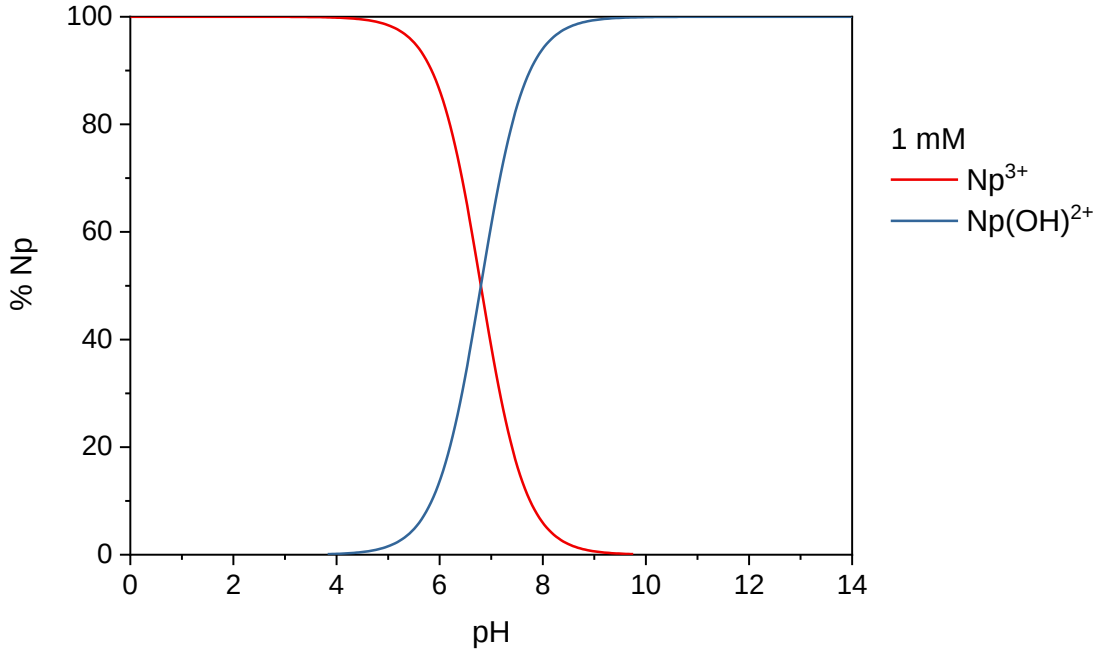
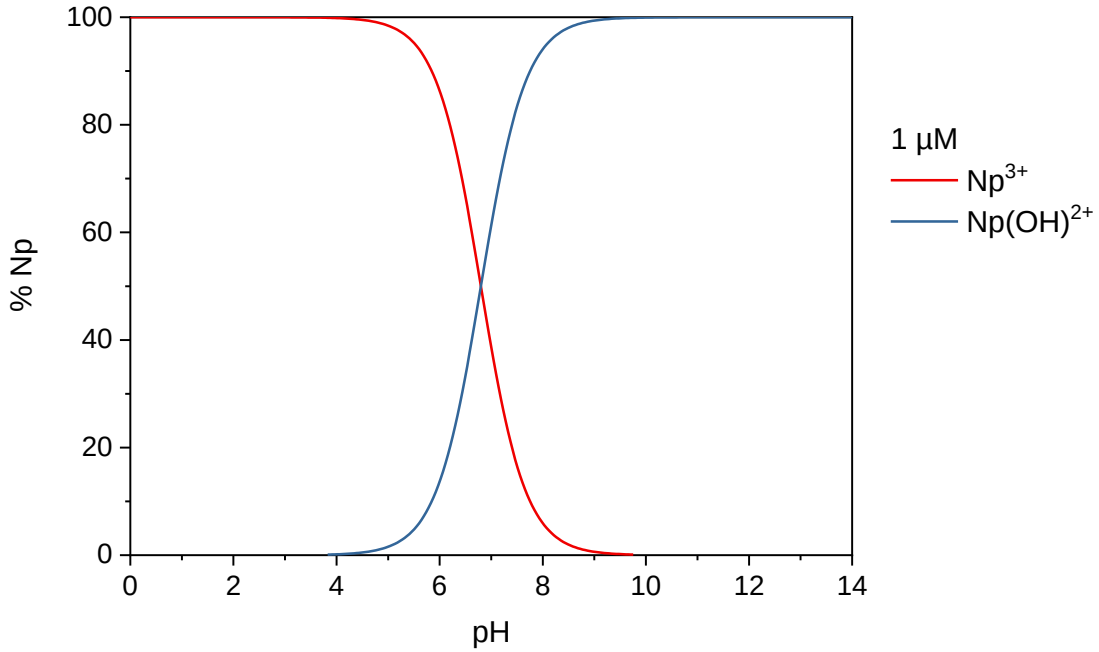
Distribution diagrams

These diagrams have been computed at two Np(III) concentrations (1 mM = $1x10^{-3}$ mol L^{-1} and 1 µM = $1x10^{-6}$ mol L^{-1}) with the 'best' equilibrium constant 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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Neptunium(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
$Np^{4+} + H_2O \rightleftharpoons Np(OH)^{3+} + H^+$	–1.49	–1.5	–1.31 ± 0.05	0.5 ± 0.2
$Np^{4+} + 2\ H_2O \rightleftharpoons Np(OH)_2^{2+} + 2\ H^+$			–3.7 ± 0.3	0.3 ± 0.3
$Np^{4+} + 4\ H_2O \rightleftharpoons Np(OH)_4 + 4\ H^+$			–10.0 ± 0.9	–8 ± 1
$Np^{4+} + 4\ OH^- \rightleftharpoons NpO_2(am, hyd) + 2\ H_2O$	52	54.9 ± 0.4	57.5 ± 0.3	56.7 ± 0.5

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 183.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 380–384.

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.

NIST46, NIST Critically Selected Stability Constants of Metal Complexes: Version 8.0. Available at: www.nist.gov/srd/nist46

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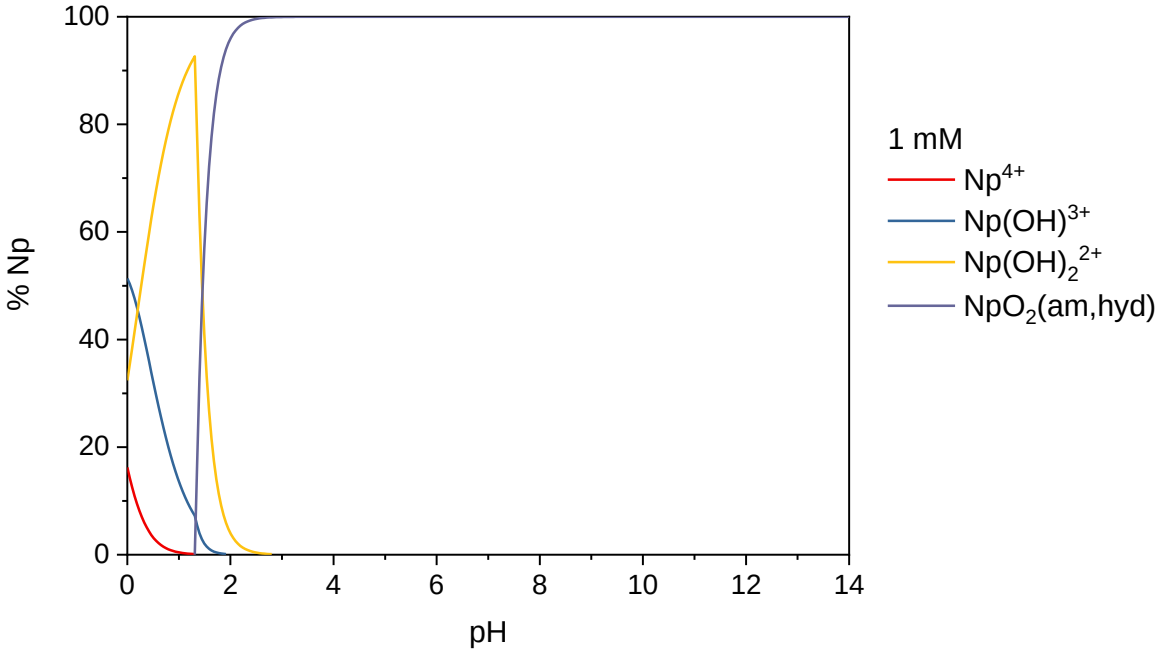
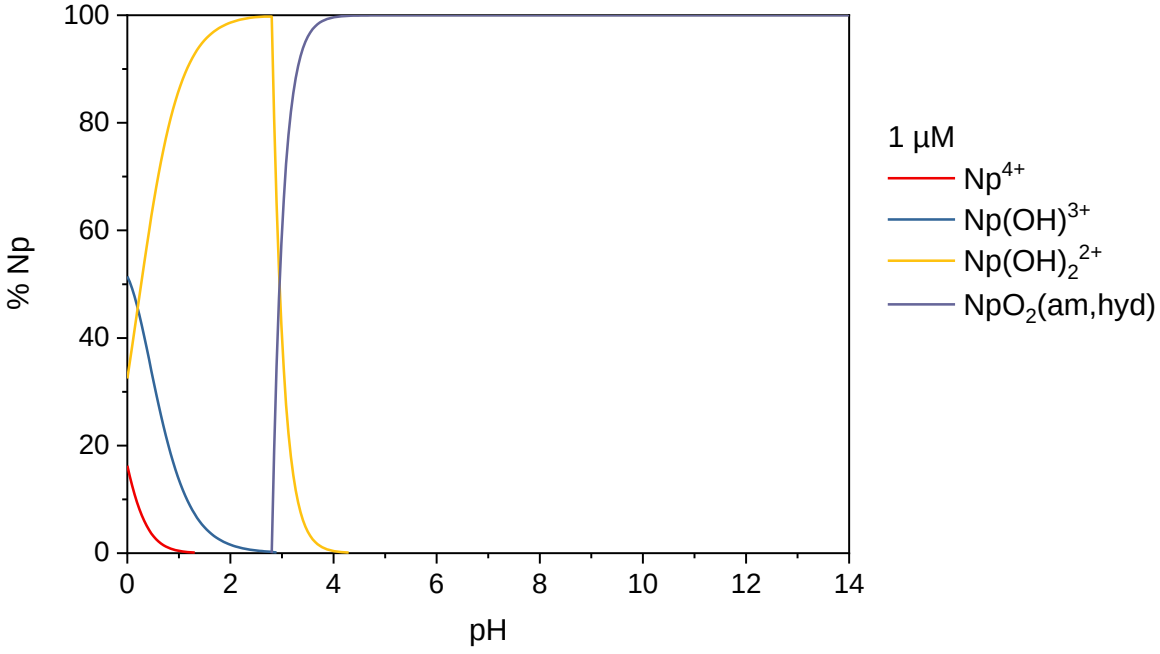
Distribution diagrams

These diagrams have been computed at two Np(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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Neptunium(V)

Equilibrium reactions	lg*K* at infinite dilution and *T* = 298 K		
	Baes and Mesmer, 1976	Brown and Ekberg, 2016	Grenthe et al., 2020
$NpO_2^+ + H_2O \rightleftharpoons NpO_2(OH) + H^+$	–8.85	–10.7 ± 0.5	–11.3 ± 0.7
$NpO_2^+ + 2\ H_2O \rightleftharpoons NpO_2(OH)_2^- + 2\ H^+$		–22.8 ± 0.7	–23.6 ± 0.5
$NpO_2^+ + H_2O \rightleftharpoons NpO_2(OH)(am, fresh) + H^+$	≤ –4.7	–5.21 ± 0.05	–5.3 ± 0.2
$NpO_2^+ + H_2O \rightleftharpoons NpO_2(OH)(am, aged) + H^+$		–4.53 ± 0.06	–4.7 ± 0.5

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, p. 183.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 384–394.

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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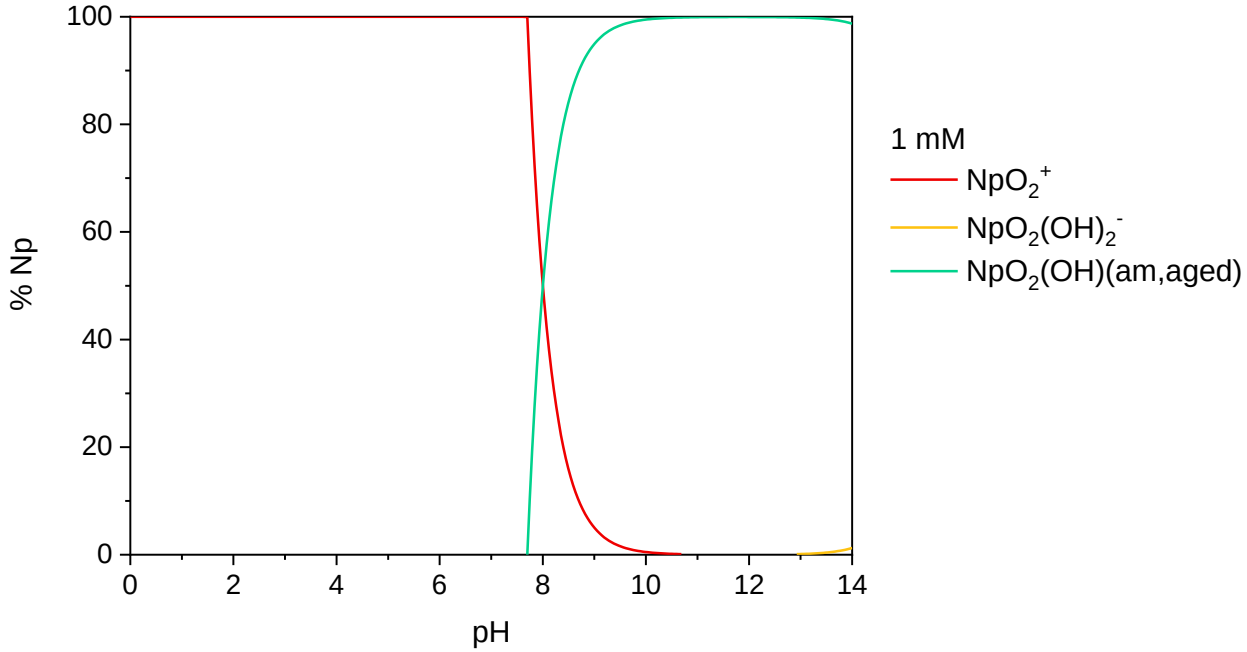
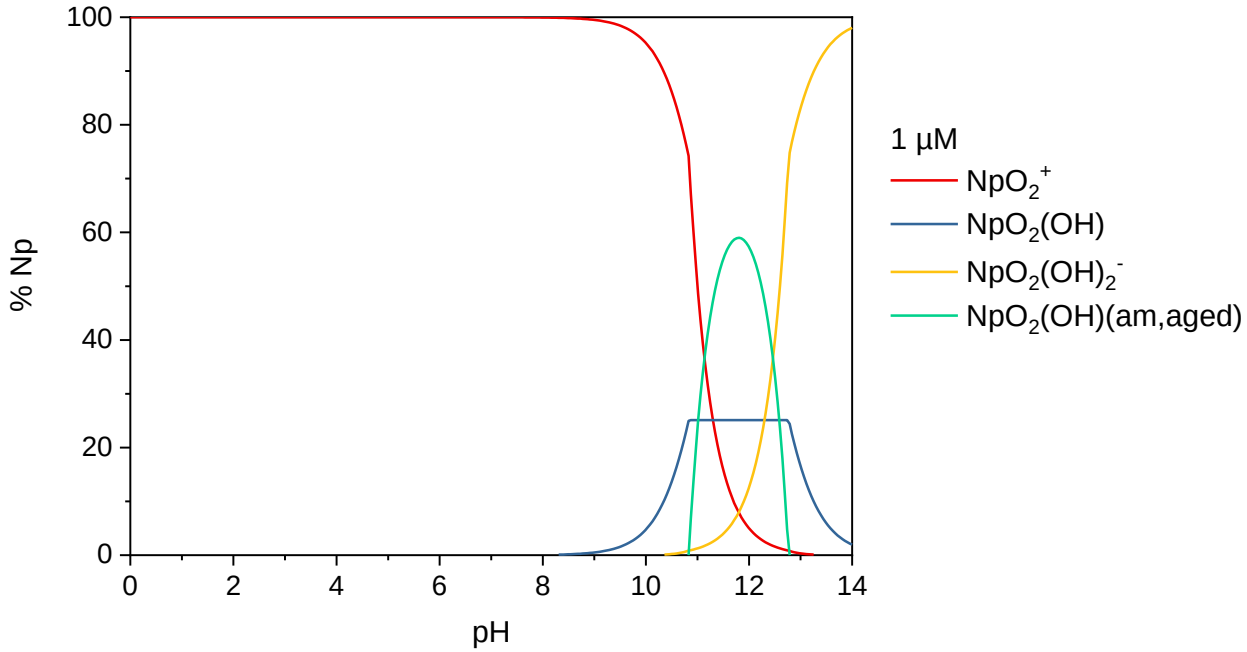
Distribution diagrams

These diagrams have been computed at two Np(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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Neptunium(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
$NpO_2^{2+} + H_2O \rightleftharpoons NpO_2(OH)^+ + H^+$	–5.15	–5.12	–5.1 ± 0.2	–5.1 ± 0.4
$NpO_2^{2+} + 3\ H_2O \rightleftharpoons NpO_2(OH)_3^- + 3\ H^+$			–21 ± 1	
$NpO_2^{2+} + 4\ H_2O \rightleftharpoons NpO_2(OH)_4^{2-} + 4\ H^+$			–32 ± 1	
$2\ NpO_2^{2+} + 2\ H_2O \rightleftharpoons (NpO_2)_2(OH)_2^{2+} + 2\ H^+$	–6.39	–6.39	–6.2 ± 0.2	–6.2 ± 0.2
$3\ NpO_2^{2+} + 5\ H_2O \rightleftharpoons (NpO_2)_3(OH)_5^+ + 5\ H^+$	–17.49	–17.49	–17.0 ± 0.2	–17.1 ± 0.2
$NpO_2^{2+} + 2\ H_2O \rightleftharpoons NpO_3.H_2O(cr) + 2\ H^+$	≥-6.6		–5.4 ± 0.4	–5.4 ± 0.4

C.F. Baes and R.E. Mesmer, The Hydrolysis of Cations. Wiley, New York, 1976, pp. 183–184.

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 394–396.

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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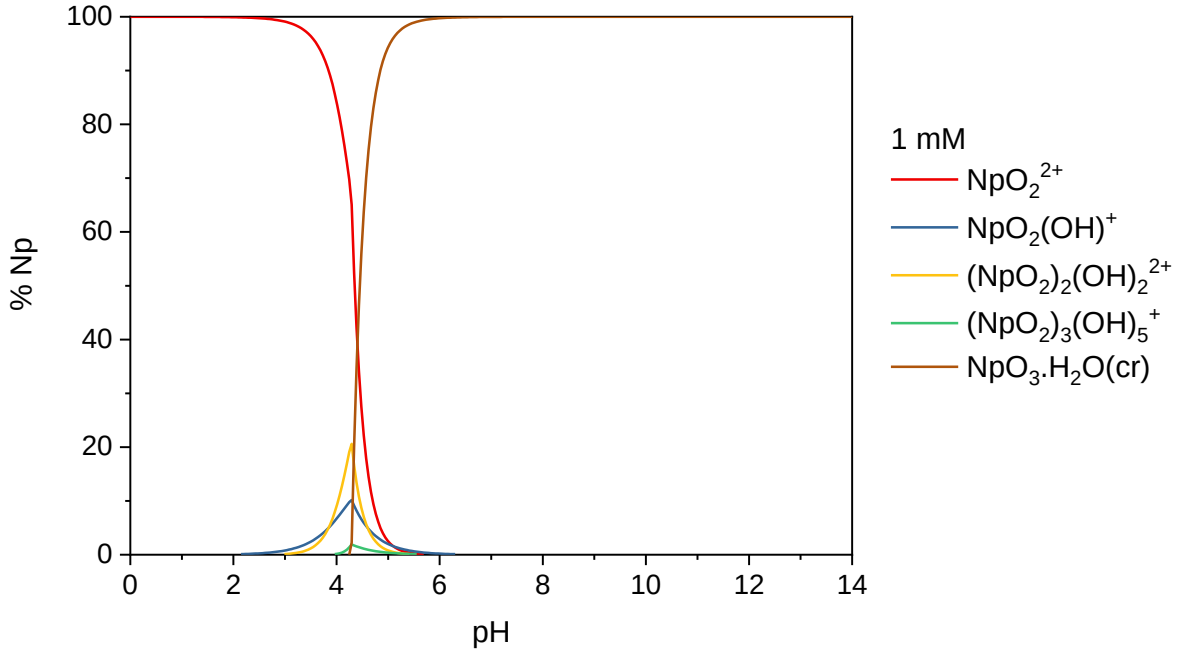
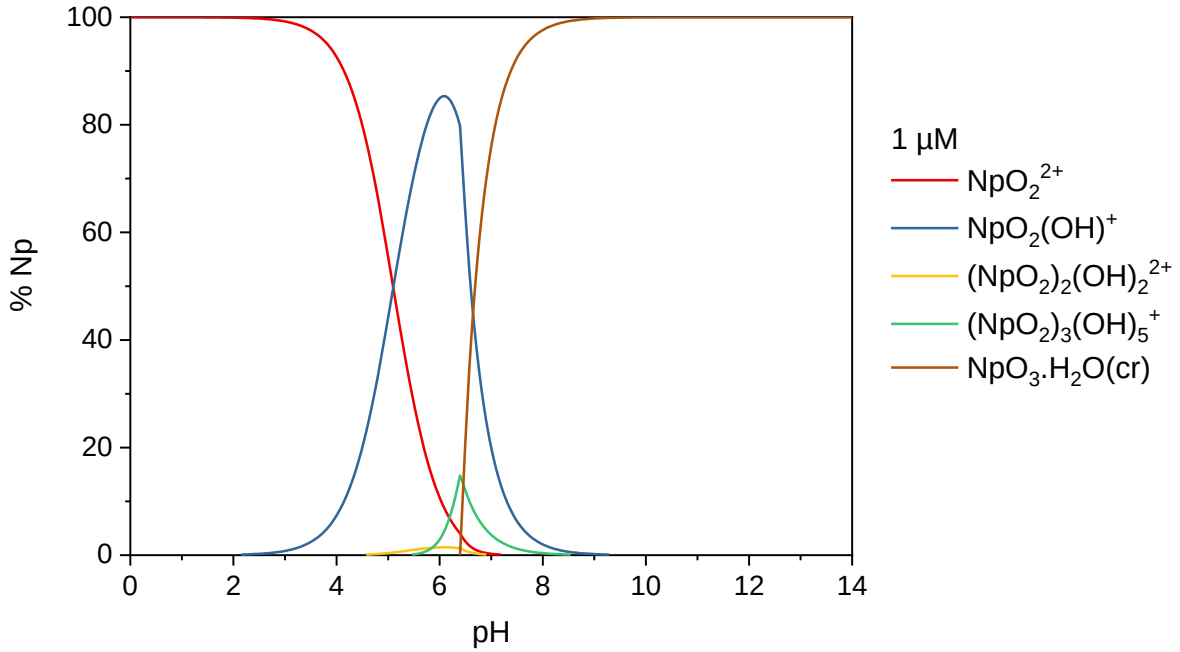
Distribution diagrams

These diagrams have been computed at two Np(VI) 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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