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Fe(III)

Equilibrium	Baes and Mesmer, 1976	Daniele, 1994	Millero 1999	Stefansson, 2007	Brown and Ekberg, 2016
α-FeOOH(s)+ 3 H^+ = Fe^{3+} + 2 H_2O	0.5 ± 0.8			0.16 ± 0.47	-0.33 ± 0.10
0.5 α-Fe_2O_3 (s)+ 3 H^+ = Fe^{3+} + 1.5 H_2O					0.36 ± 0.40
$Fe(OH)_3$(s) +3 H^+ = Fe^{3+} + 3 H_2O			4.1 ± 0.1	3.50 ± 0.20	3.50 ± 0.20
Fe^{3+} + H_2O = $Fe(OH)^{2+}$ + H^+	-2.19 ± 0.02	-2.20 ± 0.02	-2.1 ± 0.03	-2.19 ± 0.02	–2.20 ± 0.02
Fe^{3+} + 2 H_2O = $Fe(OH)_2^+$ + 2 H^+	-5.67 ± 0.01	-5.70 ± 0.2	-6.3 ± 0.1	-5.76 ± 0.06	-5.71 ± 0.01
Fe^{3+} + 3 H_2O = $Fe(OH)_{3\,(aq)}$ + 3 H^+	< -12		-14.3 ± 0.6	-14.3 ± 0.32	–12.26 ± 0.26

$Fe^{3+} + 4\ H_2O = Fe(OH)_4^- + 4\ H^+$	–21.6 ± 0.2		-22.3 ± 0.2	-21.71 ± 0.24	–21.60 ± 0.23
$2\ Fe^{3+} + 2\ H_2O = Fe_2(OH)_2^{4+} + 2\ H^+$	-2.95 ± 0.05	-2.92 ± 0.06		-2.92 ± 0.02	-2.91 ± 0.07
$3\ Fe^{3+} + 4\ H_2O = Fe_3(OH)_4^{5+} + 4\ H^+$	-6.3 ± 0.1				

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

P.L. Brown and C. Ekberg, Hydrolysis of Metal Ions. Wiley, 2016, pp. 135-145.

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A. Stefansson. Iron (III) hydrolysis and solubility at 25°C. Environ. Sci. Technol., 2007,41, 6117-6123

P.G. Daniele, C. Rigano, S. Sammartano, V. Zelano. Ionic strength dependence of formation constants. XVIII. The hydrolysis of iron(III) in aqueous KNO_3 solutions. Talanta, 1994, 9, 1577–1582.

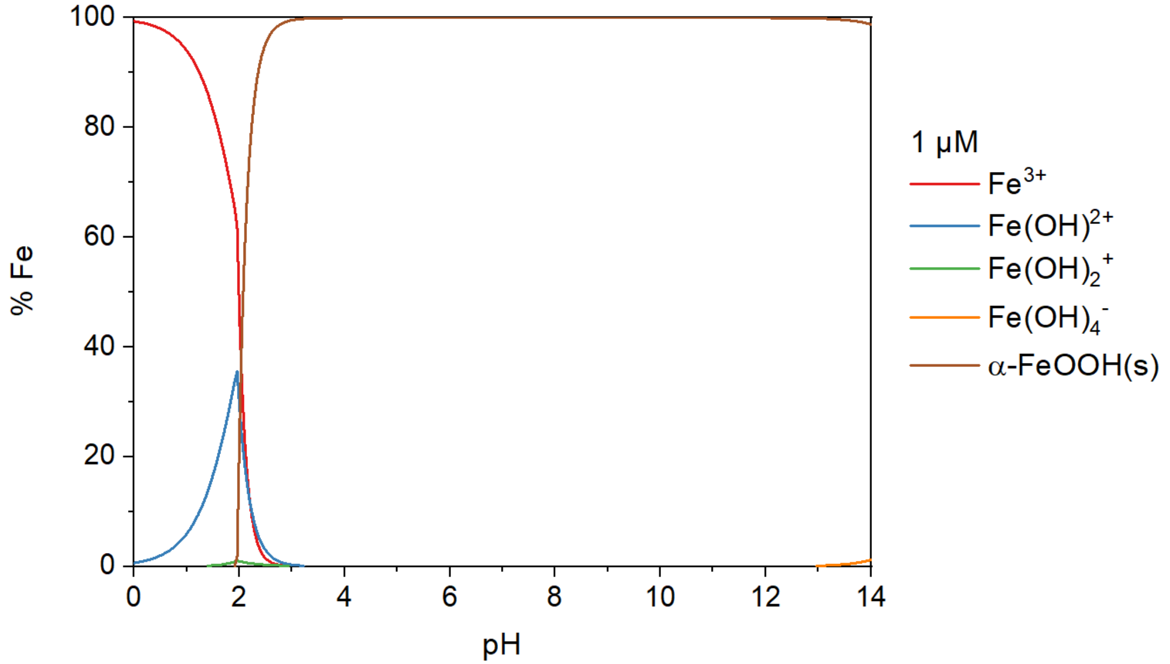
Log file

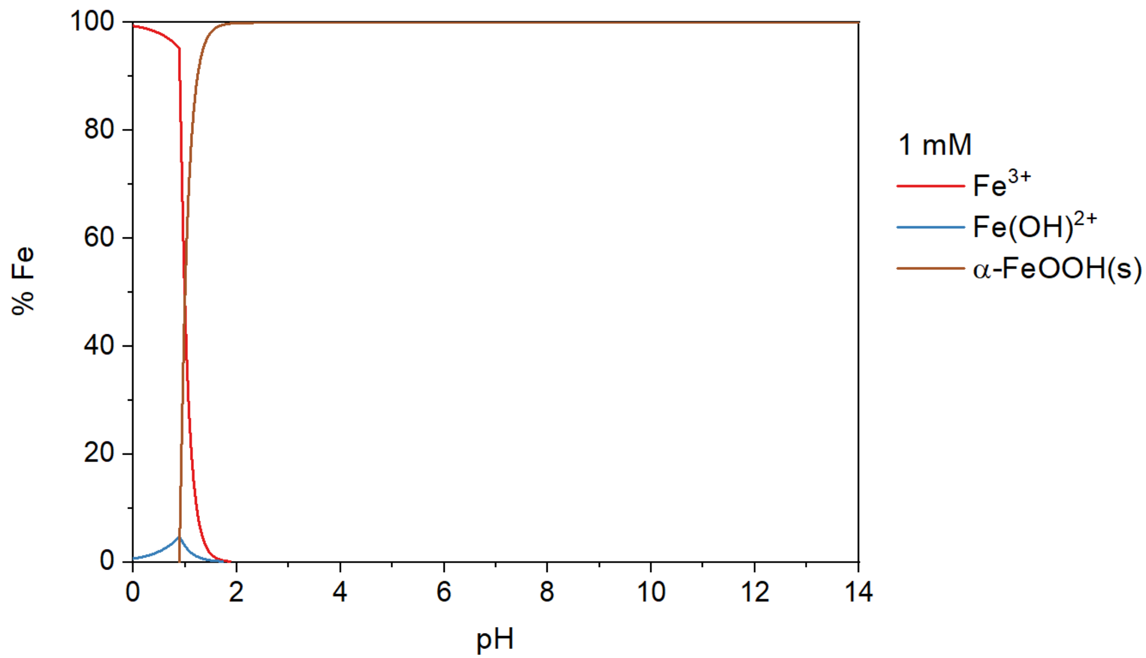
24/04/2021 xxx. first compilation of values

25/10/2023 Bretti revision

Distribution diagrams

These diagrams have been computed at two Cd 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).





100
80
60
40
20
0
% Fe
0
2
4
6
8
10
12
14
pH
1 mM
Fe3+
Fe(OH)2+
α-FeOOH(s)