

Table 14: Zn²⁺-Selective Electrodes

ionophore	membrane composition	$\lg K_{Zn^{2+}, B^{n+}}$	method	primary ion conc. (M)	interfering ion conc. (M)	slope (mV/decade)	linear range (M)	remarks	ref.
Zn²⁺-1	Zn²⁺-1 (<i>w</i> = 2 %), NaTPB (<i>x</i> _i = 70 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -2.6; Na ⁺ , -2.1; K ⁺ , -1.7; NH ₄ ⁺ , +0.3; H ⁺ , +1.5; Mg ²⁺ , -1.5; Ca ²⁺ , -2.4; Cd ²⁺ , -0.8; Cu ²⁺ , +0.3; Pb ²⁺ , 0.0	SSM	0.1	0.1	nN	–	lg <i>P</i> _{TLC} = 8; pH ≥ 6; r.o.o.g.	[1]
	Zn²⁺-1 (<i>w</i> = 2 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -1.0; Na ⁺ , -0.5; K ⁺ , -2.0; NH ₄ ⁺ , -0.1; Mg ²⁺ , -1.0; Ca ²⁺ , -1.6	SSM	0.1	0.1	nN	–	pH ≥ 6; r.o.o.g.	[1]
	Zn²⁺-1 (<i>w</i> = 2 %), KTpCIPB (<i>x</i> _i = 30 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -2.4; Na ⁺ , -2.1; K ⁺ , -1.5; NH ₄ ⁺ , +0.8; Mg ²⁺ , -1.3; Ca ²⁺ , -1.3	SSM	0.1	0.1	nN	–	pH ≥ 6; r.o.o.g.	[1]
	Zn²⁺-1 (<i>w</i> = 2 %), KTpCIPB (<i>x</i> _i = 45 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -2.2; Na ⁺ , -2.3; K ⁺ , -2.0; NH ₄ ⁺ , -1.2; Mg ²⁺ , -3.5; Ca ²⁺ , -2.3	SSM	0.1	0.1	29.5	10 ⁻⁵ –10 ⁻¹	pH ≥ 6; <i>c</i> _{dl} = 10 ^{-5.5} M; pH = 6.0; r.o.o.g.	[1]
	Zn²⁺-1 (<i>w</i> = 2 %), KTpCIPB (<i>x</i> _i = 70 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -2.6; Na ⁺ , -2.7; K ⁺ , -2.5; NH ₄ ⁺ , +3.0; H ⁺ , +0.6; Mg ²⁺ , -3.5; Ca ²⁺ , -2.9; Cd ²⁺ , -3.6; Cu ²⁺ , +0.2; Pb ²⁺ , -2.0	SSM	0.1	0.1	nN	–	pH ≥ 6; r.o.o.g.	[1]
	Zn²⁺-1 (<i>w</i> = 2 %), KTpCIPB (<i>x</i> _i = 162 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Na ⁺ , -0.9; K ⁺ , -1.2; NH ₄ ⁺ , -1.4; Mg ²⁺ , -2.7; Ca ²⁺ , -2.5	SSM	0.1	0.1	nN	–	pH ≥ 6; [1] r.o.o.g.	
	Zn²⁺-2	Zn²⁺-2 (<i>w</i> = 2 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %), KTpCIPB (<i>x</i> _i = 70 %)	Li ⁺ , -1.34; Na ⁺ , -1.7; K ⁺ , +0.05; NH ₄ ⁺ , -0.05; H ⁺ , +8; Mg ²⁺ , -1.7; Ca ²⁺ , +0.5; Cd ²⁺ , -0.6; Cu ²⁺ , +2.5; Pb ²⁺ , +0.5	SSM	0.1	0.1	nN	–	pH ≥ 6; lg <i>P</i> _{TLC} = 3.0 r.o.o.g.
Zn²⁺-3	Zn²⁺-3 (<i>w</i> = 2 %), KTpCIPB (<i>x</i> _i = 70 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -1.2; Na ⁺ , -1.7; K ⁺ , -0.9; NH ₄ ⁺ , -1.4; H ⁺ , +6; Mg ²⁺ , -2.6; Ca ²⁺ , 0.0; Cd ²⁺ , -0.5; Cu ²⁺ , +2.3; Pb ²⁺ , +2.3	SSM	0.1	0.1	nN	–	pH 6; [1] lg <i>P</i> _{TLC} = 4.6; r.o.o.g.	
Zn²⁺-4	Zn²⁺-4 (<i>w</i> = 2 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -1.0; Na ⁺ , -1.0; K ⁺ , -0.4; NH ₄ ⁺ , -1.7; H ⁺ , +2.7; Mg ²⁺ , -2.0;	SSM	0.1	0.1	nN	–	pH ≥ 6; [1] lg <i>P</i> _{TLC} = 7.0; r.o.o.g.	

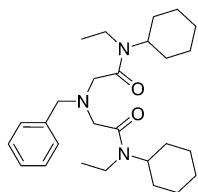
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Table 14: Zn²⁺-Selective Electrodes (Continued)

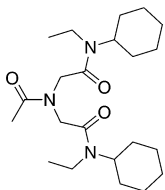
ionophore	membrane composition	$\lg K_{Zn^{2+}, B^{n+}}$	method	primary ion conc. (M)	interfering ion conc. (M)	slope (mV/decade)	linear range (M)	remarks	ref.
		Ca ²⁺ , -1.9							
	Zn²⁺-4 (<i>w</i> = 2 %), KTPCIPB (<i>x</i> ₁ = 30 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -2.4; Na ⁺ , -2.8; K ⁺ , -2.0; NH ₄ ⁺ , -3.3; Mg ²⁺ , -4.3; Ca ²⁺ , -3.6	SSM	0.1	0.1	nN	–	pH ≥ 6; r.o.o.g.	[1]
	Zn²⁺-4 (<i>w</i> = 2 %), KTPCIPB (<i>x</i> ₁ = 70 %), oNPOE (<i>w</i> = 65 %), PVC (<i>w</i> = 33 %)	Li ⁺ , -3.0; Na ⁺ , -3.4; K ⁺ , -3.2; NH ₄ ⁺ , -3.6; H ⁺ , +2.7; Mg ²⁺ , -4.9; Ca ²⁺ , -4.2; Cd ²⁺ , -0.5; Cu ²⁺ , +1.5; Pb ²⁺ , 0.0	SSM	0.1	0.1	29.5	10 ⁻⁵ –10 ⁻¹	pH ≥ 6; <i>c</i> _{dl} = 10 ^{-5.5} M; pH = 6.0; r.o.o.g.	[1]
Zn²⁺-5	Zn²⁺-5 (<i>w</i> = 2 %), NaTPB (<i>x</i> ₁ = 31 %), oNPOE (<i>w</i> = 63.5 %), PVC (<i>w</i> = 34 %)	Li ⁺ , -1.5; Na ⁺ , -0.1 Cs ⁺ , -0.6; NH ₄ ⁺ , -0.6; Mg ²⁺ , -2.8; Ca ²⁺ , -1.1; Sr ²⁺ , -0.4; Ba ²⁺ , +1.3; Mn ²⁺ , -0.3; Fe ²⁺ , -0.2; Fe ³⁺ , -0.7; Co ²⁺ , +0.0; Ni ²⁺ , -1.2; Cu ²⁺ , +0.2; Zn ²⁺ , -0.7	TSM	10 ⁻³	10 ⁻¹	26	10 ⁻³ –10 ⁻¹	r.o.o.g.; <i>K</i> was obtained as $\lg K_{K^+, B^{n+}}$.	[2]
Zn²⁺-6	Zn²⁺-6 (<i>w</i> = 5.4 %), KTPCIPB (<i>x</i> ₁ = 12 %), oNPOE (<i>w</i> = 53.6 %), PVC (<i>w</i> = 40.2 %)	Na ⁺ , -3.28; K ⁺ , -3.77 NH ₄ ⁺ , -3.27; Mg ²⁺ , -3.14; Ca ²⁺ , -2.82; Mn ²⁺ , -2.08; Co ²⁺ , -1.48; Ni ²⁺ , -1.42; Cu ²⁺ , +0.96; Pb ²⁺ , +0.79; Fe ³⁺ , -2.42; Hg ²⁺ , Ag ⁺ , interfere	SSM	–	–	28.0	10 ⁻⁶ –10 ⁻¹	25 ± 1 °C; <i>c</i> _{dl} = 4.2 × 10 ⁻⁷ M; <i>t</i> _{resp} = 2 s; 3.5 < pH < 6.5	[3]
Zn²⁺-7	Zn²⁺-7 (<i>w</i> = 5.6%), DBP (<i>w</i> = 11.1 %), PVC (<i>w</i> = 83.3 %)	Li ⁺ , +1.2; Na ⁺ , +1.2; K ⁺ , +1.3; NH ₄ ⁺ , +1.3; Mg ²⁺ , -0.8; Ca ²⁺ , -0.65; Ba ²⁺ , -0.9; Cr ³⁺ , -1.3; Fe ³⁺ , -1.25; Cu ²⁺ , -0.75; Pb ²⁺ , -0.75	FIM	–	0.01	22.0	1.58 × 10 ⁻⁴ –1.00 × 10 ⁻¹	<i>t</i> _{resp} < 10 s; 2.8 < pH < 7.0; τ > 90 d	[3]
		Li ⁺ , -0.75; Na ⁺ , -0.75; K ⁺ , -0.7; NH ₄ ⁺ , -0.7; Mg ²⁺ , -0.8; Ca ²⁺ , -0.65; Ba ²⁺ , -0.9; Cr ³⁺ , -0.6; Fe ³⁺ , -0.85; Cu ²⁺ , -0.75; Pb ²⁺ , -0.75	FIM	–	0.01			<i>K</i> was recalculated by omitting charge numbers of the ions.	

Table 14: Zn²⁺-Selective Electrodes (Continued)

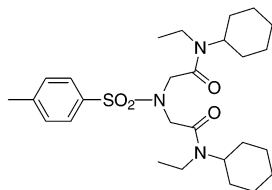
- (1) E. Lindner, M. Horváth, K. Tóth, E. Pungor, *Anal. Lett.*, **25**, 453–470 (1992).
- (2) J.E. Madden, T.J. Cardwell, R.W. Cattrall, L.W. Deady, *Anal. Chim. Acta*, **319**, 129–134 (1996).
- (3) R. Kojima, S. Kamata, *Anal. Sci.*, **10**, 409–412 (1994).
- (4) S.S. Srivastava, V.K. Gupta, S. Jain, *Anal. Chem.*, **68**, 1272–1275 (1996).



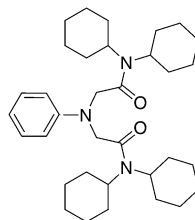
Zn²⁺-1 ($M_r = 441.66$)



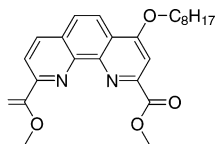
Zn²⁺-2 ($M_r = 393.57$)



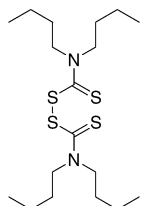
Zn²⁺-3 ($M_r = 505.72$)



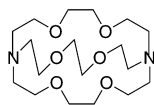
Zn²⁺-4 ($M_r = 535.82$)



Zn²⁺-5 ($M_r = 424.50$)



Zn²⁺-6 ($M_r = 408.74$)



Zn²⁺-7 ($M_r = 376.50$)