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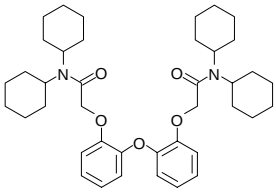
I

Barium



Barium ionophore I

(V 163; *N,N,N′,N′*-Tetracyclohexyl-oxybis(*o*-phenyleneoxy)diacetamide)
$C_{40}H_{52}N_2O_5$ M_r 644.90 [96476-01-6]

11788	**Selectophore®, function tested**	50 mg

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Electrochemical Transduction

Ion-Selective Electrodes

Application 1 and Sensor Type *general 1, application 2*
Assay of Ba^{2+} activity with solvent polymeric membrane electrodes based on Barium ionophore I.

Recommended Membrane Composition

1.20	wt%	Barium ionophore I (11788)
0.70	wt%	Potassium tetrakis(4-chlorophenyl)borate (60591)
65.20	wt%	2-Nitrophenyl octyl ether (73732)
32.90	wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended Cell Assembly
Reference ‖ sample solution ‖ ion-selective membrane | 0.01 M $BaCl_2$ [1)] | AgCl, Ag

1) for titrations; 0.1 M $BaCl_2$ for all other measurements

Electrode Characteristics and Function

Selectivity coefficients $\log K^{Pot}_{Ba, M}$ as obtained by the separate solution method (0.1 M solutions of the chlorides)

$\log K^{Pot}_{Ba, H}$	-1.5	$\log K^{Pot}_{Ba, NH_4}$	-3.1
$\log K^{Pot}_{Ba, Li}$	-3.2	$\log K^{Pot}_{Ba, Ca}$	-1.7
$\log K^{Pot}_{Ba, Na}$	-2.5	$\log K^{Pot}_{Ba, Mg}$	-7.7
$\log K^{Pot}_{Ba, Cs}$	-2.8	$\log K^{Pot}_{Ba, K}$	-2.5

Slope of linear regression: 29.7 ± 0.6 mV ($10^{-5.5}$ to 10^{-1} M $BaCl_2$)
Detection limit ($BaCl_2$, no ion background: log a_{Ba} ~ < -5.5
Lifetime: log P_{TLC} [1)] ionophore : 8.2 ± 0.4
Response time: 99% response time: <60 s
Stability: Drift ≤0.05 mV/h (in 0.1 M $BaCl_2$)

[1)] lipophilicity, determined by thin layer chromatography [3]

Application 2 and Sensor Type [4]
Potentiometric determination of sulfate in water with ion-selective electrodes based on Barium ionophore I applying Gran's plot titration.

Recommended Membrane Composition

1.20	wt%	Barium ionophore I (11788)
0.80	wt%	Potassium tetrakis(4-chlorophenyl)borate (60591)
64.90	wt%	2-Nitrophenyl octyl ether (73732)
33.10	wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended Cell Assembly
Reference ‖ sample solution ‖ ion-selective membrane | 0.01 M LiOAc, 1 M KCl | Ag, AgCl

Electrode Characteristics and Function
Slope of linear regression: 28.6 mV ($5•10^{-5}$ to $5•10^{-3}$ M $BaCl_2$)
Standard deviation: 0.2 mV
Drift: 0.25 mV/h
Practical pH measuring range: 4-7

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[1] T. Kleiner, F. Bongardt, F. Vögtle, M.W. Läubli, O. Dinten, W. Simon, New neutral ionophores with high barium(2+) selectivity. **Chem. Ber. *118***, 1071 (1985).
[2] M.W. Läubli, O. Dinten, E. Pretsch, W. Simon, F. Vögtle, F. Bongardt, T. Kleiner, Barium-selective electrodes based on neutral carriers and their use in the titration of sulfate in combustion products. **Anal. Chem. *57***, 2756 (1985).
[3] O. Dinten, U.E. Spichiger, N. Chaniotakis, P. Gehrig, B. Rusterholz, W.E. Morf, W. Simon, Lifetime of neutral-carrier-based liquid membranes in aqueous samples and blood and the lipophilicity of membrane components, Lifetime of neutral-carrier-based liquid membranes in aqueous samples and blood and the lipophilicity of membrane components. **Anal. Chem. *63***, 596 (1991).
[4] O. Lutze, B. Ross. K. Cammann, Gran's plot titration and flow injection titration of sulfate in ground and drinking water with a barium ion-selective electrode. **Fresenius J. Anal. Chem. *350***, 630 (1994).