

Product Information

99310 Calcium ionophore I – Cocktail A

(Calcium-selective membrane solution for microelectrodes)

Selectophore®

Electrochemical Transduction

Microelectrodes

Application 1 and Sensor Type¹⁻¹⁷

Assay of Ca²⁺ activity in extra- and intracellular (single-cell) liquids with Ca²⁺ microelectrodes of tip diameter > 1µm based on Calcium ionophore I.

Calcium ionophore I - Cocktail A ([99310](#))

Cocktail Composition:

10.0 wt%	Calcium ionophore I (21192)
89.0 wt%	2-Nitrophenyl octyl ether (73732)
1.0 wt%	Sodium tetraphenylborate (72018)

Recommended Cell Assembly

Reference || sample solution || cocktail | 0.001 M CaCl₂ + 0.011 M NTA + 0.047 M Na₂B₄O₇ | AgCl, Ag

Electrode Characteristics and Function

Selectivity coefficients $\log K_{Ca,M}^{Pot}$ as obtained by the fixed interference method in Ca²⁺-buffered solutions (for M: Na⁺, K⁺) or Ca²⁺-unbuffered solutions (for M: Mg²⁺).

$\log K_{Ca,Na}^{Pot}$	-5.5
$\log K_{Ca,K}^{Pot}$	-5.4
$\log K_{Ca,Mg}^{Pot}$	<-4.9

Slope of linear regression:	28.1±1.8 mV (10 ⁻⁷ to 10 ⁻² CaCl ₂)
Detection limit (Ca ²⁺ -buffered solutions, constant ion background of 125 mM K ⁺):	$\log a_{Ca} \sim -7.4$
Electrical resistance, tip diameter 1-2 µm:	$\sim 2 \cdot 10^{10} \Omega$
Response time:	90% response time: ≤5 s
Time constant:	$\tau = 7 \text{ ms}$



- ¹ Critical evaluation of the applicability of neutral carrier-based calcium selective microelectrodes. F. Lanter, R.A. Steiner, D. Ammann, W. Simon, *Anal. Chim. Acta* 135, 51 (1982).
- ² Ca²⁺-selective electrodes: a novel PVC-gelled neutral carrier mixture compared with other currently available sensors. R.Y. Tsien, T.J. Rink, *J. Neurosci. Methods* 4, 73 (1981).
- ³ Low-impedance, coaxial, ion-selective, double-barrel microelectrodes and their use in biological measurements. E. Ujec, E.E.O. Keller, N. Kõž, V. Pavlik, J. Machek, *Bioelectrochem. Bioenerg.* 7, 363 (1980).
- ⁴ Free calcium in heart muscle at rest and during contraction measured with Ca²⁺-sensitive microelectrodes E. Marban, T.J. Rink, R.W. Tsien, R.Y. Tsien, *Nature* 286, 845 (1980).
- ⁵ Changes of intracellular calcium and sodium activities in sheep heart Purkinje fibres measured with ion-selective microelectrodes. D.M. Bers, D. Ellis, *J. Physiol.* 310, 73P (1981).
- ⁶ Fast extracellular calcium transients: involvement in epileptic processes. R. Pumain, I. Kurcewicz, J. Louvel, *Science* 222, 177 (1983).
- ⁷ Free calcium in sheep cardiac tissue and frog skeletal muscle measured with Ca²⁺-selective microelectrodes. R. Weingart, P. Hess, *Pflügers Arch.* 402, 1 (1984).
- ⁸ Modulation of extracellular calcium and its functional implications. C. Nicholson, *Fed. Proc.* 39, 1519 (1980).
- ⁹ Intracellular calcium measured with calcium-sensitive micro-electrodes and Arsenazo III in voltage-clamped Aplysia neurones. A.L.F. Gorman, S. Levy, E. Nasi, D. Tillotson, *J. Physiol.* 353, 127 (1984).
- ¹⁰ Measurements of intracellular ionized calcium in squid giant axons using calcium-selective electrodes. R. DiPolo, H. Rojas, J. Vergara, R. Lopez, C. Caputo, *Biochim. Biophys. Acta* 728, 311 (1983).
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- ¹² Preliminary measurements of intracellular calcium in an insect salivary gland using a calcium-sensitive microelectrode. M.J. Berridge, *Cell Calcium* 1, 217 (1980).
- ¹³ Relationship between light sensitivity and intracellular free Ca concentration in *Limulus* ventral photoreceptors. A quantitative study using Ca-selective microelectrodes. S. Levy, A. Fein, *J. Gen. Physiol.* 85, 805 (1985).
- ¹⁴ Is calcium the second messenger of 1-methyladenine in meiosis reinitiation of starfish oocytes? A. Picard, M. Dorée, *Exp. Cell. Res.* 145, 325 (1983).
- ¹⁵ Extracellular calcium ion depletion in frog cardiac ventricular muscle. K.P. Dresdner, R.P. Kline, *Biophys. J.* 48, 33 (1985).
- ¹⁶ Recording of intracellular Ca²⁺ from smooth muscle cells by sub-micron tip, double-barrelled Ca²⁺-selective microelectrodes. H. Yamaguchi, *Cell Calcium* 7, 203 (1986).
- ¹⁷ Intracellular calcium activity in split frog skin epithelium: effect of cAMP. E. Kelepouris, Z.S. Agus, M.M. Civan, *J. Membr. Biol.* 88, 113 (1985).



The life science business of Merck KGaA, Darmstadt, Germany operates as MilliporeSigma in the U.S. and Canada

