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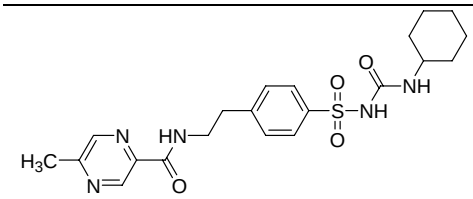
Samarium

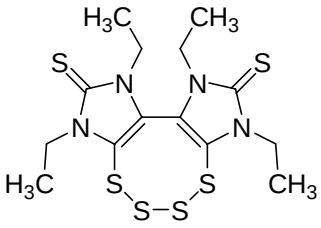


Samarium ionophore I

(Glipizide; 1-Cyclohexyl-3-{4-[2-(5-methylpyrazine-2-carboxamido)ethyl]phenylsulfonyl}urea)

$C_{21}H_{27}N_5O_4S$ M_r 445.54 [29094-61-9]

30553	**Selectophore®**	25 mg, 100 mg



Samarium ionophore II

(1,3,8,10-Tetraethyl-1,3,8,10-tetrahydro[1,2,3,4]tetrathiocino[5,6-d:7,8-d']diimidazole-2,9-dithione; Et_4todit)

$C_{14}H_{20}N_4S_6$ M_r 436.73 [120097-53-2]

15906	**Selectophore®**	50 mg

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Electrochemical Transduction

Ion-Selective Electrodes

Application 1 and Sensor Type [1]
Assay of Sm^{3+} activity in aqueous solution with solvent polymeric membrane electrode based on Samarium ionophore I.

Recommended Membrane Composition

11	wt%	Samarium ionophore I (30553)
55	wt%	Benzyl acetate (43957)
4	wt%	Sodium tetraphenylborate (NaTPB) (72018)
30	wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended Cell Assembly
Reference || sample solution || liquid membrane | 0.001 M $SmCl_3$ | AgCl, Ag

Electrode Characteristics and Function

Selectivity coefficients $\log K^{Pot}_{Sm, M}$ as obtained by the matched potential method. Optimum conditioning time for the membrane sensor in a $1.0 \cdot 10^{-3}$ M $SmCl_3$ solution is 12 h.

$\log K^{Pot}_{Sm, La}$	-2.4	$\log K^{Pot}_{Sm, Co}$	-3.1
$\log K^{Pot}_{Sm, Ce}$	-2.1	$\log K^{Pot}_{Sm, Ni}$	-2.7
$\log K^{Pot}_{Sm, Gd}$	-2.4	$\log K^{Pot}_{Sm, Sr}$	-2.6
$\log K^{Pot}_{Sm, Pb}$	-2.0	$\log K^{Pot}_{Sm, Ca}$	-2.7
$\log K^{Pot}_{Sm, Hg}$	-2.7	$\log K^{Pot}_{Sm, Mg}$	-2.6
$\log K^{Pot}_{Sm, Ag}$	-2.0	$\log K^{Pot}_{Sm, Na}$	-3.1
$\log K^{Pot}_{Sm, Cu}$	-2.8	$\log K^{Pot}_{Sm, K}$	-3.1

Slope of linear regression: 19.8 mV/dec ($1.0 \cdot 10^{-6}$ to $1.0 \cdot 10^{-1}$ M $SmCl_3$)
Detection limit: $6.0 \cdot 10^{-7}$ M Sm^{3+}
Response time: 95% response time: <10 s (>10^{-5} M Sm^{3+})
Lifetime: >2 months

[1] M.R. Ganjali, M.R. Pourjavid, M. Rezapour, S. Haghgoo, Novel Samarium(III) selective membrane sensor based on glipizid. **Sensors and Actuators *B 89***, 21 (2003).

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Application 2 and Sensor Type [2]

Assay of Sm^{3+} activity in aqueous solution with solvent polymeric membrane electrode based on Samarium ionophore II.

Recommended Membrane Composition

3	wt%	Samarium ionophore II (15906)
2	wt%	Sodium tetraphenylborate (NaTPB) (72018)
65	wt%	2-Nitrophenyl octyl ether (73732)
30	wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended Cell Assembly

Reference ‖ sample solution ‖ liquid membrane ⎮ 0.001 M $Sm(NO_3)_3$ ⎮ KCl (3M) ‖ AgCl, Ag (PME)
Reference ‖ sample solution ‖ liquid membrane ⎮ graphite surface (CGE)

Electrode Characteristics and Function

Selectivity coefficients $\log K^{Pot}_{Sm,\,M}$ as obtained by the matched potential method. Optimum conditioning time for the membrane sensor in a $1.0 \cdot 10^{-3}$ M $Sm(NO_3)_3$ solution is 24 h.[2]

	PME	CGE		PME	CGE
$\log K^{Pot}_{Sm,\,La}$	-1.3	-3.2	$\log K^{Pot}_{Sm,\,Co}$	-2.3	-3.3
$\log K^{Pot}_{Sm,\,Ce}$	-1.1	-3.1	$\log K^{Pot}_{Sm,\,Ni}$	-2.4	-3.4
$\log K^{Pot}_{Sm,\,Gd}$	-1.1	-3.1	$\log K^{Pot}_{Sm,\,Tl}$	-3.2	-4.3
$\log K^{Pot}_{Sm,\,Pb}$	-1.0	-2.2	$\log K^{Pot}_{Sm,\,Ca}$	-2.9	-3.4
$\log K^{Pot}_{Sm,\,Hg}$	-1.1	-2.2	$\log K^{Pot}_{Sm,\,Mg}$	-2.7	-3.6
$\log K^{Pot}_{Sm,\,Ag}$	-2.4	-3.4	$\log K^{Pot}_{Sm,\,Ba}$	-2.7	-3.5
$\log K^{Pot}_{Sm,\,Cu}$	-2.5	-3.4	$\log K^{Pot}_{Sm,\,Na}$	-3.5	-4.1
$\log K^{Pot}_{Sm,\,Cd}$	-2.7	-3.7	$\log K^{Pot}_{Sm,\,K}$	-3.4	-4.6
$\log K^{Pot}_{Sm,\,Zn}$	-2.1	-3.9	$\log K^{Pot}_{Sm,\,Li}$	-3.4	-4.8

PME (Polymeric Membrane Electrode):

Conditions	Reference solution: $1.0 \cdot 10^{-6}$ M
	Sm^{3+}: $1.0 \cdot 10^{-2}$ M - $1.0 \cdot 10^{-5}$ M
	M^{n+}: $1.0 \cdot 10^{-2}$ M - $1.0 \cdot 10^{-3}$ M
Slope of linear regression:	19.6 ± 0.5 mV/dec ($1.0 \cdot 10^{-5}$ to $1.0 \cdot 10^{-1}$ M $Sm(NO_3)_3$)
Detection limit:	$8.0 \cdot 10^{-6}$ M Sm^{3+}
Response time:	20 s
pH range:	4.0-6.5

CGE (Coated Graphite Electrode):

Conditions:	Reference solution: $1.0 \cdot 10^{-8}$ M
	Sm^{3+}: $1.0 \cdot 10^{-3}$ M - $1.0 \cdot 10^{-7}$ M
	M^{n+}: $1.0 \cdot 10^{-2}$ M - $1.0 \cdot 10^{-4}$ M
Slope of linear regression:	19.3 ± 0.3 mV/dec ($1.0 \cdot 10^{-7}$ to $1.0 \cdot 10^{-1}$ M $Sm(NO_3)_3$)
Detection limit:	$1.6 \cdot 10^{-8}$ M Sm^{3+}
Response time:	18 s

[2] M. Shamsipur, M. Hosseini, K. Alisadeh, Z. Talebpour, M.F. Mousavi, M.R. Ganjali, M. Arca, V. Lippolis, PVC Membrane and Coated Graphite Potentiometric Sensors Based on Et_4todit for Selective Determination of Samarium(III). **Anal. Chem *75***, 5680 (2003).