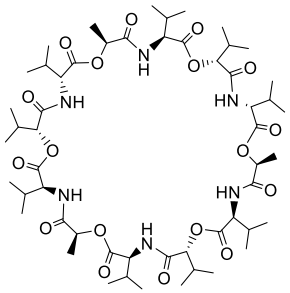
Product Information



60403 Potassium ionophore I

(Valinomycin)
Selectophore®, function tested

Electrochemical Transduction

Ion-Selective Electrodes

Application 1 and Sensor Type[1-5]

Assay of K^+ activity in diluted urine, whole blood, plasma, serum and aqueous solutions with solvent polymeric membrane electrodes based on Potassium ionophore I.

Recommended Membrane Composition

1.00 wt%	Potassium ionophore I (60403)
65.50 wt%	Bis(1-butylpentyl) decane-1,10-diyl diglutarate (ETH 469) (30585)[a)]
0.50 wt%	Potassium tetrakis(4-chlorphenyl)borate (60591)
33.00 wt%	Poly(vinyl chloride) high molecular weight (81392)

[a)] The use of bis(1-butylpentyl) adipate (BBPA) or bis(2-ethylhexyl)sebacate (DOS) leads to membrane electrodes of similar performance.

Recommended Cell Assembly

Reference || sample solution || liquid membrane | 0.004 M KCl | AgCl, Ag

Electrode Characteristics and Function

Selectivity coefficients $\log K_{K,M}^{Pot}$.

		Required[b)]	Found[c)]
$\log K_{K,H}^{Pot}$		<-2.8	-3.4
$\log K_{K,Na}^{Pot}$		<-3.6	-4.1
$\log K_{K,Mg}^{Pot}$		<-2.8	-5.7
$\log K_{K,Ca}^{Pot}$		<-2.9	-5.2
Stability:	Drift [mV h^{-1}]		0.01
	Standard deviation [mV]	<-0.46	0.03
	Reproducibility [mV]		0.16
Lifetime:	log P_{TLC}[d)] ionophore	>8.4	8.6
	log P_{TLC}[d)] plasticizer	>12.8	10.8

[b)] for measurements in blood (1% interference, worst case)[6,7]
[c)] membrane without potassium tetrakis(4-chlorophenyl)borate
[d)] lipophilicity, determined by thin-layer chromatography[8]

Application 2 and Sensor Type[4,9,10]

Assay of K^+ activity in undiluted urine, whole blood, plasma, serum, and aqueous solutions with solvent polymeric membrane electrodes based on Potassium ionophore I.

Recommended Membrane Composition

2.50 wt%	Potassium ionophore I (60403)
83.00 wt%	Siloprene K 1000 (85417)
14.50 wt%	Siloprene Crosslinking Agent K11 (85418)

Recommended Cell Assembly

Reference || sample solution || liquid membrane | 0.1 M KCl | AgCl, Ag

Electrode Characteristics and Function

Selectivity coefficients $\log K_{K,M}^{Pot}$ as obtained by the separate solution method.

		Required[a)]	Found
$\log K_{K,H}^{Pot}$		<-2.8	-4.4
$\log K_{K,Li}^{Pot}$		<-1.7[b)]	-4.3
$\log K_{K,Na}^{Pot}$		<-3.6	-4.0
$\log K_{K,Mg}^{Pot}$		<-2.8	-4.3
$\log K_{K,Ca}^{Pot}$		<-2.9	-4.2
Lifetime:	log P_{TLC}[c)] ionophore	>8.4	8.6

[a)] for measurements in blood (1% interference, worst case)[6,7]
[b)] therapeutical Li^+ concentrations
[c)] lipophilicity, determined by thin-layer chromatography[8]

Application 3 and Sensor Type[11-14]

Assay of K^+ activity for cardiovascular application with biocompatible solvent polymeric membrane electrodes and related microfabricated sensor arrays based on Potassium ionophore I.

Recommended Membrane Composition

1.00 wt%	Potassium ionophore I (60403)
0.50 wt%	Potassium tetrakis(4-chloropheny)borate (60591)
49.50 wt%	Bis(2-ethylhexyl)sebacate (84818)
49.00 wt%	Poly(vinyl chloride) carboxylated (1.8% carboxyl content) (81395)

Electrode Characteristics and Function

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

$\log K_{K,Li}^{Pot}$	-3.98	$\log K_{K,Ca}^{Pot}$	-4.30
$\log K_{K,Na}^{Pot}$	-3.56	$\log K_{K,NH_4}^{Pot}$	-1.81

Slope of linear regression:	59-60 mV/dec
Detection limit (KCl ion background of 140 mM Na^+):	$4 \cdot 10^{-6}$ M K^+
Membrane resistance (10^{-2} M KCl at pH 7.0 with Tris buffer):	3.17 MΩ

Application 4 and Sensor Type[15,16]

Assay of K^+ activity with double-matrix membrane ion-selective electrodes based on Potassium ionophore I

Recommended Membrane Composition

2.00 wt%	Potassium ionophore I (60403)
0.50 wt%	Potassium tetrakis(4-chlorophenyl)borate (60591)
64.70 wt%	Bis(2-ethylhexyl)sebacate (84818)
32.80 wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended Cell Assembly

Ag, AgCl |3 M KCl || 0.3 M NH_4NO_3 || sample solution || liquid membrane | 0.1 M KCl | AgCl, Ag

Electrode Characteristics and Function

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

$\log K_{K,Li}^{Pot}$	-4.3
$\log K_{K,Na}^{Pot}$	-4.2

Slope of linear regression:	58 mV ($1.8 \cdot 10^{-5}$ to 10^{-1} M K^+)
Detection limit:	$3 \cdot 10^{-6}$ M K^+
Lifetime:	>1 month

Ion-selective Field Effect Transistors

Application 1 and Sensor Type[17,18,19]

Assay of K^+ activity with Urushi matrix ion-selective field effect transistors of good durability based on Potassium ionophore I.

Recommended Membrane Composition

0.50 wt%	Potassium ionophore I (60403)
49.25 wt%	Bis(2-ethylhexyl) phthalate (80030)
0.25 wt%	Potassium tetrakis((4-chlorophenyl)borate (60591)
50.00 wt%	Urushi (polymer from lacquer tree)

Electroanalytical Characteristics

Selectivity coefficients $\log K_{K,M}^{Pot}$ as obtained by the mixed solution method.

$\log K_{K,Mg}^{Pot}$	-4.6	$\log K_{K,Ca}^{Pot}$	-4.5
$\log K_{K,Na}^{Pot}$	-3.3	$\log K_{K,NH_4}^{Pot}$	-1.7

Slope of linear regression:	53 mV (10^{-4} to 1 M K^+)

Application 2 and Sensor Type[18,19,20]

Assay of K^+ activity with silicon rubber matrix ion-selective field effect transistors based on Potassium ionophore I.

Recommended Membrane Composition

3.0 wt%	Potassium ionophore I (60403)
88.0 wt%	Siloprene K 1000 (85417)
9.0 wt%	Siloprene crosslinking agent K 11 (85418)

Electroanalytical Characteristics

Selectivity coefficients $\log K_{K,M}^{Pot}$ <-3.7 as obtained by the fixed interference method (0.1 M of the chlorides).

Lifetime:	~2 months

Ion-selective Conductometric Microsensors

Application[21]

Assay of K^+ activity with ion-selective conductometric microsensors (ISCOM). Detection is accomplished by measurement of the bulk conductance of the solvent polymeric membrane based on Potassium ionophore I.

Recommended Membrane Composition

5.0 wt%	Potassium ionophore I (60403)
30.0 wt%	Poly(vinyl chloride) high molecular weight (81392)
65.0 wt%	2-Nitrophenyl octyl ether (73732)

Electroanalytical Characteristics

Selectivity coefficients $\log K_{K,M}^{Pot}$ as obtained by the mixed solution method.

$\log K_{K,Li}^{Pot}$	-3.0	$\log K_{K,Cs}^{Pot}$	-0.5
$\log K_{K,Na}^{Pot}$	-2.6	$\log K_{K,Rb}^{Pot}$	0.6
$\log K_{K,NH_4}^{Pot}$	-1.3		

Membrane specific conductivity:	0.5 to 5 µS/cm
Frequency range:	0.5 to 20 kHz
Membrane thickness:	~2 mm
Detection limit:	$>10^{-6}$ M K^+
Response time:	~1 s

Optical Transduction

Application 1 and Sensor Type[22,23,24]

Assay of K^+ activity in aqueous pH buffered solutions and in diluted blood plasma with solvent polymeric optode membranes based on Chromoionophore I (ETH 5294) and Potassium ionophore I.

Recommended Membrane Composition

0.48 wt%	Chromoionophore I (27086)
1.00 wt%	Potassium ionophore I (60403)
0.44 wt%	Potassium tetrakis(4-chlorophenyl)borate (60591)
66.05 wt%	Bis(1-ethylhexyl)sebacate (84818)
32.03 wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended pH Buffer

0.16 M sodium acetate, adjusted with acetic acid to pH 5.1 for recording the calibration curve to pH 5.5 for diluting blood plasma samples.[25]

Optode Characteristics and Function

Selectivity coefficients $\log K_{K,M}^{Opt}$ as obtained by the fixed interference method in pH buffered solutions.

$\log K_{K,Na}^{Opt}$	-3.5	$\log K_{K,Ca}^{Opt}$	-3.7
$\log K_{K,Mg}^{Opt}$	-4.0	$\log K_{K,Li}^{Opt}$	-3.7

Application 2 and Sensor Type[26]

Assay of K^+ activity in aqueous pH buffered solutions with solvent polymeric fluorescent optode membranes based on Chromoionophore I (ETH 5294) and Potassium ionophore I. LEDs or diode lasers may be used as light sources.

Recommended Membrane Composition

2.98 wt%	Chromoionophore I (27086)
13.43 wt%	Potassium ionophore I (60403)
2.98 wt%	Potassium tetrakis(4-chlorophenyl)borate (60591)
44.78 wt%	Bis(2-ethylhexyl)sebacate (84818)
17.91 wt%	WM-3 plasticizer
17.92 wt%	Poly(vinyl chloride) high molecular weight (81392)

Recommended pH Buffer

0.1 M TRIS at pH 7.38

Optode Characteristics

Membrane range:	5 10^{-6} to 10^{-1} K^+
Membrane thickness:	~2 µm
Detection limit:	~5 10^{-6} M K^+
Response time:	~1 to 3 min

Application 3 and Sensor Type[27]

Assay of ammonia gas in aqueous solutions with solvent polymeric optode membranes based on Chromoionophore III (ETH 5350) and Potassium ionophore I. The optode membrane is covered with a gas-permeable membrane.

Recommended Membrane Composition

3.50 wt%	Potassium ionophore I (60403)
1.52 wt%	Chromoionophore III (27088)
1.52 wt%	Potassium tetrakis(4-chlorophenylphenyl)borate (60591)
62.31 wt%	Bis(2-ethylhexyl)sebacate (84818)
31.15 wt%	Poly(vinyl chloride) high molecular weight (81392)

Optode Characteristics

Selectivity coefficients $\log K^{Opt}_{NH_3,G}$ as obtained by the separate solution method.

$\log K^{Opt}_{NH_3,MeNH_2}$	-0.4	$\log K^{Opt}_{NH_3,Me_2NH}$	-2.0
$\log K^{Opt}_{NH_3,EtNH_2}$	-1.7	$\log K^{Opt}_{NH_3,Me_3N}$	-2.9
$\log K^{Opt}_{NH_3,PrNH_2}$	-1.9		

Reproducibility: 10^{-4} NH_3 ~3.2%; 10^{-3} M NH_3 ~1.6%

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