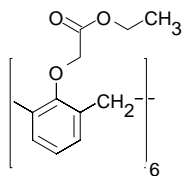


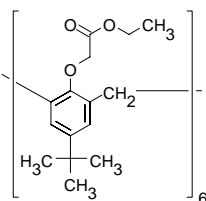
## Cesium



### Cesium ionophore I

(Calix[6]arene-hexaacetic acid hexaethylester)  
 $C_{66}H_{72}O_{18}$   $M_r = 1153.27$  [97600-45-8]

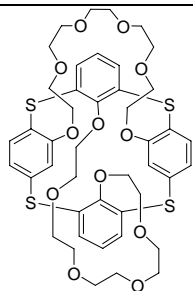
[21007](#) **Selectophore<sup>®</sup>, function tested** 50 mg, 250 mg



### Cesium ionophore II

(4-*tert*-Butylcalix[6]arene-hexaacetic acid hexaethylester)  
 $C_{90}H_{120}O_{18}$   $M_r = 1489.91$  [92003-62-8]

[83757](#) **Selectophore<sup>®</sup>, function tested** 50 mg



### Cesium ionophore III

(Thiocalix[4]-bis(crown-6))  
 $C_{44}H_{52}O_{12}S_4$   $M_r = 901.14$  [388569-88-8]

[01657](#) **Selectophore<sup>®</sup>, function tested** 50 mg

## Electrochemical Transduction

- Ion-Selective Electrodes

## Electrochemical Transduction

### Ion-Selective Electrodes

#### Application 1 and Sensor Type <sup>1</sup>

Assay of Cs<sup>+</sup> activity in aqueous solution with polymeric membrane electrodes based on Cesium ionophore I.

#### Recommended Membrane Composition

0.37	wt%	Cesium ionophore I ( <a href="#">21007</a> )
0.09	wt%	Potassium tetrakis(4-chloropheny) borate ( <a href="#">60591</a> )
66.36	wt%	2-Nitrophenyl octyl ether ( <a href="#">73732</a> )
33.18	wt%	Poly(vinyl chloride) high molecular weight ( <a href="#">81392</a> )

#### Recommended Cell Assembly

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

#### Electrode Characteristics and Function

Selectivity coefficients  $\log K_{Cs, M}^{Pot}$  as obtained by the separate solution method for alkali metal ions (0.1 M solution of the chloride salts) or mixed solution method for alkaline earth metal ions (0.1 M) and the hydrogen ion (0.01 M)

$\log K_{Cs, Rb}^{Pot}$	-1.52	$\log K_{Cs, Ca}^{Pot}$	-3.97
$\log K_{Cs, K}^{Pot}$	-2.53	$\log K_{Cs, Mg}^{Pot}$	-3.92
$\log K_{Cs, Na}^{Pot}$	-3.73	$\log K_{Cs, H}^{Pot}$	-2.70
$\log K_{Cs, Li}^{Pot}$	-4.45	$\log K_{Cs, NH_4}^{Pot}$	-2.75

Slope of linear regression: 55.3 mV ( $3 \cdot 10^{-5}$  to  $10^{-1}$  M CsCl)

Detection limit  $.1 \cdot 10^{-5}$  M Cs<sup>+</sup>

Response time: few seconds

<sup>1</sup> A. Cadogan, D. Diamond, M.R. Smyth, G. Svehla, M.A. McKervey, E.M. Seward, S.J. Harris, Caesium-selective poly(vinyl chloride) membrane electrodes based on calix[6]arene esters. **Analyst** **115**, 1207 (1990).

**Application 2 and Sensor Type**<sup>1,2</sup>

 Assay of Cs<sup>+</sup> activity in aqueous solution with polymeric membrane electrodes based on Cesium ionophore II.

*Recommended Membrane Composition*

0.37	wt%	Cesium ionophore II ( <a href="#">83757</a> )
0.09	wt%	Potassium tetrakis(4-chloropheny) borate ( <a href="#">60591</a> )
66.36	wt%	2-Nitrophenyl octyl ether ( <a href="#">73732</a> )
33.18	wt%	Poly(vinyl chloride) high molecular weight ( <a href="#">81392</a> )

*Recommended Cell Assembly*

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

*Electrode Characteristics and Function*

 Selectivity coefficients  $\log K_{Cs, M}^{Pot}$  as obtained by the mixed solution fixed interference method for alkali metal ions (0.1 M solution of the chloride salts) or mixed solution method for alkaline earth metal ions (0.1 M) and the hydrogen ion (0.01 M)

$\log K_{Cs, Rb}^{Pot}$	-0.99	$\log K_{Cs, Ca}^{Pot}$	-3.52
$\log K_{Cs, K}^{Pot}$	-0.79	$\log K_{Cs, Mg}^{Pot}$	-3.02
$\log K_{Cs, Na}^{Pot}$	-2.05	$\log K_{Cs, H}^{Pot}$	-3.04
$\log K_{Cs, Li}^{Pot}$	-3.25	$\log K_{Cs, NH_4}^{Pot}$	-2.06

 Slope of linear regression: >50 mV ( $3 \cdot 10^{-5}$  to  $10^{-1}$  M CsCl)

 Detection limit  $1 \cdot 10^{-5}$  M Cs<sup>+</sup>

Response time: few seconds

<sup>2</sup> Katsu T, Ido K., Ethylammonium-selective membrane electrode using p-tert-butylcalix[6]arene derivatives. *Anal Sci.* **18(4)**, 473 (2002).

### Application 3 and Sensor Type <sup>3</sup>

Determination of Cs<sup>+</sup> activity in aqueous solution with polymeric membrane electrodes based on Cesium ionophore III. The electrode has a wide linear range and the selectivity for cesium ion over potassium ion ( $\log K_{Cs, K}^{Pot} = -3.7$ ) is better than those previously reported with other ionophores.

#### Recommended Membrane Composition

1.0	wt%	Cesium ionophore III ( <a href="#">01657</a> )
0.	wt%	Bis(2-ethyl) sebacate (DOS) ( <a href="#">84818</a> )
66.0	wt%	2-Nitrophenyl octyl ether ( <a href="#">73732</a> )
33.0	wt%	Poly(vinyl chloride) high molecular weight ( <a href="#">81392</a> )

#### Recommended Cell Assembly

Reference | | sample solution | | liquid membrane | 0.01 M CsNO<sub>3</sub> | AgCl, Ag

#### Electrode Characteristics and Function

Selectivity Coefficients  $\log K_{Cs, M}^{Pot}$  as obtained by the fixed interference method (1 mM CsNO<sub>3</sub>) at pH 7.4.

$\log K_{Cs, Rb}^{Pot}$	-1.4	$\log K_{Cs, NH_4}^{Pot}$	-2.5
$\log K_{Cs, K}^{Pot}$	-3.7	$\log K_{Cs, Ca}^{Pot}$	-5.5
$\log K_{Cs, Na}^{Pot}$	-4.3	$\log K_{Cs, Mg}^{Pot}$	-5.9

Slope of linear regression: 57.6 mV ( $1 \cdot 10^{-6}$  to  $3.2 \cdot 10^{-2}$  M CsNO<sub>3</sub>)

pH range: 2.5-12.5

Response time: ca. 5s

<sup>3</sup> Y. Choi, H. Kim, J.K. Lee, S.H. Lee, H.B. Lim, J.S. Kim, Cesium ion-selective electrodes based on 1,3-alternate thiocalix[4]bis-crown-6,6. *Talanta* **64**, 975 (2004).