

Ion-selective Electrodes

The use of ion-selective electrodes constitutes a quick and cost-effective method of determining ionic activity.

Due to their quality and diversity, Radiometer Analytical ion-selective electrodes efficiently solve various analytical problems of species in solution.

For details of the reference electrodes recommended for use with ion-selective electrodes, please see pages 8 and 9.

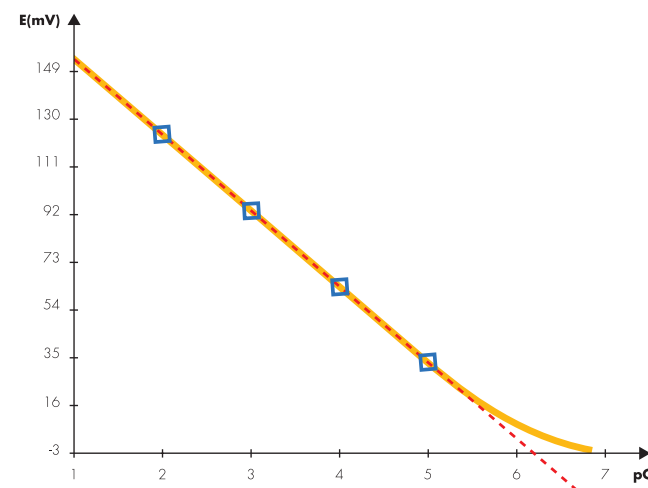
Each electrode is carefully checked before packing and is delivered with an individual control report including information such as the response curve, checkpoint value and slope.

Ion Species	Br ⁻	Ca ⁺⁺	Cl ⁻	Cl ⁻	CN ⁻	Cu ⁺⁺	F ⁻	F ⁻	I ⁻	K ⁺	Na ⁺	NH ₄ ⁺	NO ₃ ⁻	Pb ⁺⁺	S ⁻ (Ag ⁺) [*]
Type	ISE25Br	ISE25Ca	ISE25Cl	ISE/HS25Cl	ISE25CN	ISE25Cu	ISE25F	ISEC301F	ISE25I	ISE25K	ISE21Na	ISE25NH4	ISE25NO3	ISE25Pb	ISE25S
Part no.	E41M001	E41M002	E41M003	E41M004	E41M005	E41M006	E41M007	E41M017	E41M008	E41M009	E41M010	E41M013	E41M014	E41M015	E41M016
Concentration range (M)	10 ⁻⁶ – 10 ⁰	2 x 10 ⁻⁶ – 10 ⁰	5 x 10 ⁻⁵ – 10 ⁰	10 ⁻⁶ – 10 ⁰	5 x 10 ⁻⁷ – 10 ⁻³	10 ⁻⁶ – 10 ⁰	5 x 10 ⁻⁷ – 10 ⁰	5 x 10 ⁻⁷ – 10 ⁰	10 ⁻⁶ – 10 ⁻¹	2 x 10 ⁻⁶ – 10 ⁰	2 x 10 ⁻⁶ – 10 ⁰	3 x 10 ⁻⁶ – 10 ⁰	3 x 10 ⁻⁶ – 10 ⁰	10 ⁻⁶ – 10 ⁰	5 x 10 ⁻⁷ – 10 ⁰
Concentration range (ppm)	0.08 – 80000	0.1 – 40000	1.8 – 35000	0.04 – 35000	0.013 – 25	0.06 – 60000	0.01 – 20000	0.01 – 20000	0.13 – 13000	0.08 – 40000	0.04 – 20000	0.06 – 20000	0.2 – 60000	0.2 – 200000	0.02 – 30000
Temperature range	0 – 60°C	0 – 50°C	0 – 60°C	0 – 60°C	0 – 60°C	0 – 60°C	0 – 60°C	0 – 50°C	0 – 60°C	0 – 50°C	0 – 70°C	0 – 50°C	0 – 50°C	0 – 60°C	0 – 60°C
Diameter	12 mm	12 mm	12 mm	12 mm	12 mm	12 mm	7 mm	12 mm	12 mm	12 mm	12 mm	12 mm	12 mm	12 mm	12 mm
pH range	2 – 14	4 – 12	2 – 14	2 – 4	9 – 14	0 – 14 (3-7 direct meas.)	5-11 (10 ⁻¹ M F) 5-7 (10 ⁻⁶ M F)	5-7 (10 ⁻⁶ M F)	2 – 12	2 – 12	5 – 12	3 – 8	3 – 10	3 – 7 (direct meas.)	11 – 14 (direct meas.)
Sensor type	Solid-state	PVC membrane	Solid-state	Solid-state	Solid-state	Solid-state	Solid-state	Solid-state	Solid-state	PVC membrane	Glass	PVC membrane	PVC membrane	Solid-state	Solid-state
Interfering ions	I ⁻ , S ⁻ , CN ⁻ , SCN ⁻	Zn ⁺⁺ , Pb ⁺⁺	I ⁻ , CN ⁻ , Br ⁻ , SCN ⁻	I ⁻ , CN ⁻ , Br ⁻ , SCN ⁻	I ⁻ , Br ⁻ , S ⁻	HgS, Ag ⁺ , Cl ⁻	OH ⁻	OH ⁻	CN ⁻ , Hg ⁺⁺ Br ⁻ , SCN ⁻	NH ₄ ⁺ , Rb ⁺	Li ⁺ , NH ₄ ⁺ Rb ⁺ , Ag ⁺	K ⁺	Cl ⁻ , Br ⁻ , NO ₂ ⁻	Hg ⁺⁺ , Cu ⁺⁺ Ag ⁺	Precipitated cations forming complexes with sulphides
Recommended reference electrodes	REF251	REF201/REF251 REF451	REF251 REF451 REF601	REF251 REF451 REF601	REF201/REF251 REF451	REF201/REF251 REF451	REF201/REF251 REF451	Built-in Ag/AgCl reference	REF201/REF251 REF451	REF251 REF451	REF251 REF451	REF251 REF451	REF201/REF251 REF451	REF251 REF451	REF251 REF451

REF251 and REF451 are double-junction electrodes. You may need to change the filling solution in the second compartment for certain measurements (see operating instructions).

* Equally sensitive to Ag⁺.

Analysis with ion-selective electrodes is reliable and convenient when a few simple guidelines are followed:



Typical calibration curve for an ion-selective electrode.

✓ Ion-selective electrodes respond logarithmically over several decades of concentration. However, to be able to rely on the result in the area near the detection limit, you must use several calibration points - see figure.

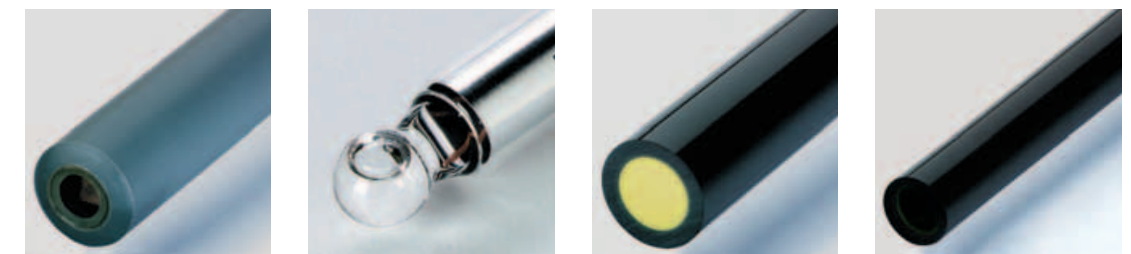
✓ Low calibration solutions should be prepared each time the electrode is calibrated.

✓ Always calibrate the lowest standard concentration first.

✓ Make sure that calibration standards and samples have the same pH value, temperature and ionic strength. If necessary, add ionic strength adjustment buffer (TISAB/ISA solutions).

✓ Some ion-selective electrodes are sensitive to light so use black beakers (part no. 904-515) when measuring Cl⁻, I⁻ and Br⁻.

Electrode membranes



Calcium

Sodium

Cyanide

Fluoride

The sensing element of an ion-selective electrode is the membrane. The type of membrane varies depending on the species to be measured. Membranes may be solid-state (e.g. cyanide or fluoride), PVC (e.g. calcium) or glass (sodium).

Accessories for PVC membrane electrodes

Ion & Electrode	Membrane kit part no.	Inner solution part no.
Ca ⁺⁺ , ISE25Ca	E91M001	S41M001
K ⁺ , ISE25K	E91M002	S41M002
NH ₄ ⁺ , ISE25NH4	E91M003	S41M003
NO ₃ ⁻ , ISE25NO3	E91M004	S41M004

The membrane kit contains three electrode tubes and a bottle of inner solution.

The electrode insert can be ordered separately:

- M27Ag-9 (part no. E34M001).

Electrode insert with screw cap.