

Ionmeters

Ion-Selective Measurements

Determination of	Application
Lead (Pb ²⁺)	Soil samples
Bromide (Br ⁻)	Wine, plants
Cadmium (Cd ²⁺)	Soil samples
Calcium (Ca ²⁺)	Dairy products
Chloride (Cl ⁻)	Drinking water, foodstuffs
Cyanide (CN ⁻)	Electroplating baths
Fluoride (F ⁻)	Toothpaste, cement
Iodide (I ⁻)	Salt water
Potassium (K ⁺)	Wine, fertilizer
Copper (Cu ²⁺)	Electroplating baths
Sodium (Na ⁺)	Wine, boiler feed water
Nitrate (NO ³⁻)	Baby food, fertilizer, wastewater
Silver (Ag ⁺)	Electroplating baths
Sulfide (S ²⁻)	Proteins, sediments

Ion-selective measurement is a method for determining the concentration of dissolved ions. Potassium, sodium, fluoride or chloride are examples of such cations and anions which are directly measured in solutions. Indirect methods such as titration allow the determination of aluminum, nickel ions, or sulfate.

Measurement with ISE's, like the measurement of pH, is a potentiometric method. ISE's are in two configurations:

1. separate ion-selective electrode and reference electrode
2. combined ion-selective electrode with built-in reference electrode

The ion-selective membrane of the electrode consists of a sparingly soluble salt of the ion to be measured (solid state electrodes), a PVC-membrane, modified by an ion exchanger or ion carrier (matrix electrodes), glass (glass electrode) or a gas-permeable plastic (gas-sensitive electrodes).

The activity of the ions to be measured determines the electrode current. With increasing activity of the anions the voltage turns more negative, with increasing activity of cations, more positive. A pH/ionmeter uses the electrode signal to calculate the concentration of the sample.

The wide range of possible applications includes, for example, the measurement of fluoride concentration according to DIN 38 405. Chloride content determination in concrete samples or nitrate concentration determination in fruit juices are further examples of the ways in which ion-selective measurement technology can be applied. An introduction to ion-selective measurement technology as well as application reports are available on our CD-ROM entitled "Principles of measurement technology".

Application Range	inoLab®					Handheld Meters
	pH/ION 735	pH/ION 740	pH 740, pH/Cond 740, Multi 740	pH/ION/Cond 750	pH/ION 340i, Multi 350i	
Occasional, simple ISE measurement	○	○	●	○	●	
Routine and standard measurement	●	●	○	●	○	
Advanced methods and procedures	●	●	-	●	-	

● recommended by WTW
○ suitable

see page

NEW

Ion-Selective Electrodes

WTW offers a wide range of Ion-Selective Electrodes and instruments. Series 500 electrodes are used in combination with a separate reference electrode.

And now WTW introduces our quality combination ISE's, Series 800! These precise electrodes combine a reference and ion selective electrode in one unit. The convenience of this design allows for ease of use even in small sample volumes.



Type 800

Ion-Selective Electrodes

Electrode type	Membrane® ISE Type 500	Reference electrode	combined ISE Type 800	Measuring range mg/l mol/l	Bridge electrolyte	ISA/TISAB	Standard- solution (conc. 10 g/l)	pH range	for determination of
Ammonium (NH ₄ ⁺)	NH 500/2	—	—	0,02...900 10 ⁻⁶ ...5 x 10 ⁻²	—	MZ/NH ₃ /CN	ES/NH ₄	4-12	Ammonium
Bromide (Br ⁻)	S Br 500	for all ion selective electrodes from the 500 series: R 503/P or R 503/D	Br 800	0.4...79000 5 x 10 ⁻⁶ ...1	ELY/BR/503	ISA/FK	ES/Br	1-12	bromide
Cadmium (Cd ²⁺)	S Cd 500		Cd 800	0.01...11000 10 ⁻⁷ ...10 ⁻¹	ELY/BR/503	ISA/FK	—	2-8	cadmium
Calcium (Ca ²⁺)	L Ca 500 ^①		Ca 800 ^①	0.02...40000 5 x 10 ⁻⁷ ...1	ELY/BR/503	ISA/Ca	ES/Ca	2.5-11	calcium, magnesium ^②
Chloride (Cl ⁻)	S Cl 500		Cl 800	2...35000 5 x 10 ⁻⁵ ...1	ELY/BR/503	ISA/FK	ES/Cl	2-12	chloride
Copper (Cu ²⁺)	S Cu 500		Cu 800	0.0006...6400 10 ⁻⁸ ...10 ⁻¹	ELY/BR/503	ISA/FK	ES/Cu	2-6	copper, nickel ^③
Cyanide (CN ⁻) ^④	S CN 500		CN 800	0.2...260 8 x 10 ⁻⁶ ...10 ⁻²	ELY/BR/503	MZ/NH ₃ /CN	—	0-14	cyanide
Fluoride (F ⁻)	S F 500		F 800	0.02...gesätt. 10 ⁻⁶ ...gesätt.	ELY/BR/503	TISAB	ES/F	5-7	fluoride, aluminum phosphate ^⑤ , lithium ^⑤
Iodide (I ⁻)	S I 500		I 800	0.006...127000 10 x 10 ⁻⁸ ...1 ⁻¹	ELY/BR/503	ISA/FK	ES/I	0-14	iodide, thiosulfate mercury
Lead (Pb ²⁺)	S Pb 500		Pb 800	0.2...20000 10 ⁻⁶ ...10 ⁻¹	ELY/BR/503	ISA/FK	ES/Pb	4-7	lead
Nitrate (NO ₃ ⁻) ^⑤	L NO 500 ^①		NO 800 ^①	0.4...62000 7 x 10 ⁻⁶ ...1	ELY/BR/503/N	TISAB/NO ₃	ES/NO ₃	2.5-11	nitrate
Potassium (K ⁺) ^⑤	L K 500 ^①		K 800 ^①	0.04...39000 10 ⁻⁶ ...1	ELY/BR/503/K	ISA/K	ES/K	2-12	potassium
Sodium (Na ⁺) ^⑤	G DX 223 NA			0.05...23000 2 x 10 ⁻⁶ ...1	—	ISA/Na	ES/Na	>10	sodium
Silver (Ag ⁺) ^⑤	S Ag/S 500	Ag/S 800	0.01...108000 10 ⁻⁷ ...1	ELY/BR/503	ISA/FK	—	2-12	silver	
Sulfide (S ²⁻) ^⑤	S Ag/S 500	Ag/S 800	0.003...32000 10 ⁻⁷ ...1	ELY/BR/503	⑥	—	2-12	sulfide	

① Exchange measuring head

② S = solid state electrode, L = matrix electrode, G = glass electrode

③ Titration

④ Use according to operating instructions

⑤ Formulations for additionally required solutions are given in the application steps and operating instructions

Ordering Information for ISE electrodes and accessories see brochure "Product Details".

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