



Lab & Field Combination Ion-Selective Electrodes (ISEs)

Ion selective electrodes (ISEs) are sensing systems that are designed to respond selectively to ions in an aqueous solution. When the reference half-cell and the sensing half-cell are combined into the same body housing, they are referred to as a “combination” electrode. ASI’s Combination ISE Electrodes are popular for many applications due to their convenience, affordability and accuracy.

ISEs typically utilize one of 4 primary sensor types:

Polymer Membrane – This common sensor design incorporates ionophores or other ion-exchange agents that are specific to the ion of interest, into an inert matrix such as PVC. A mill volt potential develops at the surface of the membrane and is correlated to the ion concentration. This sensor type is accurate but less durable than some others. Sensors of this type include: Ca^{2+} , BF_4^- , NO_3^- , K^+ , and Surfactant.

Solid State – These sensors utilize relatively insoluble inorganic salts within a hard pellet or crystalline matrix that allows the detection of specific ion activity. These sensors are both accurate and one of the longest lasting ISE sensor types. They may need to be buffed on occasion to restore performance. Sensors of this type include: Br^- , Cd^{2+} , Cl^- , CN^- , F^- , I^- , Pb^{2+} , S_2^- , Ag^{2+} , and SCN^- .



Gas Sensing – With a gas permeable membrane, an internal buffer solution, and the use of ionic strength adjustors, these sensors are an accurate method to detect ions like NH_4^+ , CO_2 , NO_x and others.

Glass Membrane – Like a pH sensor, these ISEs use a special glass formula to be selective for a specific ion. Na^+ is a common parameter for this type of ISE.

ASI ships most of our ISEs with the proper Reference Filling Solution, Ionic Strength Adjustor, Calibration Solution, and an Instruction Sheet so the analyst has everything they need to begin their measurements.



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To address the design requirements of the ion-selective sensor, as well as the needs of analysts, ASI has 5 primary types of combination ISEs:



12 Series – With its refillable double junction reference system, a ceramic pin junction and replaceable sensing modules, this very versatile ISE model offers many of the best features to ensure a long life and affordability.



03 Series – A refillable sleeve type reference junction captures a film of electrolyte for a very effective liquid-liquid interface. A quick press of the electrode cap replenishes the junction before contaminants can attack the reference wire. A fixed sensor and refillable double junction reference make this a very good ISE for dirty samples.



43 Series – This affordable ISE has a sealed, double-junction reference with a fiber junction. For general purpose measurements it will provide accurate measurements for an extended period.



44 Series - This affordable ISE has a refillable, double-junction reference with a porous Teflon junction. For general purpose measurements it will provide accurate measurements and the versatility of different reference filling solutions.



35 Series – A few ions are only sensed in the gas form. This gas-sensing ISE has replaceable membranes, a refillable inner body and provides an accurate measuring system.

	12 Series	03 Series	43 Series	44 Series	35 Series
Sensor.....	Replaceable	Fixed	Fixed	Fixed	Replaceable membranes
Reference.....	Refillable, ceramic pin	Refillable, sleeve-type	Sealed, Fiber	Refillable, ceramic pin	Refillable Inner body
Construction...	PVC/ABS	Epoxy	PVC, Epoxy	PVC, Epoxy	ABS
Parameters.....	NH ₄ ⁺ , Br ⁻ , Cd ²⁺ , Ca ²⁺ , Cl ⁻ , Cu ²⁺ , CN ⁻ , F ⁻ , BF ₄ ⁻ , I ⁻ , Pb ²⁺ , NO ₃ ⁻ , NO ₂ ⁻ , K ⁺ , Ag ⁺ , S ₂ ⁻ , Surfactant, SCN ⁻	Br ⁻ , Cd ²⁺ , Cl ⁻ , Cu ²⁺ , CN ⁻ , F ⁻ , I ⁻ , Pb ²⁺ , Ag ⁺ , S ₂ ⁻ , SCN ⁻	NH ₄ ⁺ , Br ⁻ , Cd ²⁺ , Ca ²⁺ , Cl ⁻ , Cu ²⁺ , CN ⁻ , F ⁻ , BF ₄ ⁻ , I ⁻ , Pb ²⁺ , NO ₃ ⁻ , NO ₂ ⁻ , K ⁺ , Ag ⁺ , S ₂ ⁻ , Na ⁺ , Surfactant, SCN ⁻	NH ₄ ⁺ , Br ⁻ , Cd ²⁺ , Ca ²⁺ , Cl ⁻ , Cu ²⁺ , CN ⁻ , F ⁻ , BF ₄ ⁻ , I ⁻ , Pb ²⁺ , NO ₃ ⁻ , NO ₂ ⁻ , K ⁺ , Ag ⁺ , S ₂ ⁻ , Na ⁺ , Surfactant, SCN ⁻	NH ₃ , CO ₂ , NO _x



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