

# Ion Selective Electrode Standards & Ionic Strength Adjustors



## Introduction

Ion Selective Electrodes, (ISEs) allow specific and quantitative measurement of a wide range of cations, anions and some dissolved gases. These ions can be measured directly like pH measurement, indirectly (see below) or by titrimetry. ISEs respond selectively to the relevant ion activity exactly like pH electrodes respond to hydrogen ion activity. Like pH electrodes, they require a suitable reference electrode, preferably a double junction system. They also require a pH or ion meter and a selection of filling solutions for the outer and inner chambers of the reference electrode. In some instances the reference and sensing electrodes may be combined into one unit.

## Types of Measurement

Direct measurement is performed exactly like the measurement of pH. The electrode is calibrated using two concentrations of the relevant standard which are chosen to bracket the expected value of the sample. More than two calibration standards may be used for better linearity or more accurate measurement and a standard curve of mV reading versus concentration of various standards can be constructed.

However, the measurement technique deviates from pH in that both sample and standards require the addition of an Ionic Strength Adjustor (ISA). The addition of this solution confers the following benefits:

- The ionic strength of the adjustor is much higher than the ionic strength of the sample or standard so it keeps the ionic strength of both high, constant and similar and thus enables what is effectively activity measurement to be read as concentration.
- The ionic strength adjustor (which should never react with the sample or standard chemically) also keeps the pH value constant in some instances. This combined with high ionic strength and the chemistry of the ISA suppresses or eliminates interfering ions.
- The ISA when added to sample and standard eliminates any matrix, hysteresis or erroneous liquid junction potentials that might affect the accuracy of the test result.
- Indirect measurement methodologies include the use of standard addition, sample addition, standard subtraction and sample subtraction. Such methods offer advantages that include:
- Calibration need only be performed occasionally or not at all, therefore only ISA needs to be added to the sample.
- The possibility of error due to a temperature co-efficient of variation between the sample and standard is largely eliminated.
- The ion concentration of solid samples can be measured.
- The range of types of ions measured and the versatility of the technique is greatly enhanced by careful and considered selection of the optimal indirect method. This is true, in particular, with standard or sample subtraction, where precipitation or complexation may be performed, or where the counter ion to that contained in the standard is measured.

## Use of Controls

As with all analytical measurements, no test should be performed without the use of control material. The control should be treated in exactly the same way as the sample including the addition of ISA, thereby picking up any error in the measurement technique, whether it be due to the analyst, environment, meter, sensors or sample in line with the execution of good laboratory practice. Reagecons ISE standards, diluted to a suitable concentration, are particularly suitable for use as control material.

## ISE Standards & ISA Solutions

Reagecon is world leader in the development, manufacture, testing and stabilising of chemical and physical standards and reagents. Our ISE standards and ISA's are an important part of our offering. The range of standards is extensive, accurate, traceable and produced to have minimal uncertainty of measurement. They can be used for:

- Calibration
- Instrument Qualification
- Control
- Method Validation

Both ISE standards or ISA reagents can be customised for individual customer requirements and can be supplied in bulk quantities for process or online applications.

## Ion Selective Electrode Standards

Product No.	Description	Pack Size
ISEF10005	Fluoride 100ppm	500ml
ISEF1005	Fluoride 10ppm	500ml
ISENH55	Ammonia 1000ppm as N	5L
ISENH1005	Ammonia 100ppm as N	500ml
ISENH1005-5L	Ammonia 100ppm as N	5L
NH0-5-P-500	Ammonia Standard 0.5ppm as NH <sub>3</sub>	500ml
NH2-5-P-500	Ammonia Standard 2.5 ppm as NH <sub>3</sub>	500ml
NH3101	Ammonia Standard 1mg/l as as NH <sub>3</sub>	100ml
ISEF101	Fluoride 10ppm	1L
ISEF11	Fluoride 1ppm	1L
ISENH4105	Ammonium 10ppm as NH <sub>4</sub>	500ml
ISENH41005	Ammonium 100ppm as NH <sub>4</sub>	500ml
ISENH45	Ammonium 1000ppm as NH <sub>4</sub>	500ml
ISENH500	Ammonia 500ppm	500ml
ISENH5	Ammonia 1000ppm as N	500ml
ISEBA5	Barium 1000ppm	500ml
ISEBR5	Bromide 1000ppm	500ml
ISECD5	Cadmium 1000ppm	500ml
ISECA10	Calcium 10ppm	500ml
ISECA1005	Calcium 100ppm	500ml
ISECA5	Calcium 1000ppm	500ml
ISECO5	Carbon Dioxide 1000ppm	500ml
ISECL10005	Chloride 100ppm	500ml
ISECL5	Chloride 1000ppm	500ml
ISECU5	Copper 1000ppm	500ml
ISECN025	Cyanide 1000ppm	250ml
ISECN5	Cyanide 1000ppm	500ml
ISEF1	Fluoride 1ppm	500ml
ISEF5	Fluoride 1000ppm	500ml
ISEI5	Iodide 1000ppm	500ml
ISEPB5	Lead 1000ppm	500ml
ISEMG5	Magnesium 1000ppm	500ml
ISEHG5	Mercury 1000ppm	500ml
ISEN105	Nitrate 10ppm as NO <sub>3</sub>	500ml
ISEN105-5L	Nitrate 10ppm as NO <sub>3</sub>	5L
ISEN1005	Nitrate 100ppm as NO <sub>3</sub>	500ml
ISEN1005-5L	Nitrate 100ppm as NO <sub>3</sub>	5L

Product No.	Description	Pack Size
ISEN5	Nitrate 1000ppm as NO <sub>3</sub>	500ml
ISEN5-5L	Nitrate 1000ppm as NO <sub>3</sub>	5L
NITRATE025PPM	Nitrate Standard 25ppm as N	1L
NITRITE025PPM	Nitrite Standard 25ppm as N	1L
NO2-0.3-100	Nitrite Standard in Water 0.3mg/l	100ml
NO2-6-100	Nitrite Standard in Water 6mg/L	100ml
NO3-6-100	Nitrate Standard in Water 6mg/l	100ml
P10001	Phosphate Solution 1000ppm	1L
P1005	Phosphate Solution 100ppm	500ml
ISENO5	Nitrogen Oxide 1000ppm as NO <sub>2</sub>	500ml
ISEPCL5	Perchlorate 1000ppm	500ml
ISEK5	Potassium 1000ppm	500ml
ISEAG5	Silver 1000ppm	500ml
ISENA5	Sodium 1000ppm	500ml
ISES5	Sulphide 1000ppm	500ml
ISESCO5	Sulphur Dioxide 1000ppm	500ml
ISESC5	Thiocyanate 1000ppm	500ml
ISEWH5	Water Hardness Standard 1000ppm CaCO <sub>3</sub>	500ml

## Ionic Strength Adjuster Solutions

Product No.	Description	Pack Size
ISANH5	Ammonia 10M NaOH	500ml
ISANH45	Ammonium 4M LiCl	500ml
ISABA5	Barium 4M LiCl	500 ml
ISABR5	Bromide 5M NaNO <sub>3</sub>	500 ml
ISACD5	Cadmium 5M NaNO <sub>3</sub>	500 ml
ISACA5	Calcium 4M KCl	500 ml
ISACO5	Carbon Dioxide Solution	500 ml
ISACL5	Chloride 5M NaNO <sub>3</sub>	500 ml
ISACU5	Copper 5M NaNO <sub>3</sub>	500 ml
ISACN5	Cyanide 10M NaOH	500 ml
TISAF5	Fluoride TISAB3	500 ml
TISAF55	Fluoride TISAB3	5L
ISAI5	Iodide 5M NaNO <sub>3</sub>	500 ml
ISAPB5	Lead 2.5M NaNO <sub>3</sub>	500 ml
ISAMG5	Magnesium 4M KCl	500 ml
ISAHG5	Mercury 5M NaNO <sub>3</sub>	500 ml
ISAN5	Nitrate 2M (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	500 ml
ISAPCL5	Perchlorate 2M (NH <sub>4</sub> ) <sub>2</sub> SO <sub>4</sub>	500 ml
ISAK5	Potassium 5M NaCl	500 ml
ISAAG5	Silver 5M NaNO <sub>3</sub>	500 ml
ISANA5	Sodium Based Standard	500 ml
ISAS5	Sulphide 10M NaOH	500 ml
ISASO5	Sulphur Dioxide 2M H <sub>2</sub> SO <sub>4</sub>	500 ml
ISASC5	Thiocyanate 5M NaNO <sub>3</sub>	500 ml
ISAWH5	Water Hardness 4M KCl Solution	500 ml