

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 produce. 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
- Control
- Instrument Qualification
- 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 STD 100ppm | 500ml |
| ISEF1005 | Fluoride STD 10ppm | 500ml |
| ISENH55 | Ammonia 1,000ppm as N | 5L |
| ISENH1005 | Ammonia 100ppm as N | 500ml |
| ISEF101 | Fluoride 10ppm | 1L |
| ISEF11 | Fluoride 1ppm | 1L |
| ISENH4105 | Ammonium 10ppm as NH ₄ | 500ml |
| ISENH5 | Ammonia 1,000ppm as N | 500ml |
| ISENH45 | Ammonium 1,000ppm as NH ₄ | 500ml |
| ISEBA5 | Barium 1,000ppm | 500ml |
| ISEBR5 | Bromide 1,000ppm | 500ml |
| ISECD5 | Cadmium 1,000ppm | 500ml |
| ISECA5 | Calcium 1,000ppm | 500ml |
| ISECO5 | Carbon Dioxide 1,000ppm | 500ml |
| ISECL5 | Chloride 1,000ppm | 500ml |
| ISECU5 | Copper 1,000ppm | 500ml |
| ISECN5 | Cyanide 1,000ppm | 500ml |
| ISEF5 | Fluoride 1,000ppm | 500ml |
| ISEI5 | Iodide 1,000ppm | 500ml |
| ISEPB5 | Lead 1,000ppm | 500ml |
| ISEN5 | Nitrate 1,000ppm as NO ₃ | 500ml |
| ISENO5 | Nitrogen Oxide 1,000ppm as NO ₂ | 500ml |
| ISEK5 | Potassium 1,000ppm | 500ml |
| ISEAG5 | Silver 1,000ppm | 500ml |
| ISENA5 | Sodium 1,000ppm | 500ml |
| ISES5 | Sulphide 1,000ppm | 500ml |
| ISESCO5 | Sulphur Dioxide 1,000ppm | 500ml |
| ISESC5 | Thiocyanate 1,000ppm | 500ml |

Ionic Strength Adjuster Solutions

| Product No. | Description | Pack Size |
|-------------|--|-----------|
| ISANH5 | Ammonia ISA 10M NaOH | 500ml |
| ISANH45 | Ammonium ISA 4M LiCl | 500ml |
| ISABA5 | Barium ISA 4M LiCl | 500ml |
| ISABR5 | Bromide ISA 5M NaNO ₃ | 500ml |
| ISACD5 | Cadmium ISA 5M NaNO ₃ | 500ml |
| ISACA5 | Calcium ISA 4M KCl | 500ml |
| ISACL5 | Chloride ISA 5M NaNO ₃ | 500ml |
| ISACU5 | Copper ISA 5M NaNO ₃ | 500ml |
| ISACN5 | Cyanide ISA 10M NaOH | 500ml |
| TISAF5 | Fluoride TISAB3 | 500ml |
| TISAF55 | Fluoride TISAB3 (Bag in Box) | 5L |
| ISAI5 | Iodide ISA 5M NaNO ₃ | 500ml |
| ISAPB5 | Lead ISA 2.5M NaNO ₃ | 500ml |
| ISAN5 | Nitrate ISA 2M (NH ₄) ₂ SO ₄ | 500ml |
| ISAK5 | Potassium ISA 5M NaCl | 500ml |
| ISAAG5 | Silver ISA 5M NaNO ₃ | 500ml |
| ISANA5 | Sodium Based Standard | 500ml |
| ISAS5 | Sulphide ISA 10M NaOH | 500ml |
| ISASO5 | Sulphur Dioxide ISA 2M H ₂ SO ₄ | 500ml |
| ISASC5 | Thiocyanate ISA 5M NaNO ₃ | 500ml |