User maintenance and troubleshooting

Symptom	Possible cause	Remedy
Drift	Junction blocked	Remove and clean sleeve
	Membrane unclean or contaminated	Remove sleeve. Gently polish membrane with P1200 "Wet & Dry"
Noisy	Poor connection to meter	Check connection
	Junction not immersed fully	Lower electrode into solution below junction
	Insufficient electrolyte or bubble	Refill electrolyte
Inaccurate readings or poor reproduc-ibility	Contaminated standard(s)	Make up fresh calibration standards and recalibrate
	Improperly made standards	Recalibrate using freshly made standards
	Contamination from electrolyte	Use 1M potassium nitrate in sleeve
	Temperature differences between calibration and sample measurement	Ensure calibration and sample measurements are done at the same temperature
	No ISA used	Add ISA
	Incorrect pH	Adjust pH
	Sensitivity to light	Perform calibration and measurements in dark beakers or away from bright light

Warranty

IJ electrodes have a warranty of 12 months from date of purchase. Any electrode found to be faulty due to manufacture within this time will be replaced.
Ionode reserves the right to limit or modify product warranty if it is deemed that the electrode has been used in unsuitable applications. Electrodes with broken stems, connectors or cables are not covered by warranty.
Electrode life may be reduced in chemically aggressive or abrasive samples and at high temperatures.

Parameter	Operating Range
Concentration range	S^{2-} 0.003 –32,100 mg/L Ag^{+} 0.01 – 107,900 mg/L
Temperature range	0 – 60°C
pH range	S^{2-} 12-14 Ag^{+} 2-8
Reference Type	Double Junction Ag/AgCl/refillable
Sensor materials	Polycrystalline solid state membrane
Body and sleeve	Polypropylene/PEEK
Overall length	150mm
Barrel diameter	12mm
Cable length	1m standard, longer to order. Maximum 20m
Connector	BNC standard, others on request

Operators Manual

Short-Form

Intermediate Junction Series

IJ-Ag_2S

SILVER/SULPHIDE ION SELECTIVE ELECTRODE

Introduction

This guide contains the basic information for proper use of your new Silver/Sulphide Ion-selective electrode.

Preparation

IJ series electrodes are shipped without sleeve electrolyte, and must be filled prior to use. To fill, hold the electrode by the sleeve and gently ease off the rubber wetting cap. Prepare as follows:

1.

2.

1. Invert the electrode. Hold the electrode just below the sleeve and with careful rotation and pulling along the axis of the electrode, remove the sleeve. DO NOT BEND.

2. Fill the annular space with electrolyte to approximately half to three quarter full. 1M potassium nitrate is normally recommended.

3.

3. Slide the sleeve back onto the electrode ensuring the black O-ring is well seated within the electrode body. Do not exert sideways force. Any excess electrolyte will be expelled from the end of the electrode through the ground junction. Ensure there are no air bubbles in the sleeve.Wash off any excess electrolyte before use.

Application

The IJ-Ag_2S Ion selective electrode measures free sulphide and silver ions (Ag^+) in aqueous solutions.
The limit of detection is 0.003 ppm (Sulfide), and 0.01 ppm (Silver). The electrode can also be used for low level cyanide and halide titrations.

Interfering Ions

Mercury ions should be absent.
Ions that complex with measured species.

Cleaning

If the membrane is poisoned by interferences, the surface may be renewed by careful polishing with fine wet-and-dry (P1200 grade). The membrane surface should have a polished metallic appearance. Always inspect the membrane before use, and clean if necessary. Organic contaminants can be removed with ethanol. **DO NOT** use the electrode in chlorinated hydrocarbons.Routinely remove the sleeve and replace the potassium nitrate electrolyte.

Electrolyte Replacement

The electrode has an inbuilt double junction Ag/AgCl with a replaceable sleeve electrolyte. 1M potassium nitrate is suitable for most applications. Please consult Ionode Customer Service if you wish to use a different sleeve electrolyte.

Calibration Standards

Standard solutions should preferably bracket the expected measurement range. Sulphide standards are susceptible to oxidation and are not commercially available; these are to be made fresh and the titer determined by standardisation with Lead Perchlorate or equivalent.

The need for ISA (Ionic Strength Adjuster)

It is important to use ISA, so that the Ionic Strength of standards and samples is independent of the concentration of the measured ion. It is also important for pH adjustment. Use 10M NaOH or SAOB (Sulphide Anti-Oxidant Buffer) for Sulphide determination. Sodium nitrate or similar can normally be used for silver and halide determination.

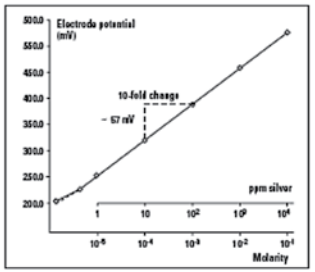
Calibration Procedure

Before use, the electrode should be calibrated by measuring a series of known standard solutions by serial dilution of stock standard. For sulphide measurement, each decade of concentration will have a theoretical difference of 29mV (@25C). Similarly, for silver determination, the theoretical difference is 59mV. In practice, the measured differences will be less than these values. Acceptable values for slope are -56±4mV for Ag^+ and -28±4mV for S^{2-}.

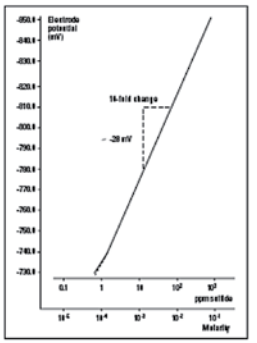
Other measurement Techniques

An unknown concentration can be determined by adding a small known amount of a concentrated standard to a known volume of sample. Other incremental techniques include sample addition, standard subtraction and analyte subtraction. More details can be obtained from the Theory Section at www.ionode.com

Typical silver calibration curve



Typical sulphide calibration curve



Titration of Chloride

The electrode may also be used as an indicator to follow the progress of a chloride (or other halide) titration using silver nitrate. During the titration, the added silver reacts with the halide ions forming a silver halide precipitate. At the stoichiometric end point, a large potential change occurs as silver ions end up in excess. These titrations may be performed manually or automatically using an automatic titrator.