User maintenance and troubleshooting

Symptom	Possible Causes	Remedy
Drift	Junction blocked	Clean junction
	Sensor tip not clean	Clean sensor tip
	Reading stable in ORP standard but not in sample	Stirring or flow may be needed for stable results
	Temperature changes	Stabilise temperature
Noisy	Non-reversible ORP reaction	See Introduction
	Poor connection	Check connection on meter and electrode and repair/replace if necessary
	Junction not immersed fully	Lower electrode into solution below junction
ORP reading in standard greater than ±20mV from expected value	Contaminated ORP standard	Replace standard
	Sensor tip not clean	Clean sensor tip
	Electrode polarised	Isolate electrode
Slow ORP response	Non-reversible ORP reaction	See Introduction
	Internal short	Replace electrode

Warranty

Any electrode found to be faulty due to manufacture will be replaced. Ionode electrodes have a warranty of 12 months from date of purchase; however we reserve the right to void warranty if the electrode has been used in an unsuitable application. Please visit our web site to register your electrode as soon as you receive your electrode.
Electrode life will be reduced in chemically aggressive or abrasive samples, and at high temperatures.
Electrodes with broken glass stems or damaged connectors and/or cables will not covered by warranty.

Parameter	Operating Range
mV range	-2000 to + 2000 mV
Sensor material	Pt wire; Au available on request
Temperature range	0 – 60°C
Reference type	Sealed Gel Ag/AgCl
Cable length	1m standard, longer to order. Maximum 20m
Connector	BNC standard, Others on request.

Sealed Gel ORP Electrodes

Short-Form

Operators Manual

ionode

Good Chemistry

Introduction

ORP (Oxidation-Reduction Potential) represents an intensity factor, and ideally obeys the Nernst Equation:

E m = E o - (RT/nF) ln {[ox] / [red]}

where
E m is the potential from the ORP electrode,
E o is related to the potential of the reference electrode,
R is the Gas Law constant,
F is Faraday's constant,
T is the temperature in Kelvin,
n is the number of electrons,
[ox] is the oxidant concentration in moles/L, and
[red] is the reductant concentration in moles/L.

The following is required for a stable ORP reading:
1. Significant concentrations of both species of the redox couple.
2. Both species must be capable of readily transferring electrons to or from each other (reversible redox couple), and readily accepting or removing electrons from an inert metal surface.

Generally most practical ORP measurements are made on samples that do not meet these criteria. This results in poor reproducibility, drift, stirring rate dependence and non-Nernstian behaviour. Nevertheless, ORP is useful for measuring changes in a system rather than absolute values.

The ORP electrode consists of an inert Platinum (or Gold) wire connected to a stem. The potential developed is compared to a stable reference potential consisting of a silver/silver chloride gelled chloride half cell.

Completion of the circuit is accomplished by solution contact between the reference half cell electrolyte and the sample via a porous wick.

Platinum is normally used for most applications; however Gold has been used in applications such as ORP control in electrolytically chlorinated swimming pools, in cyanide solutions and in reducing environments.

Preparation

The electrodes are shipped pre-filled with electrolyte and are ready for use after removal of the wetting cap. Remove the wetting cap by gently easing it off the electrode.
Retain the wetting cap as it can be useful during long-term storage.

ORP Electrode Calibration

Unlike pH electrodes, ORP electrodes do not require asymmetry potential and slope correction. An offset can develop if the sensor tip or the reference junction becomes contaminated. To assure proper operation, check ORP electrodes with an ORP standard as described below:

1. Consult the meter instruction manual for meter setup. Connect the electrode and rinse it with distilled water.
2. Place the electrode in a stirred ORP standard.
After allowing time to stabilise, observe the reading.
3. If the reading is not within ±20mV of the correct value, clean the electrode and repeat procedure.

ORP standards

Ionode recommends the use of either Zobell's (229mV @25°C) or Light's solution (476mV@25°C) for checking ORP electrodes.

Helpful Hints

1. ORPsamples are generally unstable and should not be stored or preserved.
2. Clean the sensing tip regularly. Unclean sensor tips are a very common source of error in ORP measurements.
3. Allow adequate time for stabilisation.

Maintenance

When not in use, keep the electrode immersed on 20% KCl solution. The wetting cap can be used for this.

Cleaning

Cleanliness of the sensor and junction is critical for accurate measurement. Drift and slow response are often due to an unclean sensor/junction. Clean the electrode periodically. Do not use abrasive materials.

To remove inorganic deposits and scale:
Soak sensor tip in dilute HCl for an hour. Wash well with water and condition in 20% KCl before use.

To remove solids and organics:
Wipe the sensor tip with cotton or tissue soaked in mild non-alkaline detergent. Wash well with water and condition in 20% KCl before use.

To remove plated metals from ORP tips. Soak the tip in approximately 0.1M nitric acid for 15-20 minutes, followed by conditioning in 20% KCl.

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