Technical Note

3 Reasons to Recondition Your Sodium Electrode

Keywords

Ion Selective Electrode (ISE), Sodium Electrode, Electrode Reconditioning, Salt, Sodium Chloride, AOAC 971.27, Food Testing, Food & Beverage, Water, Wastewater, Pulp and Paper, Soil, Plant Tissue

Introduction

A top-performing sodium ion selective electrode (ISE) is sensitive, selective, fast and stable – making testing quick, accurate and reliable. With the ability to be utilized in a variety of different industries, typical sodium testing by ISE only requires a few basic things – standard equipment, minimal user training and time. Sample preparation is minimal, and analysis only takes a few minutes. Best of all, it's cost effective.

What industries can benefit from sodium ISE testing?

Sodium ISE testing can be beneficial for many different industries. Various sample types can be accommodated in a variety of markets for numerous use cases – including food and beverage, natural and potable waters, wastewaters and process waters, pulp and paper liquors, soil and plant tissues, and much more.

Why recondition your sodium ISE?

1. **Restore Electrode Slope** – to bring back sensitivity and detection limits.
2. **Restore Electrode Signal Stability** – to reestablish good precision.
3. **Restore Fast Electrode Response** – for quicker calibration and testing.

Similar to a pH sensor, the sodium ISE sensing surface is the glass bulb. The special glass composition and the elevated pH (pH > 9) used for electrode storage and testing optimize the sensor for selectivity towards sodium ions. When the sodium glass bulb is thinly hydrated and clean, the performance is great with the speed, accuracy and reliability that we expect.

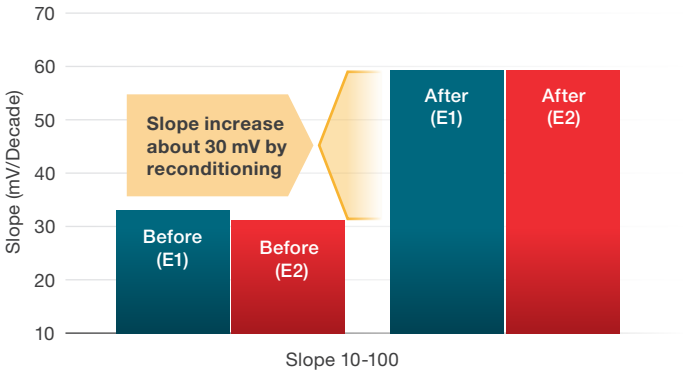
However, over time, the ideal performance can be compromised. The sodium sensor glass can become coated with a thin layer of dirt, oil, or scale from sample testing. Immersion in solution eventually leads to a leached and thickened layer on the surface of the sodium sensor glass. Alternately, a dried-out sodium glass bulb (due to long term dry storage, for example) will become dehydrated and will not have any hydrated layer.

In these cases, the ability of the sensor to interact with the sodium in the sample is impaired. The slope (sensitivity) will decrease, the signal will lose stability, and the testing time will take longer. Reconditioning your sensor refreshes the glass sensor surface for optimum sensing of the sodium ions in the sample.

Performance of sodium ISE before and after reconditioning

Let's examine how reconditioning can positively impact performance of your sodium ISE. The first example illustrating the value of reconditioning is shown in Figure 1. Before reconditioning, two electrodes showed poor slope results (<30 mV/min) between 10 and 100 mg/L sodium and did not meet the slope criteria. After reconditioning with Thermo Scientific™ Orion™ Sodium Reconditioning Solution (Cat. #: 841113), the slopes were restored to the ideal range between 54 and 60 mV/decade. When the slope is within criteria, the sensitivity is restored.

Figure 1. Effect of Reconditioning



The second example (in Figures 2A and 2B) shows the value of both reconditioning and proper storage. Before reconditioning, two sodium electrodes (one in wet storage and one from dry storage), were measured for drift. The wet storage electrode responded well. It responded within 2 minutes to a stability of 0.2 mV/min. The dry storage electrode responded poorly. It was drifting twice as much as the wet storage electrode and was still not stable after 3 minutes. After reconditioning, both electrodes showed improved performance with very fast response and stable readings in less than 2 minutes. There was little or no drift observed.

How to recondition your sodium ISE

Observe proper handling and safety measures when reconditioning your sodium electrode. Place a small amount of Orion™ Sodium Reconditioning Solution (Cat. #: 841113) into a small plastic beaker. Place the sodium ISE in a stable electrode holder and immerse just the glass bulb. After 30 to 60 seconds, remove and rinse thoroughly with sodium electrode rinse solution. Soak at least 15 minutes or more in sodium storage solution. See the sodium electrode user guide for more details.

Figure 2A. Drift Before Reconditioning (Dry vs. Wet ISE Storage)

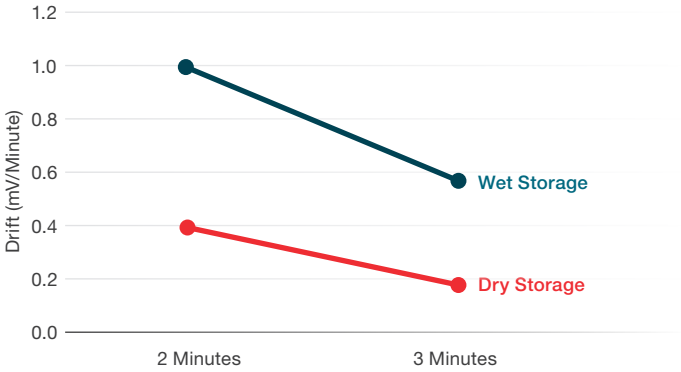
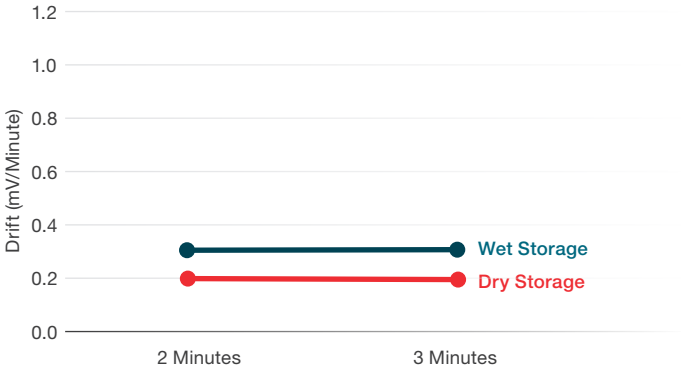


Figure 2B. Drift After Reconditioning (Dry vs. Wet ISE Storage)



Electrode care

Refer to your sodium electrode user manual for details on cleaning, storage and maintenance recommendations to keep your electrode performing well. Main points for care are summarized below.

Daily care

- Add Thermo Scientific™ Orion™ Sodium Ion Selective Electrode Fill Solution (Cat. #: 900010) up to the bottom of the fill hole and leave the fill hole open during measurement.
- Rinse the electrode well with sodium electrode rinse solution before and between tests.
- If samples are sticky or dirty, clean any excess sample from the sensor by wiping gently with a moistened lint-free wiper. Rinse as needed with a 1% laboratory detergent solution, then rinse well with sodium electrode rinse solution.
- Thoroughly rinse the electrode with sodium electrode rinse solution and cover the fill hole prior to storage. Store in Thermo Scientific™ Orion™ Sodium Electrode Storage Solution (Cat. #: 841101).

Weekly or bi-weekly care

- Prepare new sodium electrode rinse solution by adding 10 mL of Thermo Scientific™ Orion™ Sodium Ion Selective Electrode Ionic Strength Adjustor Buffer Solution (Cat. #: 841111) to a 1L wash bottle and fill with reagent grade water.
- Drain and replace the electrode fill solution.
- Replace the sodium electrode storage solution in the container the electrode is stored in.
- Consider reconditioning the electrode on a weekly or bi-weekly basis, especially if the slope is trending lower or the the response is becoming slow. Use Thermo Scientific™ Orion™ Sodium Electrode Reconditioning Solution (Cat. #: 841113). See above and consult the sodium electrode user guide for details. Observe proper handling and safety measures when reconditioning.

As needed

- If the electrode becomes dirty or oily over time, soak the electrode in warm (not hot) 1% laboratory detergent solution with vigorous stirring for 15 minutes. Rinse well with sodium rinse solution. Drain and refill the electrode.
- For a more rigorous cleaning, recondition the electrode.
- See the sodium electrode user guide for details on electrode maintenance, storage and reconditioning.

Ordering information

Product	Description	Catalog number
Meter and Electrode	Orion Star A214 pH/ISE Benchtop Meter Kit for Sodium	STARA2148
	Orion ROSS Sodium Ion Selective Electrode Kit (includes solutions)	8611BNWP
Solutions	Sodium Electrode Reconditioning Solution	841113

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