Using I9131 Sodium Combination ISE on 3200I/M

Overview
This document demonstrates how to use I9131 Sodium Combination ISE on 3200I or 3200 M to measure pNa or the concentration of [Na⁺].

Applied to
3200I Ion Meter; 3200M Multi-Parameter Analyzer

What are required
3200I or 3200M; I9131; ATC Probe; Stirrer; Electrode Holder; Diisopropylamine; NaCl (Analytical Grade); DI Water; pH Test Paper; Dust-free Paper

Procedure

<table>
<thead>
<tr>
<th>Formula</th>
<th>1×10⁻¹ mol/L NaCl</th>
<th>1×10⁻² mol/L NaCl</th>
<th>1×10⁻³ mol/L NaCl</th>
<th>1×10⁻⁴ mol/L NaCl</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>pNa 1</td>
<td>pNa 2</td>
<td>pNa 3</td>
<td>pNa 4</td>
</tr>
<tr>
<td></td>
<td>Weigh 5.845g NaCl</td>
<td>Take 100ml sodium</td>
<td>Take 100ml sodium</td>
<td>Take 100ml sodium</td>
</tr>
<tr>
<td></td>
<td>which is dried</td>
<td>solution of 1×10⁻¹</td>
<td>solution of 1×10⁻²</td>
<td>solution of 1×10⁻³</td>
</tr>
<tr>
<td></td>
<td>in 105°C for</td>
<td>mol/L</td>
<td>mol/L</td>
<td>mol/L</td>
</tr>
<tr>
<td></td>
<td>two hours.</td>
<td>Dilute it to</td>
<td>Dilute it to</td>
<td>Dilute it to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1000ml.</td>
<td>1000ml.</td>
<td>1000ml.</td>
</tr>
<tr>
<td>Basifier</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>Generally add a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>few drops of</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Diisopropylamine</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>to all STDs and</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Sample Solutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use pH test paper</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>to confirm pH</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>more than 10</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In this table we take three-point (pNa 2, pNa 3 and pNa 4) calibration as an example to give you a better idea of how to prepare the standard solutions.

2. Adjust mV Zero (Optional)
   1) Connect the short circuit plug into pH/ISE port.
2) Turn on the meter.
3) Press <Measure> key
4) Monitor the potential (mV) reading and it should be in the range from -0.5 mV to 0.5 mV (also called mV Zero).
5) If yes, the meter is functioning properly.

If not, adjust mV Zero first.
Press <Setup> key.

Highlight “Adjust mV Zero” and press <Enter> key. Press <Enter> key to confirm.

3. Connect I9131 and ATC probe.

1) Fix I9131 and ATC probe to the Electrode Holder.
2) Route the cables as the picture shown.
   Connect the connector of I9131 to pH/ISE port.
   Connect the connector of ATC probe to Temp. port.

4. Clean I9131 and ATC probe using DI water (also generally be added several drops of Diisopropylamine and it’s pH is above 10 after that) by stirring. Check the blank potential during cleaning. The blank potential should be lower than -310 mV. After cleaning dry them gently with dust-free paper.
5. Set parameters

1) From the Homepage, press `<Setup>` key

![Setup menu](image1)

2) Press `<Enter>` key to select “Measuring Mode”

![Measuring Mode menu](image2)

3) Use the downward arrow key to highlight “pX” or “CONC”. Press `<Setup>` key to select it.

![Measuring Mode menu](image3)

4) Use the right arrow key to switch from Parameter to Mode. Use the downward arrow key to highlight the appropriate mode and press `<Setup>` key to select it.

For Parameter – pX, Auto-Lock mode is as default.
For Parameter – CONC, Direct Reading is as default.
Change the mode if necessary.

5) Press `<Enter>` key to return to previous page. Use the downward arrow key to highlight “Set Ion Mode” and press `<Enter>` key to select it.
6) Use **the downward arrow** key to highlight “Na⁺” and press <Enter> key to select it.

7) Press <Cancel> key to return to Homepage.

6. Calibration

1) Place the first standard solution (eg. pNa 4, from low concentration to high concentration, also generally be added several drops of Diisopropylamine and its pH is above 10 after that) on the Stirrer. Immerse the measuring tips (especially the liquid junction) into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.

2) Press <Calibrate> from the Homepage. Use **the downward arrow** key to highlight “Calib pX EC” and press <Enter> key to select it. Press <Enter> key again to confirm it.

3) When “R” appears on the right top, it indicates the reading is stable.
4) Press <Setup> key. Use the downward arrow key to highlight “Set STD Value” and press <Enter> key to select it. Use the digital key to input “STD Value” and press <Enter> key to confirm it.

5) Press <Enter> key. It will store the first point calibration result and press <Enter> key again to continue with the second point.

6) Take out I9131 and ATC probe from the first standard solution and clean them with fresh DI water (basified). Dry them with dust-free paper.

7) Place the second standard solution (eg. pNa 3, from low concentration to high concentration, also generally be added several drops of Diisopropylamine and its pH is above 10 after that) on the Stirrer. Immerse the measuring tips (especially the liquid junction) into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.

8) When “R” appears on the right top, it indicates the reading is stable.

9) Press <Setup> key. Use the downward arrow key to highlight “Set STD Value” and press <Enter> key to select it. Use the digital key to input “STD Value” and press <Enter> key to confirm it.
10) Press <Enter> key. It will store the second point calibration result and press <Enter> key again to continue with the third point or press <Cancel> key to terminate the calibration.

11) Repeat until all points have been calibrated.

12) Press <Cancel> key to terminate the calibration.

13) It will display calibration result automatically.

It is an example for three-point calibration.
Check the Slope and make sure it should be more than 88 %.

\[ \text{[mV of pNa } X ] - \text{[mV of pNa (X+1)]} > 52 \text{ mV} \]

7. Measure unknown sample
1) Clean I9131 and ATC probe with fresh DI water (basified) by stirring. After cleaning dry them with dust-free paper.
2) Place the unknown sample (also generally be added several drops of Diisopropylamine and its pH is above 10 after that) on the Stirrer. Immerse the measuring tips (especially the liquid junction) into the solution. Increase the stirring rate gradually. Make sure there are no bubble and no swirl around the measuring tip.
3) Press <Measure> key from the Homepage. Press <Enter> key again to confirm it.
4) When “R” appears on the right top, it indicates the reading is stable.

If the measuring parameter is “pX”

5) Press <Save> to save data.
6) If the display is frozen, press <Measure> key to unlock the display.
7) Press <Cancel> key to end measuring. Press <Enter> key to confirm it.

If the measuring parameter is “CONC”

5) Press <Enter> key to transfer “pX” data to “CONC” data. And the measurement ends.
6) Use the right arrow key to switch between different CONC units. (ppm, %, mg/L, ug/L, mol/L). Once the desired unit appears, just stop pressing the right arrow key. Or you could define the CONC unit during measuring.
   - Under measuring, press <Setup> key.
   - Use the downward arrow key to highlight “Select CONC Unit” and press <Enter> key to select it.

   ![Select CONC Unit](image)

   - Use the downward arrow key to highlight your expected unit and press <Enter> key to select it.

   In this way, you don’t need to use the right arrow key to switch among the different units. It will display the CONC data in this unit automatically.

7) Press <Save> to save CONC data.
8) Press <Enter> key to confirm it.
9) Press <Measure> key to start another measurement.

8. Review data through two ways,
   1) Under measurement or calibration, press <View> key.
If the selected parameter is “pH”:

Use the downward arrow key to highlight “View Last Calib”

Press <Enter> key

Press the downward arrow key

If the selected parameter is “pX”:

If the selected parameter is “CONC”:

Use the downward arrow key to highlight “View Last Calib”
It's an example of three-point calibration.

2) From Homepage, press <View> key.