FAQ pH MEASUREMENT

How do I test my pH sensor?

pH Sensor Test Procedure

The purpose of this test is to determine if a pH sensor is functioning within acceptable limits. The asymmetry potential (A.P) and slope (efficiency) can be used as guidelines to judge a sensor's performance. Typically a sensor is replaced when the A.P is greater than ±20 mV and/or the slope drops below 91%. Consideration should also be given to the sensor's speed of response. Please follow this step-by-step procedure to determine the performance of a sensor . Required test equipment includes 7.00 and 4.01 pH buffer solutions with a pH meter that has an mV readout.

1. Set the pH/mV switch on the pH meter to the mV position.

2. Connect a shorting plug to the input on the pH meter, or connect a precision mV generator with a 0 mV input. Adjust the standardize/zero control on the pH meter for a reading equal to 0.0 mV.

3. Disconnect the shorting plug/precision mV generator, and connect the sensor that will be tested.

4. Rinse the sensor thoroughly with DI water to remove all traces of storage solution, process medium, or previous test solution. Thoroughly rinse the sensor after each buffer test to prevent carry over contamination of the pH buffer solutions. Gently blot the sensor on a soft tissue to remove the excess rinse water. Do not rub the bulb since it can cause a static charge build-up.

5. Insert the sensor and the ATC (automatic temperature compensator) in 7.00 pH buffer solution. Allow 30 seconds for the sensor/ATC to reach thermal equilibrium with the buffer solution. Record the polarity and the mV reading. This is the asymmetry potential of the sensor. A perfect sensor would have an A.P equal to 0 mV, but most sensors read between ±30 mV. Note: If the meter does not have an ATC, place a thermometer along with the sensor in the 7.00 pH buffer solution. Allow 30 seconds for the pair to reach thermal equilibrium with the buffer. Adjust the temperature setting on the meter to correspond with the thermometer reading. Record the polarity and the mV reading to determine the A.P

6. Repeat Step 4, and insert the sensor and the ATC in a 4.01 buffer solution. Allow 30 seconds before recording the mV reading.

7. Determine the mathematical difference between the two mV readings. This is the sensor's span.

8. Divide the sensor's span by the theoretical span of 176.9 mV (at 25ºC) and multiply by 100. This determines the slope of the sensor.

Note: For best results, the pH buffer solutions should be used at 25ºC. Otherwise, record the temperature of the buffer and determine the temperature adjusted pH with the temperature coefficient charts printed on the buffer container.

Example: Download this calculator in an Excel file

Reading in a 7.00 pH buffer solution: -7.4 mV Reading in a 4.01 pH buffer solution: +164.6 mV

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Asymmetry Potential = -7.4 mV Span = +164.6 - (-7.4) = 172.0 mV

Slope = Span = 172.0 mV

Theoretical Span 176.9 mV X l00 = 97%

Sensor Test Results:

Reading in a 7.00 pH buffer solution: _____ mV (max/min range ±40 mV)
(Asymmetry Potential)

Span = _____mV - _____mV = _____mV (min 150.4 mV)
(Reading in 4.01 pH) (Asymmetry Potential)

Slope = Span ÷ Theoretical Span (176.9 mV) X l00 = _____% (min 85%)

Date Tested:_____ Initial:_____ Identification:_____
(Sensor P/N, Vessel Location/No.)

All sensors have a finite life, and should be tested from time to time to determine acceptable performance.

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