

Calculating a pH Slope Percentage



Calculating a pH slope percentage verifies that your pH probe is functioning properly.

Generally a slope between 85 and 105% and an offset of ± 30 mV is acceptable. Outside of this range, you may need to replace your pH probe.

To calculate the slope percentage of your pH probe:

- 1) Measure and record the mV value in pH 7.0 buffer; this is the electrode offset.
- 2) Measure the mV value in a second buffer, such as pH 4.0.
- 3) To determine the electrode slope, calculate the absolute mV difference in between the two buffers.
- 4) Divide this by the difference of pH units between buffers. (Example: the difference in pH units between 7.01 buffer and 4.01 buffer is $7.01 - 4.01 = 3$).
- 5) To convert this result to electrode slope percentage, divide the electrode slope by the theoretical maximum slope (59.16 mV/pH unit @ 25°C), and multiply by 100.

$$\% \text{ slope} = \frac{(\Delta \text{mV} / \Delta \text{pH units})}{(59.16 \text{ mV} / \text{pH units})} * 100$$

Sample Calculation

Electrode 1 generates -15 mV in pH 7.01 and +160 mV in pH 4.01.

Absolute mV difference: $+160 \text{ mV} - (-15 \text{ mV}) = +175 \text{ mV}$

$$\% \text{ slope} = \frac{(175 \text{ mV} / 3 \text{ pH units})}{(59.16 \text{ mV} / \text{pH units})} * 100 = \left(\frac{58.33}{59.16} \right) * 100 = 98.6\%$$

Electrode 2 generates +15 mV in pH 7.01 and +160 mV in pH 4.01.

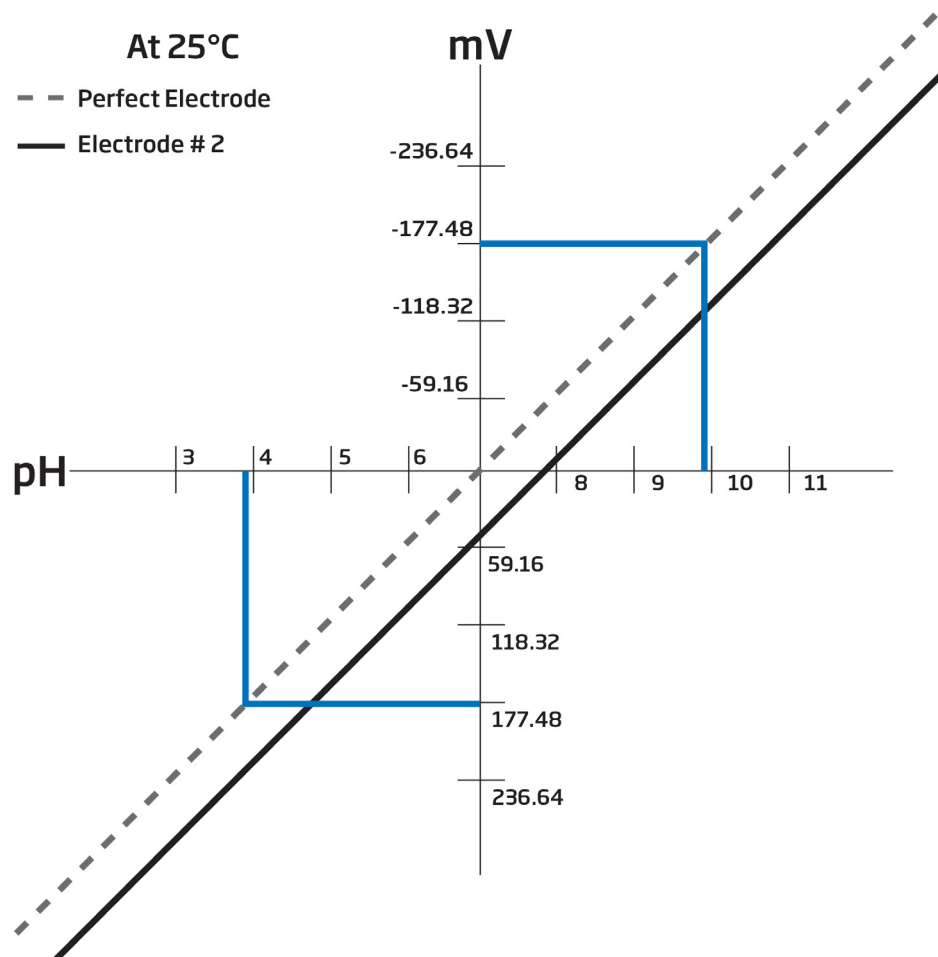
Absolute mV difference: $+160 \text{ mV} - (+15 \text{ mV}) = +145 \text{ mV}$

$$\% \text{ slope} = \frac{(145 \text{ mV} / 3 \text{ pH units})}{(59.16 \text{ mV} / \text{pH units})} * 100 = \left(\frac{48.33}{59.16} \right) * 100 = 81.7\%$$

Conclusion: Both have acceptable offsets. Electrode 1 has an offset of -15 mV and a slope of 98.6% while electrode 2 has an offset of +15 mV and a slope of 81.7%. Electrode 1 is working properly while electrode 2 has an unacceptable slope. If changing the fill solution, cleaning the electrode, and calibrating does not help, replace the electrode.

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pH electrode calibration



[Click here to watch our video:](#)
how to check the slope and offset of a pH meter (3 minutes)

