

# pH Measurement in Low-ionic Strength (Pure) Samples

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Measurement of pH in Low-ionic Strength (LIS) samples can cause two problems: long stabilization times exceeding 5 minutes and incorrect pH values. With some general application pH electrodes, measurements in deionized (DI) water can be almost impossible. Therefore, it is important to select the right pH probe designed for LIS samples. Furthermore, the conditioning of the probe is essential to achieve reliable and repeatable results. While standard pH electrodes can measure water samples from 100 to 200  $\mu\text{S}/\text{cm}$ , it is often a problem to measure below 100  $\mu\text{S}/\text{cm}$  or even in DI water.

Hach recommends the new IntelliCal™ pH Ultra Probe (PHC281) designed for LIS water samples. The specific pH Ultra electrolyte filling solution helps to obtain fast and accurate pH readings in LIS samples. After calibration, when the pH Ultra Probe is pre-conditioned for 2 minutes in LIS water, the average stabilization time in tap water samples of 100  $\mu\text{S}/\text{cm}$  is less than 1 minute. Under these conditions, precision is better than 0.01 pH.

## LIS Calibration

The standard calibration with pH buffer of pH 4.01 and pH 7.00 (@25°C) is sufficient in most cases to measure water samples. Using diluted buffers pH 4.01 and pH 7.00 to calibrate the LIS pH probe can help get more accurate and stable readings in LIS samples.

## Using ISA (Ionic Strength Adjustor) in Tap Water Samples

Adding 100 mg of a neutral salt such as KCl crystals to the 100 mL LIS water sample (100  $\mu\text{S}/\text{cm}$  or less) can decrease the stabilization time by 50%, due to ionic strength being raised to a conductivity of about 2 mS/cm. The pH reading is shifted by the salt addition a maximum of 0.05 pH. In most cases this is an acceptable amount, given the time saved in measurement.

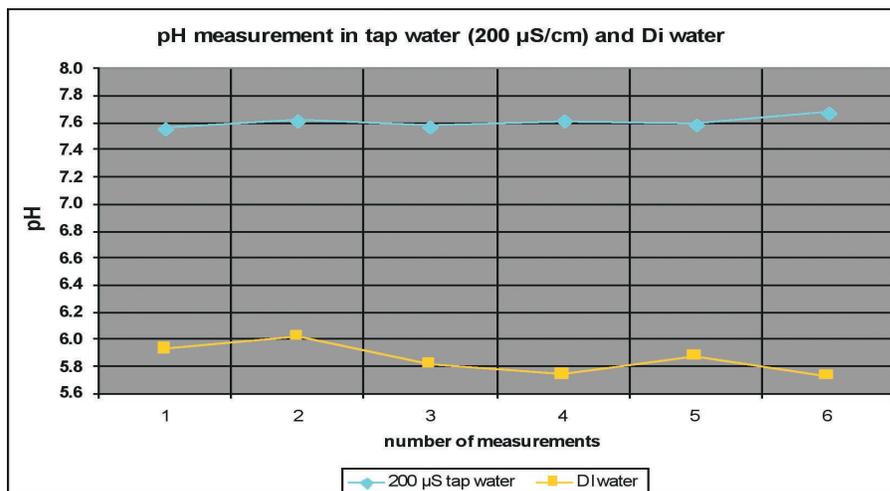
## Using ISA in Deionized Water Samples

When measuring DI water, it is recommended that 100 mg KCl crystals be added to the 100 mL sample to adjust the ionic strength. Here the stabilization time of 4 to 5 minutes can be lowered by more than 60%, while the reading is reliable and accurate within 0.1 pH as compared to pure DI water. This is an acceptable compromise if a shorter measurement time is desired.



pH readings in tap water and DI water after addition of 100 mg KCl crystals to the sample (100 mL)

	200 $\mu\text{S}$ tap water	DI water
1	7.56	5.93
2	7.62	6.02
3	7.58	5.82
4	7.61	5.74
5	7.59	5.88
6	7.68	5.73
average	7.607	5.838
std. dev.	0.042	0.119



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