

Application Note

pH Measurements in Non-Aqueous Solutions

Typical Problems When Measuring pH of Non-aqueous (non-water based) Solutions:

- Readings will not stabilize
- Incorrect results
- Epoxy-body cracking or chemically changing

Contributing Factors:

- Organic solvents have a low ionic strength making the electrode work very hard to find H⁺
- Contamination from sample to sample
- Organic solvents can damage the epoxy body electrodes and the ceramic reference junction

Solution:

- Denver Instrument glass-body, platinum junction electrodes (such as 300729.1 or 300731.1) are a great alternative to epoxy body electrodes and ceramic junction electrodes.
- Store electrodes in 3M to saturated KCl solution that has a high ionic strength and refreshes the probe.
- Between measurements, rinse electrodes with a solution that will remove the all of the previous sample from the glass membrane. Soak the electrode in 3M KCl to revive the sensing membrane.
- Denver free-flow, sleeve junction electrode (300738.1) is also great for low ionic strength samples including non-aqueous solutions. It provides a constant, user-defined flow of the filling solution (3M KCl) into the sample. This increases the ionic strength of the sample that alleviates the above problems. However the addition of KCl in the solution may not be desirable as it changes the composition of the sample. Typically this discrepancy is less than the drifting results without the addition.

Other factors to consider when measuring non-aqueous solutions (keep in mind most common applications can use the above guidelines).

- Calibrating using standard (aqueous) buffers but measuring non-aqueous solutions can cause some discrepancy in pH readings. You may wish to review scientific journals for a better understanding of the differences and to find a solution.
- Sample type may not be compatible with the electrode due to the difference in diffusion rates of the internal filling solution. Double junction electrodes allow for more compatible electrode fill solutions. Although Denver Instrument does not offer double junction electrodes, the above referenced electrodes provide excellent performance with most non-aqueous samples.