NEW ELECTRODE METHODOLOGY FOR pH MEASUREMENT IN PRECIPITATION SAMPLES

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Abstract
The National Atmospheric Deposition Program - National Trends Network (NADP-NTN) has been collecting precipitation samples across the country for several decades. The determination of pH, along with other parameters, is crucial in order to properly analyze the data. Historically, the Broadley-James Electrode has been used to measure precipitation pH. However, the use of alternative methods was explored in order to improve the efficiency and accuracy of these measurements. As technology improves so does the availability of new products and methods. One such method is the manner in which the pH (acidity) of a precipitation sample is measured. Currently, the CAL measures the acidity of precipitation samples received by users and researchers, we began examining other available electrodes. Reducing sample volumes, and rapid, reliable readings for low-ionic strength samples were defined requirements for systems being evaluated. One such electrode is the Sentron series of pH probes, available in several designs for a variety of applications. It was determined that the Sentron probes were more accurate and reliable for the low ionic strength, low volume needs. Each probe's design incorporates the working principle of an electronic pH meter with an imbedded micro sensor that responds to the pH of the sample. Both a flow type reference probe developed especially for low conductance applications and the drop sample and flat bottomed probe tip developed for small samples were compared. Six individual readings were made on separate days and instrument calibrations for each sample were analyzed. The commonality between them being the sensor and the portable pH meter with a battery powered portable meter. Data recorded included the pH values, as well as, the response time for each sample to come to a stable reading. The Sentron probes seemed to compare equally. The commonality between them being the sensor and the portable pH meter with a battery powered portable meter.