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How to Measure Total Dissolved Solids (TDS) Using the HANNA Portable Conductivity Meter

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The HANNA D4 portable conductivity meter allows you to quickly estimate the amount of total dissolved solids (TDS) present in a water sample.

To obtain valid measurements, you need to follow proper procedures in calibrating, rinsing, and measuring. Here is a step-by-step procedure for two HANNA D4 model meters, along with instructions for converting the meter reading of each meter to TDS (ppm). Depending on which meter you have, the actual meter reading will be different, but EC or TDS results are the same.

Calibrating the meter

1. Install the batteries.
2. Turn meter on to check that the batteries are working.
3. Obtain distilled water, low standard solution (0.01 N KCl, 1,400 ppm), and a high standard solution (0.10 N KCl, 12,900 ppm).
4. Allow all standards and samples to achieve room temperature (77 degrees Fahrenheit).
5. Check the statement on the back of the your meter to determine the model HANNA D4 meter you have, as some older units had a different calibration.
6. Calibration of the HANNA DIST WP 4 meter or HANNA DIST 4 meter [range 0.01-19.99 mS/cm (mmho/cm)]:
 - a. Place meter tip in an inch of distilled water. Meter should read 0.00. Solution only needs to cover the probes, and the probe should not rest on the bottom of the container.
 - b. Rinse meter tip and small container, then place meter tip in low standard solution (1,400 ppm). Meter should read 1.4. If meter reading differs, adjust calibration screw to give 1.4 reading.
 - c. Repeat calibration with high standard solution (12,900 ppm)/ Meter reading should be 12.9. If meter reading differs, adjust calibration screw to give 12.9 reading.
7. Calibration of the HANNA 4 meter (range 100/19900 μ S):
 - a. Place meter tip in an inch of distilled water. Meter should read 0.00. Solution only needs to cover the probes, and the probes should not rest on the bottom of the container.

- b. Rinse meter tip and small container, then place meter tip in low standard solution (1,400 ppm). Meter should read 14. If meter reading differs, adjust calibration screw to give 14 reading.
- c. Repeat calibration with high standard solution (12,900 ppm). Meter reading should be 129. If meter reading differs, adjust to 129.

Measuring TDS of water sample

1. After calibrating meter, rinse meter tip and small container with distilled water, then place meter tip into water sample and take meter reading. Remember to allow meter to stabilize prior to taking reading.
2. Calculating TDS (ppm):
 - a. HANNA DIST WP 4 or DIST 4 meter [range 0.01-19.99 mS/cm (mmho/cm)]:
TDS (ppm) = meter reading * 1,000
(reading of 9.00 equals 9,000 ppm TDS).
 - b. HANNA 4 meter (range 100/19900 μ S):
TDS (ppm) = meter reading * 100
(reading of 90 equals 9,000 ppm)

How meters work

Conductivity meters measure how easily water conducts an electrical current. The ease with which the current moves through water is related to the amount of dissolved salt (Na^+ , Ca^{++} , Mg^{++} , K^+ , Cl^+ , SO_4^{++} , HCO_3^+ , and CO_3^{++}) predominant. Total dissolved solids (TDS) is determined by multiplying the electrical conductivity by an appropriate constant, with the constant depending on the specific HANNA Model 4 meter used. The TDS values obtained through using HANNA Model 4 meters provide a good estimate of TDS but not an exact measurement because other factors such as type of salt have a small effect.

Suitability of livestock water

Use the TDS table in "Livestock Water Quality" by O.E. Olson and D.G. Fox to determine the livestock suitability of the sample. Preliminary research results from SDSU research on livestock water quality indicate that additional information should be obtained if the TDS reading is over 3,000 ppm.

More information

Additional information on using portable conductivity meters to determine TDS, the water quality requirements of livestock, and how to obtain laboratory analysis of water is available from your local county Extension office.

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