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Technical Note 14

Total Dissolved Solids from conductivity

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Total Solids is the term applied to material residue left in a vessel after evaporation of a water sample and subsequent drying of the residue. Total Solids includes Total Suspended Solids (TSS), the portion of total solids in a sample that can be retained by a filter, and Total Dissolved Solids (TDS), the portion that passes through a filter.

The amount of dissolved material in a sample correlates to electrical conductivity. TDS values reported by Win-Situ software are derived from conductivity readings. This calculation, as with other calculations in Win-Situ, is per the 20th edition of *Standard Methods for the Examination of Water and Wastewater*. It should only be used as a rough field check of a sample, though. TDS derived from conductivity is not recommended for critical quantitative reporting purposes. The reason for this is that there is not a relationship between conductivity and TDS that is very repeatable across different locations and different dissolved material. The calculation used is:

TDS = SC * 0.65

where:

TDS = Total Dissolved Solids in mg/L
SC = Specific Conductance (temperature corrected) in uS/cm

The constant of 0.65 is only a VERY crude average for natural samples. The actual constant for any particular sample with a specific mix of dissolved materials and measurement temperature can vary widely. The actual multiplier necessary depends on the activity of each specific dissolved species present and the average activity of all species in a sample. These activities are influenced by sample temperature, the relative amounts of each species (they can influence each other) and the total concentration of dissolved solids in the sample (can be a non-linear relationship).

While the default average value for this calculation can give good results for some samples, this calculation from conductivity only represents a very crude index for other samples and should not be used as the sole method to accurately quantify the actual amount of dissolved material in a sample. If measurements will always be made at the same location, then it would be far better practice to determine the actual constant that would be appropriate for those samples and then manually do the TDS calculation from Specific Conductance. Ideally, measuring TDS of preliminary samples gravimetrically and regressing those results against the measured Specific Conductance of the samples would determine the constant.

The composition of dissolved material in samples will certainly change from one site to another. Even for the same site, however, the type of dissolved material may also change over time. If the composition of dissolved solids changes appreciably, then it will be necessary to again determine a new constant for the site gravimetrically.

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