



Applications Tip of the Week

Conductivity and Salinity

Because of its high sensitivity and the ease of measurement, conductivity is said to be the most commonly used method to determine Salinity. Salinity of water can be measured directly using an Orion Star meter with Salinity capability, a conductivity probe with cell constant between 0.475 and 1.0 and a temperature thermistor (such as Orion 013005MD), and the Orion 111 mS/cm conductivity standard.

How to Measure Salinity

The steps for measuring Salinity* are as follows:

1. Calibrate the conductivity probe using the 111 mS/cm standard.
2. Select conductivity units of “ppt” on the meter display for Salinity measurements.
3. Immerse the conductivity probe in the sample and read results as Salinity.

*Note that the temperature compensation choices in the Orion Star meter conductivity setup menu are not applicable to the Salinity calculation and will not affect the Salinity measurement.

Background Information on Salinity

Salinity is a relative scale based on a standard potassium chloride (KCl) solution. Since the Practical Salinity Scale was adopted by oceanographers in 1978 (PSS-78), salinity has been defined as follows: a seawater of Salinity 35 has a conductivity ratio of unity with a solution of 32.4356 grams of potassium chlorine in 1 kg of solution at 15C and 1 atmosphere. This value for Salinity was determined by extensive testing of seawater samples prior to adopting PSS-78.

Before the development of the PSS-78, salinity commonly was reported in “parts per thousand” (ppt). Since PSS-78 was adopted, Salinity values determined by conductivity measurement are calculated as a ratio of measured conductivity to standard KCl conductivity. Since Salinity is a ratio, the value is actually dimensionless (no units). However, Salinity is still commonly reported as “parts per thousand” (ppt) or sometime as “practical salinity units” (psu).

Note: Salinity values in ppt and psu are nearly equivalent, by design. The Orion meter reports Salinity in “ppt” to avoid the display of a unitless value and in accordance with historical use. However, the result displayed on the Orion meter does follow the convention of PSS-78 and is the true Salinity ratio. For example, a Salinity value displayed as 34.97 ppt on the Star meter is $S = 34.97$ (in accordance with PSS-78).