

## Standard Operating Procedure (SOP) 3.1.3.2

By Erick Burres

### Measuring Salinity with a Hydrometer

Salinity is simply a measure of the amount of salts dissolved in water. As water becomes saltier, its weight increases although its volume does not measurably rise. Since salt water is denser than fresh water, this change of weight results in a greater specific gravity. Calculate the salinity by measuring a water sample's specific gravity. This is measured by a hydrometer. Salinity is usually expressed in parts per thousand (ppt or 0/00). Seawater salinity averages 35 ppt and drinking water less than 0.5 ppt.

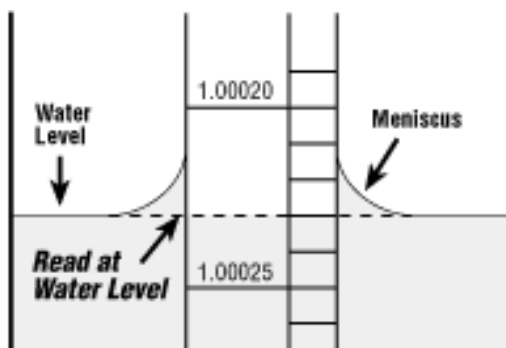
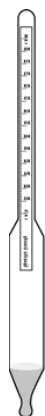
This procedure requires the use of a hydrometer table. The tables that are widely used to convert hydrometer readings (specific gravity) at any temperature to density at 15°C were designed to be used with a hydrometer calibrated on a 15°C/4° basis. Most hydrometers used for salinity are calibrated on a 60°/60°F basis. The calibration basis for a hydrometer is printed on the paper scale inside the hydrometer.

If a 60°/60°F hydrometer is used with conversion tables designed for 15°C/4° hydrometer, a value is obtained which is 0.001 higher than it should be. When converted to salinity, this error produces a salinity reading that averages 1.3 ppt higher than it should be.

#### Equipment

- 1) Hydrometer
- 2) Hydrometer jar
- 3) Hydrometer conversion table
- 4) Thermometer

Monitors should consult with the instructions that come with their sampling and analyzing instruments.



### Hydrometer: How to read a Hydrometer

#### Procedure

- 1) Put a water sample in a hydrometer jar (3/4 full).
- 2) Hang a thermometer in the jar so that it is completely submerged.
- 3) Gently lower the hydrometer into the jar. Allow the hydrometer to float freely. Make sure the hydrometer and thermometer are not touching and that the top of the hydrometer stem (which is not in the water) is free of water drops.
- 4) Let the hydrometer stabilize and then record the specific gravity and temperature. Read the specific gravity (to the fourth decimal place) at the point where the water level in the jar meets the hydrometer scale. Do not record the value where the meniscus (the upward curvature of the water where it touches the glass) intersects the hydrometer.
- 5) Record the specific gravity read from the scale on the hydrometer at water level and the temperature.
- 6) Use a hydrometer conversion table that comes with your hydrometer to determine the salinity of the sample at the recorded temperature. Record the salinity of the sample.

#### Quality Control

Standards can be made with which to verify your technique.

**35 ppt standard:** Measure out 17.5 grams of table salt (NaCl). Add the salt to 500ml of distilled water. Careful swirl the solution until all of the salt is dissolved.

**Blank:** Measure out 500 ml of distilled water.

**Measure:** Perform the measuring procedure for the standard and the blank.

**Results:** If the blank gives a non-zero reading your equipment is tainted and needs to be cleaned. If the salinity standard measurement is off by more than 2ppt prepare a new standard and repeat the measurement.

G.L.O.B.E. 1997 Teachers manual

Green, L. 1998. "Let Us Go Down to the Sea—How Monitoring Changes from River to Estuary." *The Volunteer Monitor* 10(2): 1-3.

Hach. 1997. *Hach Water Analysis Handbook*. 3<sup>rd</sup> ed. Hach Company. Loveland, CO

LaMotte. 2000. 60°/60°F Hydrometer Instructions. LaMotte Company, Chestertown, MD

U.S. Environmental Protection Agency (USEPA). 1997. *Volunteer Stream Monitoring: A Methods Manual*. EPA 841-B-97-003. Office of Water, Washington, DC. 211 pp.

Images: <http://www.epa.gov/owow/estuaries/monitor/chptr14.html>