
Specific Conductance

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Specific conductance (conductivity) is a measurement of the capacity of water to carry an electric current. It will vary according to the amount of ionized substances in the water, and the temperature at which the measurement is made.

Treatment Plant Significance

This test is not routine in potable water treatment, but when performed on source water is a good indicator of contamination. Although it measures primarily for inorganic substances, the concentration of these, along with the organic pollutants, will be elevated if contamination exists. Conductivity readings can be used to indicate wastewater contamination or saltwater intrusion. Distilled water used for potable water analyses at public water supply facilities must have a conductivity of no more than 1 $\mu\text{mho/cm}$. This is an EPA regulation applying to certification of potable water laboratories.

Analysis: Instrumental Method for Specific Conductance

The conductivity meter is a resistance meter, measuring ohms. The electrode (conductivity cell) is electroplated with platinum to improve contact with the solution, and cells with a range of sensitivities can be chosen. Cells with small electrodes spaced further apart are used for waters with very high conductivities, i.e., hard waters and wastewaters. The meter actually measures resistance, converts it to conductance (reciprocal), and then multiplies it by a constant to convert it to a conductivity reading in μmhos .

Conductivity is measured in units called micromhos ($\mu\text{mhos/cm}$) or micro-Siemens/cm ($\mu\text{S/cm}$). The numerical equivalence between these two is 1:1.

Typical readings are:	Distilled water:	1 to 5 μmhos
	Raw and tap water:	50 to 500 μmhos
	Hard waters:	500 to 2000 μmhos

NOTE: Micromhos can be equated to units of mg/l, as NaCl, on approximately a 2:1 basis: 2 μmhos = 1 mg/l, as NaCl.

Quality Control

- Temperature is very important in this test. Conductivity can vary by as much as 10 μmhos for every 1°C change. It is best to bring the sample to room temperature before measuring.
- Calibrate meter with purchased NaCl conductivity standards.

Apparatus

- Conductivity meter with electrode appropriate for conductivity range to be measured

Reagents

Purchased conductivity standards

NaCl

Procedure

1. Rinse cell well in distilled water.
2. Immerse cell in conductivity standards to check calibration. Adjust if necessary.
3. Immerse cell in sample. Read conductivity.

Federal Limits

None.

Reference

American Public Health Association, American Water Works Association, and Water Environment Federation, *Standard Methods for the Examination of Water and Wastewater*, 20th ed., American Public Health Association, Washington, D.C., 1998, p. 2-44.