How Conductivity Works

Definition of Conductivity

Conductivity is the ability of a material to conduct electric current. The principle by which instruments measure conductivity in solution is simple—two plates are placed in the sample, a potential is applied across the plates (normally a sine wave voltage), and the current that passes through the solution is measured. Conductivity (G), the opposite of resistivity (R), is determined from the voltage and current values according to Ohm's law.

G = 1/R = amps/volts

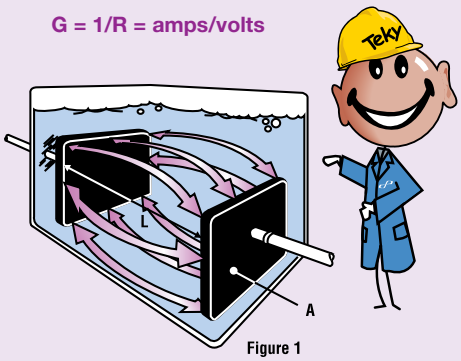

Figure 1

Units of Measurement

The basic unit of conductance is the siemen (S), also called the mho. Since cell geometry affects conductivity values, standardized measurements are expressed in (S/cm) to compensate for variations in electrode dimensions.

If the cell constant (K) is 1 cm^{-1}, the specific conductivity is the same as the measured conductivity of the solution. If other cell constants are used, the meter will automatically compensate for the change in geometry. To save room, cm^{-1} is not shown when cell constants are listed.

Although we specify conductivity ranges in µS or mS, due to space limitations these ranges should be understood to reflect specific conductivity in µS/cm or mS/cm, respectively.

1 µS/cm = 0.001 mS/cm = 0.000001 S/cm = 1 µmho/cm

Important features to consider...

- **Autoranging:** Meter automatically selects the most accurate range for measurement. There is no need to manually change the range.
- **TDS conversion factor:** When a solution does not have a similar ionic content to natural water or salt water, then a TDS conversion factor is needed to automatically adjust the TDS readings.
- **Temperature compensation:** A cell with built-in temperature sensor allows the meter to make adjustments to the conductivity or TDS readings based on changes in solution temperature.
- **Adjustable temperature coefficients:** Alcohols and pure water are affected by changes in temperature differently than typical samples. An adjustable temperature coefficient allows the user to compensate for the properties of the measured solution.
- **Adjustable cell constant:** Adjusts the measurement to reflect use of a cell with a constant other than K = 1.0. Wide range meters may accept cells between K = 0.01 and 10.

Cell constant (K)	Optimum conductivity range
0.01	0.055 to 20 µS
0.1	0.5 to 200 µS
1	0.01 to 2 mS
10	1 to 200 mS

Oakton® Waterproof EcoTestr™ Salt Pocket Meter

Just dip and read

- Low cost with long-life sensor
- IP67-rated waterproof housing that floats if dropped in water
- Precalibrated against NaCl standards
- Keep it with you—built-in clip for pocket or belt hanging

Features include single-button digital calibration, auto-shutoff, and display hold function.

OAKTON® ISO9001:2008 CERTIFIED SUPPLIER IP67

Description	EcoTestr Salt
Catalog number	GY-35462-50
Range	0 to 10.0 ppt
Resolution	0.1 ppt
Accuracy	±1% FS
Temperature compensation	Automatic, 0 to 50°C, 2% per °C
Calibration	One-point digital calibration
Power	Four 1.5 V batteries (included), >200 hours
Price	

GY-09377-16 **Replacement batteries.** Pack of 6

Oakton® Waterproof SaltTestr® 11 Pocket Meter

Never be without a meter

- Get easy spot checks of salt-based samples
- IP67-rated waterproof housing—even floats!
- Precalibrated against NaCl standards for immediate use

Push-button calibration provides easy and precise field calibration. Hold function freezes measurement for viewing and recording.

OAKTON® ISO9001:2008 CERTIFIED SUPPLIER CE IP67

Description		SaltTestr 11
Catalog number		GY-35662-52
Range	Salinity	0.0 to 10.00 ppt (g/L)
	Temperature	32 to 122°F (0 to 50°C)
Resolution	Salinity	0.01 ppt
	Temperature	0.01°F (0.1°C)
Accuracy	Salinity	±1% full-scale, 0.00 to 7.00 ppt; ±3% full-scale over 7.00 ppt
	Temperature	±0.9°F (0.5°C)
Temperature compensation		Automatic
Power		Four 1.5 V batteries (included)
Price		

GY-35661-17 **Replacement sensor**

GY-00653-89 **Oakton calibration solution;** 8974 µS (4487 ppm NaCl), 500 mL

GY-09377-16 **Replacement batteries.** Pack of 6