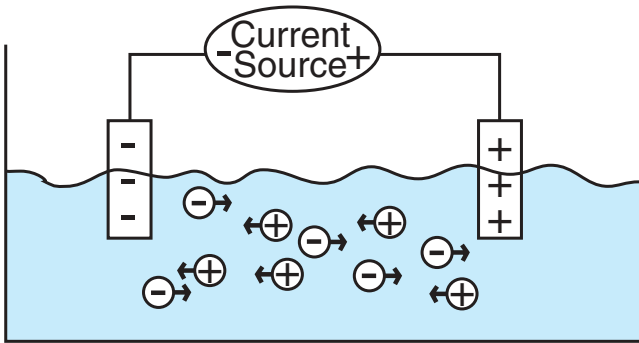


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CONDUCTIVITY AND RESISTIVITY



Conductivity measures the ability of a solution to conduct an electric current between two electrodes. In solution, the current flows by ion transport. Therefore, with an increasing amount of ions present in the liquid, the liquid will have a higher conductivity. If the number of ions in the liquid is very small, the solution will be "resistive" to current flow. AC current is used to prevent complete ion migration to the two electrodes.

CONDUCTIVITY/RESISTIVITY MEASUREMENT

Conductance = 1/Resistance
 Conductivity: mho = Siemen
 Normal unit of measurement is:
 1 micromho (μmho) = 1 microSiemen (μS)
 1 millimho (mmho) = 1 milliSiemen (mS)
 = 1,000 μS

Resistivity : ohm (Ω)
 Normal unit of measurement is:
 megohm ($\text{M}\Omega$) = 1,000,000 Ω

Example - Conductivity to Resistivity Conversion:

$$\begin{aligned} \text{Conductivity} &= 20 \mu\text{S} \\ &= 20 \times 10^{-6}\text{S} \\ &= 2 \times 10^{-5}\text{S} \\ &= 2 \times 10^{-5} \text{ mho} \\ &= \left[\frac{2 \times 10^{-5}}{1 \text{ ohm}} \right] \end{aligned}$$

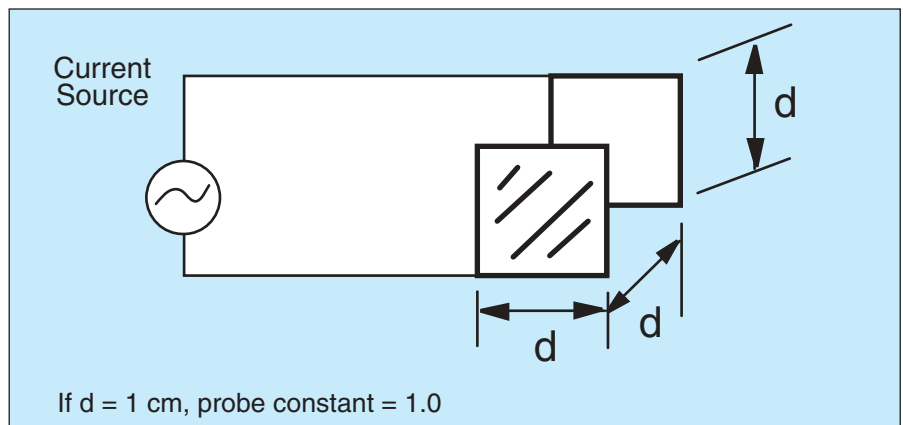
$$\begin{aligned} \text{Resistivity} &= 1/\text{conductivity} \\ &= \left[\frac{2 \times 10^{-5}}{1 \text{ ohm}} \right]^{-1} \\ &= \frac{1 \text{ ohm}}{2 \times 10^{-5}} \end{aligned}$$

$$\begin{aligned} &= \frac{1}{2} \times 10^5 \text{ ohm} \\ &= .5 \times 10^5 \text{ ohm} \\ &= 5 \times 10^4 \text{ ohm} \\ &= 50,000 \text{ ohm} \end{aligned}$$

CONDUCTIVITY/RESISTIVITY CONVERSIONS

Conductivity (Micromhos-cm)	Resistivity (Ohms-cm)	Dissolved Solids (ppm)
.084	12,000,000	.0417
.167	6,000,000	.0833
1.00	1,000,000	.500
2.50	400,000	1.25
20.0	50,000	10.0
200	5,000	100
2000	500	1,000
20,000	50	10,000

Note: ppm x 2 = Conductivity



PROBE CONSTANTS

Probe constant defines the volume between electrodes.
 Solutions with an extremely high conductivity require a sensor with a probe constant greater than 1.0.

Solutions with extremely low conductivity require a sensor with a probe constant less than 1.0.
 The greater the distance between the electrodes, the smaller the current signal.

CONDUCTIVITY AND RESISTIVITY (NaCl AND CaCO₃ SOLUTIONS AT 25°C (77°F))

ppm as CaCO ₃	ppm NaCl	Conductivity micromho/cm	Resistivity megohm/cm
1700	2000	3860	0.00026
1275	1500	2930	0.00034
850	1000	1990	0.00050
425	500	1020	0.00099
170	200	415	0.0024
127.5	150	315	0.0032
85.0	100	210	0.0048
42.5	50	105	0.0095
17.0	20	42.7	0.023
12.7	15	32.1	0.031
8.5	10	21.4	0.047
4.25	5.0	10.8	0.093
1.70	2.0	4.35	0.23
1.27	1.5	3.28	0.30
0.85	1.00	2.21	0.45
0.42	0.50	1.13	0.88
0.17	0.20	0.49	2.05
0.13	0.15	0.38	2.65
0.085	0.10	0.27	3.70
0.042	0.05	0.16	6.15
0.017	0.02	0.098	10.2
0.012	0.015	0.087	11.5
0.008	0.010	0.076	13.1
0.004	0.005	0.066	15.2
0.002	0.002	0.059	16.9
0.001	0.001	0.057	17.6
None	None	0.005	18.3