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Method 120.1: Conductance (Specific Conductance, µmhos at 25°C) by Conductivity Meter

METHOD #: 120.1	Approved for NPDES (Editorial Revision 1982)
TITLE:	Conductance (Specific Conductance, *u*mhos at 25°C)
ANALYTE:	Conductance
INSTRUMENTATION:	Conductivity Meter
STORET No.	00095

1.0 Scope and Application

1.1 This method is applicable to drinking, surface, and saline water, domestic and industrial wastes and acid rain (atmospheric deposition).

2.0 Summary of Method

2.1 The specific conductance of a sample is measured by use of a self-contained conductivity meter, Wheatstone bridge-type, or equivalent.
2.2 Samples are preferable analyzed at 25°C. If not, temperature corrections are made and results reported at 25°C.

3.0 Comments

3.1 Instrument must be standardized with KCl solution before daily use.
3.2 Conductivity cell must be kept clean.
3.3 Field measurements with comparable instruments are reliable.
3.4 Temperature variations and corrections represent the largest source of potential error.

4.0 Sample Handling and Preservation

4.1 Analyses can be performed either in the field or laboratory.
4.2 If analysis is not completed within 24 hours of sample collection, sample should be filtered through a 0.45 micron filter and stored at 4°C. Filter and apparatus must be washed with high quality distilled water and pre-rinsed with sample before use.

5.0 Apparatus

5.1 Conductivity bridge, range 1 to 1000 *u*mho per centimeter.
5.2 Conductivity cell, cell constant 1.0 or micro dipping type cell with 1.0 constant. YSI #3403 or equivalent.
5.3 Thermometer

6.0 Reagents

6.1 Standard potassium chloride solutions, 0.01 M: Dissolve 0.7456 gm of pre-dried (2 hour at 105°C) KCl in distilled water and dilute to 1 liter at 25°C.

7.0 Cell Calibration

7.1 The analyst should use the standard potassium chloride solution (6.1) and the table below to check the accuracy of the cell constant and conductivity bridge.

Conductivity 0.01 m KCl

°C	Micromhos/cm
21	1305
22	1332
23	1359
24	1386
25	1413
26	1441
27	1468
28	1496

8.0 Procedure

8.1 Follow the direction of the manufacturer for the operation of the instrument.
8.2 Allow samples to come to room temperature (23 to 27°C), if possible.
8.3 Determine the temperature of samples within 0.5°C. If the temperature of the samples is not 25°C, make temperature correction in accordance with the instruction in Section 9 to convert reading to 25°C.

9.0 Calculation

9.1 These temperature corrections are based on the standard KCl solution.
9.1.1 If the temperature of the sample is below 25°C, add 2% of the reading per degree.
9.1.2 If the temperature is above 25°C, subtract 2% of the reading per degree.
9.2 Report results as Specific Conductance, *u*mhos/cm at 25°C.

10.0 Precision and Accuracy

10.1 Forty-one analysts in 17 laboratories analyzed six synthetic water samples containing increments of inorganic salts, with the following results:

Increment as Specific Conductance	Precision as Standard Deviation	Accuracy as Bias, %	Accuracy as Bias, *u*mhos/cm
100	7.55	-2.02	-2.0
106	8.14	-0.76	-0.8
808	66.1	-3.63	-29.3
848	79.6	-4.54	-38.5
1640	106	-5.36	-87.9
1710	119	-5.08	-86.9

(FWPCA Method Study 1, Mineral and Physical Analyses.)

10.2 In a single laboratory (EMSL) using surface water samples with an average conductivity of 536 *u*mhos/cm at 25°C, the standard deviation was ± 6.

Bibliography

1. The procedure to be used for this determination is found in: Annual Book of ASTM Standards Part 31, "Water," Standard D1125-64, p. 120 (1976).
2. Standard Methods for the Examination of Water and Wastewater, 14th Edition, p. 71, Method 205 (1975).
3. Instruction Manual for YSI Model 31 Conductivity Bridge.
4. Peden, M. E., and Skowron. "Ionic Stability of Precipitation Samples," Atmospheric Environment, Vol. 12, p. 2343-2344, 1978.