SOP-C-113

Determination of Specific Conductance

Revision 11

Approval:

Laboratory Manager — Date: 8-20-20

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Texas Institute for Applied Environmental Research

i. Identification of the method

a. Standard Methods SM 2510 B (approved 2011)

ii. Applicable matrix or matrices

a. non-potable water (TNI accredited), other matrices are not accredited

iii. Limits of detection and quantitation

a. LOD of 0.1 up to about 30,000 µmho/cm^2 (µS/cm)

iv. Scope and application, including parameters to be analyzed

a. Specific conductance (electrical conductivity) of water for environmental quality determination

v. Summary of the method

a. Electrometric determination is made of the conductance through dissolved ion concentration. A portion of the sample is poured through a flowcell, or set in a dip cell connected to a conductivity meter. The specific conductance or conductivity of the sample is displayed in the meter readout area in µS/cm.

vi. Definitions

a. Specific Conductance- the conductivity between opposite faces of a cube of the test material of one-cm edge, measured in standard µmhos/cm^2 or microSiemens per centimeter (µS/cm) at 25ºC. A Siemens/cm is equal to a mho/cm^2.
b. Conductivity-the ability of a substance to conduct electric current.
c. Conductivity cell- probe attached to a conductivity meter containing electrodes used by the instrument to analyze ability of samples to carry an electric current.
d. Conductivity meter- device used to provide the electric current needed for this test and to display the analytical results.
e. Standard QA/QC definitions are found in QAM-Q-101 “Laboratory Quality Control”.

vii. Interferences

a. Electrode fouling and inadequate sample circulation
b. Organic material and high suspended matter.

viii. Safety

a. All aspects of this procedure comply with QAM-S-101, "Laboratory Safety".
b. All waste is placed into the proper waste receptacle. No hazardous waste generation is expected with this procedure, unless the samples are inherently hazardous.
c. The analyst consults the MSDS files if there are any questions as to the safe handling of any reagent required by this procedure.

ix. Equipment and supplies

a. YSI Model 3200 Conductivity Meter
b. YSI Flow-Thru Conductivity Cell
c. YSI Conductivity Dip Cell

x. Reagents and standards

a. Deionized water (DI)
b. 0.01M KCl Standard reference solution from QAM-I-111, "Operation and Calibration of the Conductivity Meter". The standard is used as either ICV/CCV or LCS/LCSD.

xi. Sample collection, preservation, shipment and storage

a. Holding time is 28 days; analyze as soon as possible in the laboratory. Conductance is best measured in the field.
b. The TIAER Lab does not normally collect or ship samples for this analysis.
c. Refrigerate sample to >0-≤6° C until analysis. Adjust to room temperature before measuring.

xii. Quality control

a. All aspects of this procedure comply with QAM-Q-101, "Laboratory Quality Control". The acceptance limit for DI water is < 1 µmhos/cm^2. If the DI water does not pass,

remove it from service and initiate a Corrective Action Report in accordance with QAM-Q-105, “Corrective Actions”.

b. Sample duplicates, initial and closing calibration verification standards are required for sample measurement batches.

xiii. Calibration and standardization

a. Refer to QAM-I-111, “Operation and Calibration of the Conductivity Meter”

xiv. Procedure

a. Turn the meter on and ensure that it is in the proper mode for sample analysis in accordance with QAM-I-111. Verify instrument calibration with the 0.01M KCl solution by using the steps bel”ow.
b. Slowly pour at least 3 portions of sample or standard (about 300 mL) into funnel attached to flowcell taking care not to introduce bubbles into the stream. For the dip cell, rinse the cell with the solution or sample to be measured, and then place the cell into a beaker of the solution or sample.
c. Allow the reading to stabilize as indicated by little or no change in displayed reading.
d. Read temperature to +/- 0.01°C and record in the Specific Conductance Log (or E-log, Attachment 1).
e. Press the [CELL] soft key.
f. Press the [CAL K] soft key.
g. Press the [SINGLE PT] soft key.
h. Using the [UP], [DOWN], and [DIGIT] soft keys, enter the value of the standard solution at the current temperature as calculated in the “Spec Cond e-LOG C-113-1”
i. Press [ENTER] to store the current cell constant (K).
j. Press [MODE] three times to exit.
k. Rinse the cell with a portion of the next sample. For samples with high conductivity readings (> 1000 µmhos/cm^2), an extra DI rinse may be needed between samples.
l. When all samples have been analyzed, rinse the cell thoroughly with DI.
m. Note: for daily DI water checks, if specific conductance is below 0.1 µmhos/cm^2, temperature correction is not required.

xv. Data analysis and calculations;

a. Enter data into the LIMS, which will perform QC calculations.
b. Dilution calculation is not applicable.

xvi. Method performance

a. Method performance: refer to QAM-Q-101, "Laboratory Quality Control"

xvii. Pollution prevention

a. Pollution prevention: refer to QAM-W-101, "Disposal of Laboratory Waste"

xviii. Data assessment and acceptance criteria for quality control measures

a. Data assessment and acceptance: refer to QAM-Q-101, "Laboratory Quality Control"

xix. Corrective actions for out-of-control data

a. Corrective action: refer to QAM-Q-105, "Corrective Actions"

xx. Contingencies for handling out-of-control or unacceptable data

a. refer to QAM-Q-101, "Laboratory Quality Control" and QAM-Q-105

xxi. Waste management

a. Waste management: refer to QAM-W-101, "Disposal of Laboratory Waste". No hazardous waste is anticipated from this procedure, unless samples are hazardous.

xxii. References

a. Standard Methods for the Examination of Water and Wastewater, latest online edition, Washington D.C., Method 2510 B (approved 2017).
b. The National Environmental Laboratory Accreditation Conference Institute (TNI), 2016.

xxiii. Any tables, diagrams, flowcharts and validation data

a. Example Specific Conductance Log, SOP-C-113-1 (may be E-log with additional information)

Attachment 1
Example Specific Conductance Log

Specific Conductivity

Specific Conductivity e-Log

cell constant x sp.cond. observed

sp.cond corrected= 1+ 0.0191 (T - 25)

correction limits = 1341-1483

jrh 8/21/18

Meter ID: C-1

10/17/2017 Therm. CF= y=0.02x-0.275

Cell ID: CC-1 CC-2

Cell constant: Determined Daily

K=0.1

Date	time	initials	Cell CC-	Sp. Cond Std ID	Sp. Cond. (Umho/cm2)	Obs. Temp	Temp w/CF	Value to enter 0.01N KCl corr. for temp.	Sample ID	Sp.Cond. observed	Obs. Temp	Temp w/CF	corrected to 25C	Sp. Cond. (Umho/cm2) Limits (DI only)	Accept. DI Pass/Fail False=n/a	Comments n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a
			1		1412		-0.28	730	di			-0.28	0.00	< 1.0		n/a

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