Standard Operating Procedure for the Determination of Conductivity 2510 B

1.0 Location

Room 306

2.0 Purpose

This method is used to determine conductivity in water.

3.0 Scope

3.1 The standard unit of electrical resistance (R) is the ohm (O). The standard unit of electrical conductance is its inverse, the siemens(or the mho). Resistivity is the resistance measured between opposite faces of a rectangular prism and is reported in ohms x unit length. Conductivity is the reciprocal of resistivity and is reported in siemens per unit length. Inasmuch as specific conductivy is defined as the conductance of a conductor 1 cm long and 1 cm^2 in cross-sectional area, it is properly reported in siemens and is numerically identical to conductivity in umhos/cm. Conductivity may also be expressed in millisiemens/meter, which are equal to 10 umhos/cm. Report results of water tests as conductivity in terms of micromhos/cm.

3.2 Electrolytic conductivity (unlike metallic conductivity) increases with tempertature at a rate of approximately 2% / C. Significant errors can result from inaccurate temperature measurement. Potassium chloride solutions have a temperature coefficient of conductivity that is lower than that of the typical potable water. Sodium chloride, on the other hand, has a temperaature coefficient that closely approximates that found in most waters from wells and surface sources. Note that each ion has a different temperature coefficient; thus, for precise work, the conductivity must be determined at 25 C.

4.0 Reference

Standard Methods 2510 B

5.0 Sample Handling and Preservation

Samples may be submitted in plastic or glass containers preserved by cooling to 4 C.

6.0 Apparatus and Materials

6.1 Orion 170 Conductivity Meter

6.2 Orion Conductivity Cell #017010 (contains temperature probe)

7.0 Reagents

7.1 Standard potassium chloride, .1 M: Dissolve 1.4912 gm of anhydrous KCL in reagent grade water and dilute to 2000 ml. This is the standard reference solution, which at 25° C has a conductivity of 1413 umhos/cm. It is satisfactory for most samples when the cell has a constant between 1 and 2. For other cell constants use stronger or weaker KCL solutions.

8.0 Procedures

8.1 Calibration

8.1.1 Turn power switch on while depressing PROG key, the meter will perform a self check. Leave the instrument on.

8.1.2 With the TC key choose linear with temperature compensation.

8.1.3 With the TREF key choose 25° C. Press scroll key to read temperature.

8.1.4 To display the current cell constant setting, press C, value will appear in the window.

8.1.5 Place the conductivity probe in the container of standard, use the arrow keys to adjust the cell constant so the conductivity reads 1413. Press the scroll key to read temperature again.

8.2 Measurement of Conductivity

8.2.1 Immerse the conductivity probe in the sample, gently moving the probe in a circular motion until the meter stabilizes. Read the conductivity noting either millimhos/cm or micromhos/cm.

8.2.2 Record value in micromhos/cm.

9.0 Quality Control

Duplicate measurements should be run on every 10 % of the samples.

10.0 Data Analysis

Results are read directly from the display and reported in micromhos/cm.

11.0 Documentation

All information and values are recorded on a worklist.

12.0 Records

Worklists are stored in a parameter log book in the bookcase in room 306.