

Soluble Salts (Electrical Conductivity)

1. Application

This procedure covers the determination of soluble salts in soil by measuring the electrical conductivity (EC) of a 1:2 soil:water suspension

2. Summary of Methods

The electrical conductivity of a soil suspension increases as the salt concentration increases. In this procedure, a suspension of soil in water (1 part soil:2 parts water) is placed in a conductivity cell, and the electrical conductivity is measured.

3. Safety

No hazardous chemicals are used in this analysis.

4. Interferences

This procedure estimates soluble salts indirectly from electrical conductivity. It does not identify which salts are present.

5. Apparatus and Materials

- 5.1 Soil scoop calibrated to hold 10.0 g of light-colored silt loam soil.
- 5.2 Conductivity meter with an operating range between 0.001-20 dS/m.
- 5.3 50-ml beaker or 13-dram vial

6. Reagents

- 6.1 Prepare a 0.01 N KCl solution, with a conductivity of 1.412 dS/m (141.2 mhos x 10⁻⁵/cm) at 25°C. Dissolve 0.746 g of oven-dried (105°C) KCl in deionized water and dilute to 1 liter.

7. Methods

- 7.1 Place a 10 g scoop of soil in beaker or vial.
- 7.2 Add 20-ml of deionized water.
Note: Any 1:2 ratio of soil:water can be used such as 5g soil with 10ml water.
- 7.3 Stir, let stand for 15 minutes.
- 7.4 Place conductivity probe into the 0.01 N KCl solution in a 50-ml beaker.
- 7.5 Set the instrument to read 1.412 dS/m.

7.6 The conductivity meter is now ready for use. Place conductivity probe into sample suspensions and read directly off display while stirring the probe in the solution.

Note: The bottom of the probe must be totally immersed in the solution for suspension to read properly.

8. Calculations

dS/m = mmhos/cm

9. Quality Control

9.1 Standard – One or more standard solutions of known electrical conductivity are analyzed with each batch of samples to check instrument calibration and procedural accuracy.

10. Reporting

Results are reported as electrical conductivity in dS/m (equivalent to mmhos/cm).

The interpretation of these results is dependent on soil texture and the soil:water ratio. The interpretation of soils prepared with a 1:2 (soil:water) ratio is listed below.

For sandy textured soils	Low	0-0.25 dS/m
	Medium	0.26-0.75 dS/m
	Excessive	>0.75 dS/m

For silty textured soils	Low	0-0.40 dS/m
	Medium	0.41-1.05 dS/m
	Excessive	>1.05 dS/m

Conversion factor: $(\text{mhos} \times 10^{-5}/\text{cm})/100 = \text{dS/m}$

11. References

11.1 Whitney, D.A. Soil Salinity. Pp. 59-60. In J.R. Brown (Ed.), Recommended Chemical Soil Test Procedures for the North Central Region. NCR Publ. No. 221 (revised). Missouri Agr. Exp. Sta. SB 1001. Columbia, MO.