Test Method: Electrical Conductivity for Compost						**Last Modified: 01/24/26 SRH**		
4.10-A: EC 1:5 Slurry Method, Mass Basis 2026						**Units:** decisiemens/meter		
Test Method Applications								
Process Management							**Product Attributes**	
Step 1: Feedstock Recovery	*Step 2:* Feedstock Preparation	*Step 3:* Composting	*Step 4:* Odor Treatment	*Step 5:* Compost Curing	*Step 6:* Compost Screening and Refining	*Step 7:* Compost Storing and Packaging	*Safety Standards*	*Market Attributes*
		4.10-A		4.10-A				4.10-A

4.10 Electrical Conductivity for Compost

Draft

Keywords

Soluble salts; electrical conductivity; dilution; slurry; centrifugate; extract; saturation

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Disclaimers

The methods in this manual (Test Methods for the Examination of Composting and Compost, TMECC) do not address all safety concerns. Users are responsible for establishing appropriate safety and health practices, reviewing current Safety Data Sheets, and determining regulatory applicability before use. Safety measures including personal protective equipment, ventilation, handling, storage, emergency response, and waste disposal must comply with current institutional and regulatory standards. Chemical hazards and requirements vary by substance and jurisdiction and may change over time. This manual does not provide comprehensive safety information; users must consult current regulations and manufacturer instructions. Failure to follow proper procedures may result in injury, environmental harm, or legal violations. All methods and sampling protocols are subject to revision to correct errors or reflect advances in practice. Report omissions or errors to the TMECC editors. Process alternatives, trade names, or

[1] Questions and correspondences can be sent to info@compostfoundation.org.

commercial products mentioned are provided as examples only and do not constitute endorsement

Values stated in International System of Units (SI) are to be regarded as the standard. Values given in parentheses are provided for information only.

Scope

This chapter covers the determination of the electrical conductivity (EC) of compost.

Terminology

Ohm — Unit of electrical resistance (symbol=Ω); the inverse of a siemens (S), where resistivity or Ohm = S^{-1}.

Salt — A chemical compound formed by replacing all or part of the hydrogen ions of an acid with metal ions or electropositive radicals.

Significance and Use

Electrical conductivity is an indicator test that infers the concentration of ions in compost and other media. The measurement indicates the propensity of a compost extract to conduct electricity. Conductivity varies with both the number and type of ions contained in the solution. Assessment of compost can be made with $EC_{1:5}$ (EC measured using a 1:5, compost dry weight [dw] to water volume [v] extract) as a relative indicator of nutrient availability. Pure water is a poor conductor of electric current, whereas water containing dissolved ions, as found in compost, will conduct electrical current in proportion to the quantity of cations and anions in solution. Therefore, an EC measurement of a compost slurry extract indicates the ion concentration of the compost sample. Solutions with a higher EC are more saline. This test is also used as a prerequisite for TMECC Method 4.11-A: Electrometric pH Determinations for Compost, because for highly saline solutions, pH measured in water leads to inconsistent readings (Gondek et al., 2020). If compost EC (1:5 water extract) exceeds 4 dS/m, pH should be measured in 0.01 molar (M) calcium chloride or 1 M potassium chloride extract to avoid interference from high soluble salts.

4.10-A: EC 1:5 Slurry Method, Mass Basis

Summary of Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

A compost sample at as-received moisture is blended with deionized water at a ratio of 1:5 on a dry mass basis. The sample is shaken for 20 minutes at room temperature to solubilize ions in deionized water. The liquid and solid fractions are separated by centrifuge or vacuum extraction, and the EC of the 1:5 sample slurry extract is measured.

Interference and Limitations for Method 4.10-A: EC Slurry Method, Mass Basis

Inorganic fertilizers — The EC 1:5 Slurry Method is valid for use on compost samples that are not amended with inorganic fertilizers (e.g., ammonium sulfate, etc.). Inorganic fertilizers will significantly increase measured EC values.

Probe maintenance — composts are often high in organic acids. These acids can accumulate on the surface of the glass electrodes, forming a film and diminishing the flow of current. See the manufacturer's instructions for cleaning and/or recoating the electrodes.

Use deionized water with a minimum resistivity of 17 MΩ/cm. Do not use tap water because it contains minerals such as calcium, magnesium, potassium, chloride and other salts that will distort the EC measurement.

The EC of an aqueous salt solution increases with increasing temperature (approximately 2 % per °C). The standard temperature for reporting EC measurements is 25 °C. If the conductivity/resistivity meter used does not compensate for differing temperatures, a correction factor must be applied.

Accurate moisture determination of the compost aliquot is needed to achieve the proper dilution to the desired ratio of 1:5, one part dry solids of compost to five parts liquid.

Sample Handling for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

Use as-received, moist material with a maximum aggregate size of 9.5 mm, i.e., material that passes through a 9.5 mm sieve.

This method requires approximately 30 g or less of material for determining EC of a sample. The prepared slurry or extract for this method can also be used for Method 4.11-A: Electrometric pH Determinations.

Apparatus for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

Conductivity cell and conductivity/resistivity meter — 1 cm, apparatus-specific, soluble salt bridge.

Büchner funnel vacuum filtration system — Büchner flask, porcelain Büchner funnel, rubber stopper, rubber tubing, and vacuum pump, approximately 97.3 kPa.

Centrifuge — with 250 mL centrifuge tubes, capable of withstanding a relative centrifugal force of 8,000 x g (i.e., 8,000 times the force of gravity).

Reciprocating Shaker — capable of shaking a sample flask at the rate of 180 reciprocations or excursions per minute.

Vacuum Extraction Filter Paper — medium flow.

Reagents and Materials for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

Extractant — Deionized water, ammonia-free, carbonate-free, maximum resistivity of 17 MΩ/cm.

Calibration Standard — Dissolve 0.7456 g potassium chloride (previously dried at 110 °C for 2 hours) in deionized water and dilute to 1.0 L. At 25 °C ± 0.1 °C, a 0.010 M potassium chloride solution will have an EC of 1.412 dS/m. A 0.100 M potassium chloride solution (7.456 g

potassium chloride diluted to 1.0 L) will have an EC of 12.90 dS/m. Standard EC calibration solutions are listed in Table 4.10-A1 and can be purchased from a scientific supply vendor.

Procedure for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

a) Determine total solids content on a parallel sample aliquot of the test sample. Refer to TMECC Method 3.9-B: Total Solids and Moisture at 105 °C.

b) Create a 1:5 slurry using an analytical balance accurate to ±0.0001 g to weigh 5 g of dry weight equivalent compost. Add 25 mL of deionized water (17 MΩ·cm or purer). Tighten the lid on the container. Shake the slurry at a rate of 180 excursions per minute for 20 minutes. Separate the liquid and solid fractions of the 1:5-slurry by centrifuge or vacuum extraction. If centrifuging, transfer the slurry to a 250-mL centrifuge tube. Centrifuge at 8000 gravities (g-force) for fifteen minutes. Refer to Appendix B to 4.10-A: EC 1:5 Slurry Method, Mass Basis — Conversions for G-Force to Revolutions Per Minute to convert g-force to revolutions per minute. The final centrifugate may be filtered to minimize the presence of floating particles.

c) A replicate sample should be processed with each analytical batch or every 20 samples, whichever is the greater number, to monitor precision.

d) If the calibration solution was created in the laboratory, determine the EC of the calibration solutions. Refer to Table 4.10-A1.

Table 4.10-A1 Conductivity of potassium chloride solutions at 25 °C

Molar Concentration	*Electrical Conductivity (dS/m)*
0.001	0.147
0.010	1.413
0.020	2.767
0.050	6.668
0.10	12.90
0.20	24.82
0.50	58.64

Adapted from Rhoades (1996)

e) Standardize the EC meter using the standard potassium chloride solution following manufacturer's instructions (e.g., Table 4.10-A1).

f) If necessary, measure the temperature of the slurry. Set the temperature compensation dial on the EC meter to the temperature of the slurry.

g) If the EC meter is not equipped with temperature compensation, correct the reading to 25 °C as specified in Appendix A to 4.10-A: EC 1:5 Slurry Method, Mass Basis — Temperature Correction.

h) Insert the EC electrodes into the slurry and swirl gently. Allow the reading on the instrument to stabilize. Read and record the EC of the slurry (dS/m).

i) Use SI reporting units including dilution specification: dS/m (1:5 dw:v ratio).

Report for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

Report test outcome in dS/m, (1:5, dw:v), sample pH, as-received sample moisture content, material type (e.g., compost, feedstock, etc.), and source material (e.g., biosolids, yard waste, etc.).

Electrical conductivity is reported as dS/m, (1:5 dw:v ratio), deciSiemens per meter, including reference to the 1:5 ratio of sample dry weight to liquid volume.

Minimum detectable EC — ± 0.1 dS/m.

Interpretation of Results for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

Electrical conductivity ($EC_{1:5}$) is an indicator test and interpreted relative to the outcome of other tests including respirometry, bioassays, Agricultural Index, volatile organic compounds, pH, and nutrient and ion concentrations of potassium, sodium, chloride, ammonium, sulfate, and carbonates.

Quality Control for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis

The guidance provided is for laboratory users to ensure that samples they submit, or analyses they perform themselves, produce reliable, defensible data. It is the responsibility of the laboratory to ensure that users receive appropriate instruction in the correct use of each instrument, including any calibration steps required prior to analysis. In cases where user calibration is not appropriate, the laboratory should provide instruments that are already calibrated, verified, and ready for use. Some analyses may fall under regulatory frameworks and compliance obligations may differ by jurisdiction and application. Established regulatory guidance for those contexts should be followed when applicable.

Calibrate the EC probe prior to sample measurements. Re-measure a mid-range calibration standard every 20 samples or less or as directed by the EC probe manual. If the reading is not equal to the calibration standard, recalibrate the probe and reanalyze affected samples.

Measure EC of deionized water at least once per analytical day. The reading should be ≤ 0.05 dS/m.

Potential errors may occur due to weighing incorrect amounts of compost or measuring incorrect water volume. Dirty glassware, probes, or mixing tools can introduce extraneous ions or residues, affecting readings. The EC probe must be cleaned undamaged; Carryover from previous samples can contaminate subsequent measurements.

Precision describes the variability in repeated measurements. Typical within-laboratory reproducibility is ≤ 6 % relative mean deviation (Sullivan et al., 2018).

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TMECC:

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Section 4.11: Electrometric pH Determinations for Compost.

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Appendix A to 4.10-A: EC 1:5 Slurry Method, Mass Basis —Temperature Correction

Temperature Correction for Method 4.10-A: EC 1:5 Slurry Method, Mass Basis based on US Salinity Laboratory Staff (1954)

Temperature Correction Coefficient — Measure EC of the potassium chloride calibration standard at laboratory temperature. Divide the 25 °C standard EC value by the measured value.

$$A = B \div C$$ Equation 4.10-A1

where:

A = temperature correction coefficient, unitless,

B = conductivity of potassium chloride calibration standard at 25 °C, 1.41 dS/m, etc. (refer to Table 4.10-A1), and

C = electrical conductivity of potassium chloride calibration standard at laboratory temperature, dS/m.

Corrected Reading — Multiply the reading from each sample by the temperature correction coefficient to correctly report readings on a 25 °C basis.

$$D = E \times A$$ Equation 4.10-A2

where:

D = corrected reading for sample on a 25 °C basis, dS/m,

E = reading for sample at laboratory temperature, dS/m,

A = temperature correction coefficient, unitless.

Appendix B to 4.10-A: EC 1:5 Slurry Method, Mass Basis — Conversions for G-Force to Revolutions Per Minute

Convert RCF to revolutions per minute (RPM) using the following formula:

RPM = $\sqrt{[RCF/(r \times 1.118)]} \times 1 \times 10^5$ Equation 4.12-F1

$$\mathrm{RPM} = \sqrt{\frac{\mathrm{RCF} \times 10^5}{1.118 \times r}}$$

where:

RCF (g force) = relative centrifugal force

RPM= rotation speed, revolutions per minute

r = rotational radius (cm)