Designation: D2976 – 15

Standard Test Method for pH of Peat Materials[1]

This standard is issued under the fixed designation D2976; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This test method covers the electrometric measurement of the pH of peat materials, not soil. The standard for measurement of pH in soil is Test Method D4972, nor does this cover the measurement of pH for corrosion testing, which is contained in Test Method G51. These standards are being intentionally kept separate for clarity at the request(s) of the governing sub-committees. It is a means of expressing the degree of acidity or alkalinity of peat material suspended in water and 0.01 *M* calcium chloride solution.

1.2 The values given in SI units are to be regarded as the standard.

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes shall not be considered as requirements of the standard.

1.4 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.4.1 The procedures used to specify how data are collected/recorded or calculated, in this standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering design.

1.5 *This standard offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "Standard" in the title of this document means only that the document has been approved though the ASTM consensus process.*

1.6 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1193 Specification for Reagent Water

D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

D4972 Test Method for pH of Soils

D6026 Practice for Using Significant Digits in Geotechnical Data

G51 Test Method for Measuring pH of Soil for Use in Corrosion Testing

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of common technical terms used in this standard, refer to Terminology D653.

4. Summary of Test Method

4.1 The electrometric measurement of the pH of peat in suspensions of water and calcium chloride solutions is made with a potentiometer using an electrode system, calibrated with buffers of known pH.

5. Significance and Use

5.1 pH measurements are made in water and in calcium chloride solution because the pH readings in water can be

[1] This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.22 on Soil as a Medium for Plant Growth.

Current edition approved Nov. 1, 2015. Published December 2015. Originally approved in 1971. Last previous edition approved in 2004 as D2976 - 71 (2004), which was withdrawn July 2015 and reinstated in November 2015. DOI: 10.1520/D2976-15.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

modified by salts, such as fertilizer material, whereas the observed pH in calcium chloride solution is virtually independent of the initial amount of salts present in the soil. pH values obtained in calcium chloride solution usually run about a 0.5 to 0.8 pH unit lower than measurements in water due to release of more hydrogen ions by cation exchange.

5.2 All water used for this test method must be ASTM Type III or better. Type III water is defined by Specification D1193.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

6. Apparatus

6.1 *pH Meter*—Potentiometer equipped with an electrode system. Follow the manufacturer's instructions for the pH meter used.

7. Reagents

7.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

7.2 *Purity of Water*—Water shall be ASTM Type III or better. Use water with a pH of not less than 6.5 nor more than 7.5, obtained by boiling distilled water for 15 min and cooling under carbon dioxide-free conditions.

7.3 *Acid Potassium Phthalate Buffer Solution* (0.05 *M*)—Dissolve 10.21 g (dried 1 h at 105 ± 5°C) of potassium phthalate (NBS Standard Samples) in water and dilute to 1 L. Protect the solution against evaporation and contamination with molds. Replace the solution when mold is apparent. The effect of temperature is as follows:

°C	pH
5 to 24	4.00
25 to 33	4.01
34 to 37	4.02

7.4 *Calcium Chloride, Stock Solution* (1.0*M*)—Dissolve 147 g of $CaCl_2 \cdot 2H_2O$ in distilled water in a 1-L volumetric flask, cool, dilute to volume with distilled water, and mix.

7.5 *Calcium Chloride Solution* (0.01*M*)—Dilute 20.0 mL of stock 1.0 *M* $CaCl_2$ solution to 2 L with distilled water. The pH of this solution should be between 5 and 6.5.

7.6 *Phosphate Buffer Solution* (0.025*M*)—Dissolve 3.40 g of KH_2PO_4 and 3.55 g of Na_2HPO_4 (NBS Standard Samples 186 I and II) in water and dilute to 1 L. Dry salts 2 h at 130°C before use. Effect of temperature on pH is:

°C	pH
0	6.98
10	6.92
20	6.88
30	6.85
40	6.83

8. Calibration of pH Meter

8.1 Calibrate the pH meter using the acid potassium phthalate and phosphate buffer solutions. Suitable commercially available NIST traceable calibration solutions are also acceptable.

9. Procedure

9.1 *pH in Distilled Water*—Weigh out about 3 g of air-dried peat or about the equivalent amount of moist material. Place into a 100-mL beaker. Add 50 mL of distilled water. Additional water may be needed for very fibrous materials, such as sphagnum moss peat. Let soak with occasional stirring for 30 min. Read on pH meter.

9.2 *pH in 0.01 M $CaCl_2$ Solution*—Weigh out about 3.0 g of air-dried peat or the equivalent amount of moist material. Place into a 100-mL beaker. Add 50 mL of 0.01 *M* $CaCl_2$ solution. Let soak with an occasional stirring for 30 min. Read on pH meter.

10. Report: Test Data Sheet(s)/Form(s)

10.1 Record as a minimum the following general information:

10.1.1 Sample/specimen identifying information, such as Project No., Boring No., Sample No., Depth, etc.

10.1.2 Any special selection and preparation process, such as removal of gravel or other materials.

10.1.3 Technician name, method used and date.

10.2 Record as a minimum the following test information:

10.2.1 Report the pH of the peat to the first decimal place (0.1) and specify whether it is pH in distilled water or pH in calcium chloride solution. All measured and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

11. Precision and Bias

11.1 *Precision*—Test data on precision is not presented due to the nature of the peat materials tested by this method. It is either not feasible or too costly at this time to produce multiple specimens that have uniform chemical properties. Any variation observed in the data is just as likely to be due to specimen variation as to operator or laboratory testing variation. Subcommittee D18.22 is seeking any data from the users of this standard that might be used to make a limited statement on precision.

11.2 *Bias*—There is no accepted reference value for this test method, therefore, bias cannot be determined.

12. Keywords

12.1 peat; pH; water penetration; water retention

SUMMARY OF CHANGES

In accordance with Committee D18 policy, this section identifies the location of changes to this standard since the last edition (1971(Reapproved 2004)) that may impact the use of this standard. (November 1, 2015)

(1) Revised Section 1.
(2) Added Referenced Documents and Terminology sections.
(3) Added reference to ASTM Type III water.
(4) Corrected Reagent mixing directions.