



## Standard Test Method for pH of Peat Materials<sup>1</sup>

This standard is issued under the fixed designation D 2976; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This test method<sup>2</sup> covers the electrometric measurement of the pH of peat materials. 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 *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. Summary of Test Method

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

### 3. Significance and Use

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

### 4. Apparatus

4.1 *pH Meter*—Potentiometer equipped with glass-calomel electrode system. Follow the manufacturer's instructions for the pH meter used.

### 5. Reagents

5.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society,

where such specifications are available.<sup>3</sup> 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.

5.2 *Purity of Water*—Water shall be carbon-dioxide-free distilled water. Use water with a pH of not less than 6.5 nor more than 7.5 obtained by boiling distilled water 15 min and cooling under carbon dioxide-free conditions.

5.3 *Acid Potassium Phthalate Buffer Solution (0.05 M)*—Dissolve 10.21 g (dried 1 h at 105°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

5.4 *Calcium Chloride, Stock Solution (1.0 M)*—Dissolve 147 g of  $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$  in distilled water in a 1-L volumetric flask, cool, dilute to volume with distilled water, and mix. Dilute 15 mL of this solution to 200 mL with distilled water in a volumetric flask, and standardize by titrating a 25-mL aliquot of the diluted solution with standard 0.1 N silver nitrate ( $\text{AgNO}_3$ ) solution using 1 mL of 5 % potassium chromate ( $\text{K}_2\text{CrO}_4$ ) solution as the indicator.

5.5 *Calcium Chloride Solution (0.01 M)*—Dilute 20.0 mL of stock 1.0 M  $\text{CaCl}_2$  solution to 2 L with distilled water. The pH of this solution should be between 5 and 6.5.

5.6 *Phosphate Buffer Solution (0.025 M)*—Dissolve 3.40 g of  $\text{KH}_2\text{PO}_4$  and 3.55 g of  $\text{Na}_2\text{HPO}_4$  (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

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.06 on Physical-Chemical Interactions of Soil and Rock.

Current edition approved Sept. 20, 1971. Published November 1971.

<sup>2</sup> This test method is currently undergoing an extensive review by ASTM Committee D-18 and additional alternative methods will be proposed.

<sup>3</sup> "Reagent Chemicals, American Chemical Society Specifications," Am. Chem. Soc., Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, NY, and the "United States Pharmacopeia."

## 6. Calibration of pH Meter

6.1 Calibrate the pH meter using the acid potassium phthalate and phosphate buffer solutions.

## 7. Procedure

7.1 *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.

7.2 *pH in 0.01 M CaCl<sub>2</sub> 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<sub>2</sub> solution. Let soak with an occasional stirring for 30 min. Read on pH meter.

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).*

## 8. Report

8.1 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.

## 9. Precision and Bias

9.1 *Precision*—Due to the nature of the soil or rock materials tested by this method it is either not feasible or too costly at this time to produce multiple specimens which have uniform physical 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 D18.18 welcomes proposals that would allow for development of a valid precision statement.

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

## 10. Keywords

10.1 peat; water penetration; water retention