



# Standard Test Method for pH of Atmospheric Wet Deposition Samples by Electrometric Determination<sup>1</sup>

This standard is issued under the fixed designation D5015; 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 is applicable to the determination of pH in atmospheric wet deposition samples by electrometric measurement using either a pH half cell with a reference probe or a combination electrode as the sensor.

1.2 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.3 *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.*

1.4 **Warning**—Mercury has been designated by many regulatory agencies as a hazardous material that can cause serious medical issues. Mercury, or its vapor, has been demonstrated to be hazardous to health and corrosive to materials. Caution should be taken when handling mercury and mercury containing products. See the applicable product Safety Data Sheet (SDS) for additional information. Users should be aware that selling mercury or mercury-containing products into your state or country may be prohibited by law.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

D1129 Terminology Relating to Water

D1193 Specification for Reagent Water

D1356 Terminology Relating to Sampling and Analysis of Atmospheres

D2777 Practice for Determination of Precision and Bias of Applicable Test Methods of Committee D19 on Water

D5012 Guide for Preparation of Materials Used for the

Collection and Preservation of Atmospheric Wet Deposition

D5111 Guide for Choosing Locations and Sampling Methods to Monitor Atmospheric Deposition at Non-Urban Locations

E1 Specification for ASTM Liquid-in-Glass Thermometers

E2251 Specification for Liquid-in-Glass ASTM Thermometers with Low-Hazard Precision Liquids

IEEE/ASTM SI-10 American National Standard for Metric Practice

## 3. Terminology

### 3.1 Definitions:

3.1.1 *pH*—the negative logarithm to the base ten of the conventional hydrogen ion activity.

3.1.2 For definitions of other terms used in this test method, refer to Terminologies D1129 and D1356. For an explanation of the metric system including units, symbols, and conversion factors, see IEEE/ASTM SI-10.

## 4. Summary of Test Method

4.1 The pH meter and the associated electrodes are calibrated with two reference buffer solutions that bracket the anticipated sample pH. The pH of the wet deposition sample is determined from this calibration and a quality control standard. The quality control standard is necessary in this application to evaluate the bias due to residual liquid junction potentials and to correct for this bias.

4.2 The pH of a solution is related to the EMF (millivolts) of a pH electrode system according to the operational definition for a two-point calibration:

$$\text{pH}(X) = \text{pH}(S_1) + \frac{E_X - E_{S_1}}{E_{S_2} - E_{S_1}} [\text{pH}(S_2) - \text{pH}(S_1)] \quad (1)$$

where:

pH (X) = pH of an unknown sample,  
pH(S<sub>1</sub>) = pH of a Standard Solution 1,  
pH(S<sub>2</sub>) = pH of a Standard Solution 2,  
E<sub>X</sub> = EMF (mV) measured in an unknown sample,  
E<sub>S<sub>1</sub></sub> = EMF (mV) measured in Standard Solution 1, and  
E<sub>S<sub>2</sub></sub> = EMF (mV) measured in Standard Solution 2.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D22 on Air Quality and is the direct responsibility of Subcommittee D22.03 on Ambient Atmospheres and Source Emissions.

Current edition approved April 1, 2015. Published April 2015. Originally approved in 1989. Last previous edition approved in 2008 as D5015 – 02 (2008). DOI: 10.1520/D5015-15.

<sup>2</sup> 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.