Designation: D2810 – 13

# Standard Test Method for pH of Leather[1]

This standard is issued under the fixed designation D2810; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope

1.1 This test method covers the determination of the pH of all types of leather. This method does not apply to wet blue.

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.*

## 2. Referenced Documents

2.1 *ASTM Standards:*

D2813 Practice for Sampling Leather for Physical and Chemical Tests

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 The pH of a solution has been defined as the negative logarithm of the hydrogen ion activity. A solution of pH 7 is neutral at 24°C. Lower numbers indicate increasing acidity; higher numbers, increasing alkalinity.

## 4. Significance and Use

4.1 This test method is designed to measure the pH of a distilled-water extract of leather. This is considered to be a measure of the acidity or alkalinity of the leather. Excessive acidity or alkalinity may have a deleterious effect on the aging characteristics of leather.

4.2 This test method is suitable for development, control, and service evaluation of leather.

## 5. Interferences

5.1 If the leather contains an excessive amount of fats or greases or has been treated with a material to obtain water repellency, the wettability and consequently the extractability may be affected.

5.2 If the specimen is difficult or impossible to wet, it may be treated by any of the following procedures:

5.2.1 A vacuum may be used to effect wetting.

5.2.2 Mix with the required amount of water for 1 min in a disintegrator.[2]

5.2.3 Extract the weighed specimen with a fat solvent in a Soxhlet apparatus for 5 h. Allow the specimen to air until all solvent has evaporated; then proceed as outlined in Section 10.

## 6. Apparatus

6.1 *pH Meter,* either battery or line-operated with a suitable electrode. The meter shall have a resolution of 0.1/0.01 pH unit, and shall have a relative accuracy of ±0.1/0.01 pH unit.

6.2 *Analytical Balance,* sensitive to 0.01 g.

## 7. Reagents

7.1 *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.[3] 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*—Unless otherwise indicated, references to water shall be understood to mean distilled water or water of equal purity. Distilled water shall have a pH value of not less than 5.5 nor more than 7.0 and shall give a residue of not more than 0.5 mg, when 100 mL is evaporated and dried in a platinum dish.

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[1] This test method is under the jurisdiction of ASTM Committee D31 on Leather and is the direct responsibility of Subcommittee D31.06 on Chemical Analysis. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method B20 – 1969).

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[2] A Waring Blender has been found satisfactory.

[3] *Reagent Chemicals, American Chemical Society Specifications* , American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

7.3 *Standard pH Solutions:*[4]

7.3.1 *Alkaline Phosphate Buffer Solution (0.01 M trisodium phosphate, pH = 11.72 at 25°C)*—Dissolve 1.42 g of anhydrous disodium hydrogen phosphate ($Na_2HPO_4$) in 100 mL of a 0.1 *N* carbonate-free solution of sodium hydroxide (NaOH) and dilute to 1 L with water.

7.3.2 *Borax Buffer Solution (0.01 M, pH = 9.18 at 25°C)*—Dissolve 3.81 g of sodium tetraborate decahydrate ($Na_2B_4O_7 \cdot 10\ H_2O$) in water and dilute to 1 L.

7.3.3 *Hydrochloric Acid (pH = 1.10 at 25°C)*—Add 2 g of concentrated hydrochloric acid (HCl, sp gr 1.19) to 450 g of water. Standardize and dilute to 0.1 *N*.

7.3.4 *Phosphate Buffer Solution (0.025 M with respect to each phosphate, salt pH = 6.86 at 25°C* )—Dissolve 3.40 g of monobasic potassium phosphate ($KH_2PO_4$) and 3.55 g of anhydrous dibasic sodium phosphate ($Na_2HPO_4$) in water and dilute to 1 L.

7.3.5 *Potassium Hydrogen Phthalate Buffer Solution (0.05 M, pH = 4.01 at 25°C)*—Dissolve 10.21 g of potassium hydrogen phthalate ($KHC_8H_4O_4$) in water and dilute to 1 L.

## 8. Test Specimen

8.1 The specimen shall consist of from 2 to 5 g of leather from a composite sample prepared according to Practice D2813.

## 9. Standardization

9.1 Before the pH of the solution is measured, turn the instrument on, allow it to warm up thoroughly, and bring to electrical balance in accordance with the manufacturer's instructions. Thoroughly rinse the electrodes with water.

9.2 Use manufacturer's directions for establishing two point standardization with standard pH solutions that read on either side of the anticipated pH of the solution to be tested.

9.3 Check for electrode drift with either of the buffers and restandardize if necessary.

## 10. Procedure

10.1 Weigh the specimen in duplicate to the nearest 0.1 g and transfer to 250-mL Erlenmeyer flasks. Add water in the amount of twenty times the mass of the specimen. Stopper the flasks and agitate thoroughly. Let stand at the Standard Laboratory Temperature, 23.0 ± 1°C (73.4± 1.8°F), with occasional agitation for not less than 4 nor more than 18 h. Agitate thoroughly and transfer to a clean beaker or decant if possible.

10.2 Rinse the electrode with water and immerse in the test solution to determine the pH of the leather-water mixture or solution. Read the meter to the nearest 0.01 unit. Rinse the electrodes with water again and repeat with the second test specimen.

## 11. Report

11.1 Report the following information:

11.1.1 The individual values or the average, or both, of pH of the sample shall be reported to the nearest 0.05 pH unit except when establishing repeatability or reproducibility then report each determination separately to 0.01 pH units.

## 12. Precision and Bias

12.1 *Repeatability*—The average difference between two results (each the average of duplicate determinations), obtained by the same analysis on different days, will approximate 0.01 pH units. Two such values should be considered suspect (95 % confidence level) if they differ by more than 0.03 pH units.

12.2 *Reproducibility*—The average difference between two results (each the average of duplicate determinations) obtained by analysis in different laboratories will approximate 0.02 pH units. Two such values should be considered suspect (95 % confidence level) if they differ by more than 0.06 units.

NOTE 1—Variance analysis of the pH data is on file as a research report at ASTM Headquarters.[5] It was developed from a round-robin test involving five laboratories and four leathers.

## 13. Keywords

13.1 acidity; alkalinity; pH

[4] Buffer salts and solutions prepared in accordance with National Bureau of Standards recommendations are sold by reputable laboratory supply houses and may be used.

[5] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting RR:D31-1002.