Designation: D2876 – 00 (Reapproved 2016)

Standard Test Method for
Water-Soluble Matter of Vegetable-Tanned Leather[1]

This standard is issued under the fixed designation D2876; 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 determination of the water-soluble materials in all types of vegetable-tanned leathers. This test 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:*[2]
D3495 Test Method for Hexane Extraction of Leather

3. Summary of Test Method

3.1 The test method gives the amount of water-soluble matter extracted from the leather at 35°C by 1 L of water in 3 h. The leather is first freed of hexane-extractable material by extraction with hexane and leaving at ambient temperature in an exhaust hood to remove the hexane.

4. Significance and Use

4.1 The test method is useful for determining the water-soluble materials in vegetable-tanned leathers.

4.2 The water-soluble matter includes the soluble nontanning components of the tanning materials used, sugars and materials of a similar nature, and inorganic compounds such as Epsom salts, Glauber's salts, borax, and other soluble salts added during curing and tannery processing.

5. Apparatus

5.1 *Crystallizing Dish,* borosilicate glass, 50 mm tall, 70 mm in outside diameter, and weighing between 30 and 39 g.

5.2 *Extractor, Reed-Churchill Type*[3]—The extraction tube shall have an internal diameter of 45 ± 2 mm and a length of 233 ± 10 mm. See Fig. 1.

5.3 *Water Bath,* equipped to control the temperature at 35 ± 0.5°C.

5.4 *Circulating Air Oven,* capable of maintaining a temperature of 99 ± 1°C.

6. Test Specimen

6.1 The specimen shall consist of the 5-g leather sample that has been extracted with hexane as directed in Test Method D3495. Any deviation from this sample size should be included with the analytical results.

7. Procedure

7.1 Insert a plug of cotton or glass wool in the extraction tube before the specimen is added. Place the specimen in the extraction tube, slurry, and extract at 35°C by adjusting the flow to such a rate as to give 1 L of extract in 3 h. Cool the extract to 23°C, adjust to volume, and thoroughly mix.

7.2 If the extract is clear, pipet 100 mL into a tared crystallizing dish, evaporate and dry in a circulating air oven at 99 ± 1°C for 16 to 18 h, transfer to a desiccator, cool, and weigh.

7.3 If the extract is not clear, filter it. During this and subsequent operations, keep funnels and containers covered to prevent changes due to evaporations. Carry out all operations at an ambient temperature of 23 to 25°C. Place a 215-mm diameter filter paper,[4] pleated so that it contains 32 evenly divided creases, into a 125-mL funnel. To 2.0 g of kaolin (see

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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 D31.01 on Vegetable Leather. This test method was developed in cooperation with the American Leather Chemists Assn. (Standard Method B8–1954).

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[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.

[3] Reed, H. C. and Churchill, J. B., "An Extractor for Water Soluble in Leather," *Journal of the American Leather Chemists Association*, JALCA, Vol 14, 1919, p. 137.

[4] The sole source of supply of approved filter paper (C.S. and S. No. 610) for tannin determinations known to the committee at this time is Carl Schleicher and Schuell Co., Keene, NH. If you are aware of alternative suppliers, please provide this information to ASTM headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee[1] which you may attend.

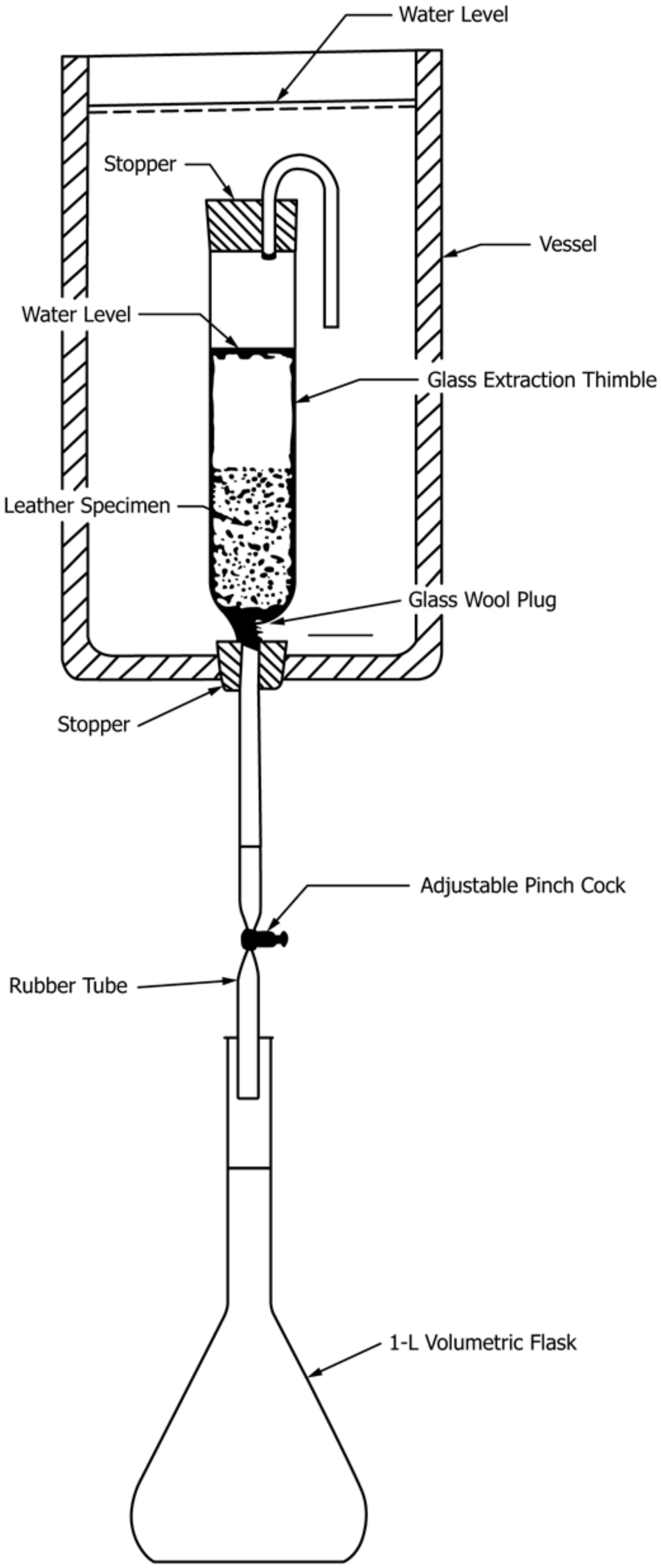

FIG. 1 Reed-Churchill Type Extractor

Note 1) in a clean glass container add 25 mL of the extract and stir the mixture to a smooth paste. Add a further 200 mL of the extract and again stir the mixture to a uniform suspension. Pour the suspension onto the pleated paper in the funnel and collect the filtrate in the container in which the solution and kaolin were mixed. When 40 mL of the filtrate have been collected, swirl it to pick up kaolin remaining in the container, and return it to the funnel. Repeat collecting and repouring 40 mL of the filtrate onto the paper in the funnel as many times as possible for 1 h. Siphon the solution out of the filter without disturbing the kaolin film and discard it. Refill the paper with 225 mL of the extract, disturbing the kaolin film as little as possible by pouring into the center of the cone. When 40 mL of the filtrate have passed through, collect the next portion in a clear, dry glass container and, when about 125 mL have been collected, remove the container from beneath the funnel. Check this 125 mL for clarity and if not clear, reject it and rerun the determination using a new filter.

Note 1—Only approved kaolin should be used.[5] When 1.0 g is suspended in 100 mL of distilled water for 5 min, the suspension shall have a pH between 4.5 and 6.0. When 2.0 g are shaken with 100 mL of distilled water for 10 min and the mixture filtered, 100 mL of clear filtrate shall leave less than 0.001 g of residue when evaporated and dried in a platinum dish.

8. Calculation

8.1 Calculate the percentage of soluble material in the leather as follows:

$$\text{Water} - \text{soluble material, } \% = \left[(W_2 - W_1)/W_3 \right] \times 1000 \qquad (1)$$

where:

W_1 = weight of crystallizing dish,
W_2 = weight of crystallizing dish and residue, and
W_3 = weight of the leather specimen.

9. Precision and Bias[6]

9.1 The precision of the test method is largely limited by lack of homogeneity of the sample in a complex material such as leather. It will also vary with water solubles content.

9.1.1 At the 95 % confidence level, duplicate determinations by the same operator should not differ more than 0.6 % water solubles.

9.1.2 At the 95 % confidence level, the average of duplicate determinations in each of two laboratories should not differ by more than 1.0 % water solubles.

9.2 Inasmuch as all leathers contain an unknown amount of natural or inherent water solubles, no meaningful statement can be made with respect to bias.

10. Keywords

10.1 leather; vegetable-tanned leather; water-soluble matter

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[5] The sole source of supply of the approved kaolin known to the committee at this time is Arthur H. Thomas Co., Philadelphia, PA. If you are aware of alternative suppliers, please provide this information to ASTM headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee[1] which you may attend.

[6] Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D31-1001.