



Designation: D6016 – 17 (Reapproved 2023)

Standard Test Method for Determination of Nitrogen, Water Extractable in Leather¹

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1. Scope

1.1 This test method covers quantitatively determining the water extractable nitrogen in leather.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

[D2868 Test Method for Nitrogen Content \(Kjeldahl\) and Hide Substance Content of Leather, Wet Blue and Wet White](#)

[D2876 Test Method for Water-Soluble Matter of Vegetable-Tanned Leather](#)

[D3495 Test Method for Hexane Extraction of Leather](#)

[D3790 Test Method for Volatile Matter \(Moisture\) of Leather by Oven Drying](#)

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 from Federal Test Method Standard No. 311, Method 6452 in cooperation with the U.S. Army Natick Research Development & Engineering Center, Natick MA and the Defense Personnel Support Center Directorate of Clothing and Textiles, Philadelphia PA.

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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. Significance and Use

3.1 This test method provides the means to determine nitrogen containing water extractable materials such as excess and loosely bound tannins, ammonium salts, and nitrates.

4. Apparatus

4.1 *Volumetric Flask*, 1 L.

4.2 *Kjeldahl Apparatus*, see Test Method [D2868](#).

5. Reagents

5.1 See Test Method [D2868](#).

5.2 See Test Method [D3495](#).

5.3 See Test Method [D2876](#).

6. Procedure

6.1 Follow the procedure for Test Method [D3495](#). Save extracted leather and follow the procedure in 7.1 only of Test Method [D2876](#).

6.2 When 1 L has been collected, cool the litre flask with contents to room temperature, readjusted up to 1 L with distilled water and mixed thoroughly. Transfer 500 mL of the solution to an 800 mL Kjeldahl flask. If using automated Kjeldahl instrumentation, sample size and quantity of reagents may need adjustment. Add 8 g of digestion catalyst (see Test Method [D2868](#)) and 20 mL of sulfuric acid (specific gravity 1.83) to the solution and the contents of the flask mixed thoroughly.

6.3 Digest the mixture over a low heat source until all organic matter is oxidized as indicated by the end of foaming and clearing of the solution. When foaming has ceased and the solution has cleared, apply full heat to the mixture and continue digestion for a minimum of 1 h. After digestion is complete, remove the flask from the heat, and allow to cool to room temperature. Then add 25 mL of 8 % sodium thiosulfate and set aside the flask for 5 min to 10 min with occasional stirring.

6.4 Follow distillation and titration procedure in 7.3 of Test Method [D2868](#).

7. Calculation

7.1 Calculate the water extractable nitrogen in the specimen as follows:

water extractable nitrogen (moisture – free basis), % (1)

$$= \frac{A \times N \times 0.014 \times 2 \times 100}{W \times \frac{(100 - M)}{(100)}}$$

and shall be reported to the nearest 0.01 %. Report individual results utilized in obtaining the average.

9. Precision and Bias

9.1 See Test Method **D2868** for information on precision and bias.

10. Keywords

10.1 ammonium salts; leather; nitrates; nitrogen; tannins; water absorption; water extractable

where:

- A** = of standard acid (corrected for blank) required to titrate the specimen, mL,
N = normality of the standard acid,
W = weight of the specimen, g, and
M = moisture content of the leather (see Test Method **D3790**).

8. Report

8.1 The water extractable nitrogen in the specimen shall be the average of the results obtained from the specimens tested,

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