



Designation: D7129 – 09

# Standard Test Method for Determination of Ammonia Trapping in a Grafted Battery Separator<sup>1</sup>

This standard is issued under the fixed designation D7129; 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 covers the measurement of the ability of a material to capture ammonia.

1.2 This test method is intended primarily for testing grafted polyolefin materials used as a battery separator, although other materials could be tested.

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

1.4 *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:*<sup>2</sup>

[D123 Terminology Relating to Textiles](#)

[E438 Specification for Glasses in Laboratory Apparatus](#)

[E1272 Specification for Laboratory Glass Graduated Cylinders](#)

## 3. Terminology

3.1 *Definitions:*

3.1.1 For definitions on other textile terms in this test method, refer to Terminology [D123](#)

## 4. Summary of Test Method

4.1 A predetermined amount of separator and ammonium hydroxide is added together in a KOH solution. The specimens are conditioned under a controlled temperature for 24 h. After

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D09 on Electrical and Electronic Insulating Materials and is the direct responsibility of Subcommittee D09.19 on Dielectric Sheet and Roll Products.

Current edition approved Oct. 1, 2009. Published November 2009. Originally approved in 2005. Last previous edition approved in 2005 as D7129 – 05. DOI: 10.1520/D7129-09.

<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.

the solution is cooled, the solutions are distilled to determine the amount of ammonia the separator retained.

4.2 Results are calculated as mol/g using the appropriate equations.

## 5. Significance and Use

5.1 Nickel metal hydride (Ni-MH) cells/batteries can exhibit high self-discharge rates. Nitrate impurities in the positive electrode can be reduced to ammonia on the negative electrode. This causes rapid self-discharge. Technical publications have reported a link between the separator ammonia trapping capabilities and the cells charge retention. Grafted polyolefin separators can absorb or trap these impurities—hence, reducing self-discharge rates. The level of ammonia trapping from this method gives an indication of the efficiency of a separator to trap these contaminants, thus helping a battery self discharge (charge retention). A higher value should allow a cell to have greater charge retention.

## 6. Apparatus

6.1 *Flask, Erlenmeyer*, wide mouth, 250 mL capacity with a screw cap.

6.2 *Flask, Erlenmeyer*, wide mouth, 500 mL capacity.

6.3 *Cylinder, Graduated, Class A*, 250 mL capacity.

NOTE 1—The tolerance on the accuracy of the graduations in Specification [E1272](#) for this apparatus is  $\pm 1.4$  mL. If greater accuracy is required for a test result, the graduated trap(s) should be calibrated.

6.4 *Pipette, Volumetric, Class A*, 10 mL capacity.

NOTE 2—The tolerance on the accuracy of the graduations in Specification [E438](#) for this apparatus is  $\pm 0.02$  mL<sup>3</sup>. If greater accuracy is required for a test result, the graduated trap(s) should be calibrated

6.5 *Pipette, Volumetric, Class A*, 3- mL capacity.

NOTE 3—The tolerance on the accuracy of the graduations in Specification [E438](#) for this apparatus is  $\pm 0.01$  mL. If greater accuracy is required for a test result, the graduated trap(s) should be calibrated.

6.6 *Distillation Unit*, Micro or macro Kjeldhal apparatus.

6.7 *Oven*.

## 7. Reagents

7.1 *Ammonium Hydroxide*, 0.3M (NH<sub>4</sub>OH), ACS grade.

7.2 *Hydrochloric Acid*, 0.1M (HCL), ACS grade.

\*A Summary of Changes section appears at the end of this standard