Designation: D1489 – 09 (Reapproved 2016)

Standard Test Method for Nonvolatile Content of Aqueous Adhesives[1]

This standard is issued under the fixed designation D1489; 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 U.S. Department of Defense.
This test method replaces Method 4021 of Federal Test Method Standard No. 175a.

1. Scope

1.1 This test method covers the determination of the nonvolatile content of aqueous adhesives, such as dextrin, starch, casein, and animal gelatin.

1.2 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

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]
D907 Terminology of Adhesives

3. Terminology

3.1 *Definitions*—Many terms in this test method are defined in Terminology D907.

4. Significance and Use

4.1 Adhesive cost is often related to the solids level (nonvolatile content).

4.2 This test method can be used to compare the nonvolatile content of various adhesives for adhesive selection and product uniformity.

4.3 This test method is suitable for quality control and research purposes.

5. Apparatus and Materials

5.1 *Analytical Balance,* for weighing of specimen, accurate to ±0.001 g.

5.2 *Laboratory Balance,* for weighing of sample, accurate to ±0.01 g.

5.3 *Constant-Temperature Oven,* capable of maintaining a temperature of 105 ± 1°C (221 ± 2°F).

5.4 *Glass Jar* of sufficient size, 1 L or more, to store sample of adhesive prior to testing. The jar shall be such that it can be sealed to prevent the loss of volatile content during the storage period.

5.5 *Beaker*—of 100 mL capacity.

5.6 *Weighing Bottles*—wide-mouth cylindrical glass weighing bottles, of flat form, about 30 mm in height and 50 mm in diameter, having interchangeable ground-in glass caps.

5.7 *Volumetric Flasks,* of 200-mL capacity, with glass stoppers.

5.8 *Volumetric Pipet,* of 10-mL capacity.

5.9 *Desiccator,* with drying agent and tray.

5.10 *Silica Sand.*

5.11 *Water, Hot*—distilled water heated to at least 80°C.

5.12 *Hot Plate,* used to heat the water.

6. Sampling

6.1 The sample of the adhesive shall be representative of the lot being evaluated. The quantity shall be at least 1.0 L aliquot consisting of a composite taken, when possible, from three or more separate containers chosen at random. Thoroughly mix the sample to uniform consistency. Immediately place the composite sample in an airtight glass jar until tested.

7. Procedure

7.1 Make sure that the sample in the glass jar is of uniform consistency before removing a specimen for testing. Inspect the sample to ensure that there are no signs of settling or separation of the adhesive. If settling or separation are noted, mix the samples thoroughly. Other factors, such as foaming or contamination may require the samples be replaced.

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[1] This test method is under the jurisdiction of ASTM Committee D14 on Adhesives and is the direct responsibility of Subcommittee D14.10 on Working Properties.

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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.

7.2 Test three 10-g specimens from each composite sample.

7.3 Weigh about 10 g of adhesive into a small beaker to the nearest 0.01 g. Disperse in 50 mL of hot distilled water and transfer to a 200-mL volumetric flask. Rinse the beaker with small portions of hot distilled water and add rinsings to the flask. Dilute to mark with hot distilled water. Perform duplicate tests on each dispersion prepared in this manner.

7.4 Pipet 10 mL of the dispersion into a tared weighing bottle three quarters full of silica sand which has been dried to constant weight.

NOTE 1—In the case of adhesives that do not reach constant weight, for example those containing glycerin or slightly volatile plasticizers, make one weighing after a specified period of time mutually agreed upon between the manufacturer and the purchaser.

7.5 Dry the sample in the bottle at 105 ± 1°C (221 ± 2°F) in the constant temperature oven until it has reached a constant weight. Determine this by removing the bottle, at predetermined times, and quickly weighing it on the scale. Once the same weight is achieved in two consecutive weighings, return the sample to the oven for 5 min more. Then, cover the bottle and cool in a desiccator charged with desiccant to room temperature before weighing to the nearest 0.001 g.

8. Calculation

8.1 Calculate the percent of nonvolatile content as follows:

$$\text{Nonvolatile matter, } \% = (W_1/W_2) \times 2000 \quad (1)$$

where:

W_1 = weight of dried residue, and
W_2 = weight of original 10-g specimen.

9. Accuracy of Test

9.1 Repeat the tests once if the results obtained in the six tests on a sample cover a range of more than 2 percentage units.

10. Report

10.1 Report the following information:

10.1.1 Complete identification of the adhesive tested, including type, source, manufacturer's code number, lot or batch number, condition, and date.

10.1.2 Number of containers received and number sampled.

10.1.3 Number of specimens tested (only if retested in accordance with Section 9).

10.1.4 Average non-volatile content, in percent, and sample standard deviation. If a retest is made, report each set of results separately.

11. Precision and Bias

11.1 No precision or bias exists for this test method, as the necessary resources for round-robin testing have not been forthcoming.

12. Keywords

12.1 nonvolatile; nonvolatile content; solids; solids content