



Standard Test Method for Nonvolatile Content of Urea-Formaldehyde Resin Solutions¹

This standard is issued under the fixed designation D 1490; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

^{ε1} NOTE—Paragraph 3.1.1 was corrected editorially in March 1997.

1. Scope

1.1 This test method covers the determination of the apparent nonvolatile content of urea-formaldehyde resin solutions intended for use as wood adhesives. Due to the chemical nature of such resins, the nonvolatile content determined varies markedly according to the type of test used. In order to minimize this condition, this test method is designed to yield reasonably uniform agreement among different laboratories testing specimens from the same sample.

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:*
D 907 Terminology of Adhesives²

3. Terminology

3.1 *Definitions*—Many terms in this test method are defined in Terminology D 907.

3.1.1 *nonvolatile content, n*—the portion of a material that remains after volatile matter has been evaporated under specified ambient or accelerated conditions. (Sometimes called *solids content*.)

3.1.1.1 *Discussion*—The percentage by weight of the nonvolatile matter in an adhesive will vary depending on the analytical procedure. A standard test method must be used to obtain consistent results.

3.1.2 *solids content, n*—See *nonvolatile content*.

4. Significance and Use

4.1 Wood adhesive performance and cost is often related to the solids level (nonvolatile content).

4.2 This test method determines the apparent nonvolatile content for urea-formaldehyde resins.

5. Apparatus

5.1 *Analytical Balance*, accurate to ± 1.0 mg (0.000002 lb).

5.2 *Thermometer*—A glass thermometer having a range from 0 to 110 or 150°C (32 to 230 or 302°F) and accurate to $\pm 1^\circ\text{C}$ ($\pm 2^\circ\text{F}$) at the required immersion.

5.3 *Constant-Temperature Oven*, capable of maintaining a temperature of $105 \pm 1^\circ\text{C}$ ($221 \pm 2^\circ\text{F}$) and an air turnover of 15 to 17 times per min. Use only one shelf for supporting the specimens. Position this shelf in the upper third of the oven, as near one third from the ceiling as possible. Level the shelf to within 0.025 mm (0.001 in.) from edge to edge in all directions. Place the thermometer bulb as close to the center of the shelf as possible.

5.4 *Tared Lunge Weighing Pipet*, stoppered weighing bottle, or equivalent dispenser for accurately weighing by difference.

5.5 *Drying Dishes*—Aluminum foil dishes, with 57 to 58-mm (2.25-in.) inside diameter and 17 mm (0.7 in.) deep, with flat bottoms, having a tolerance of ± 0.076 mm (± 0.003 in.).

5.6 *Desiccator*, with tray, containing active anhydrous calcium chloride desiccant.

6. Sampling

6.1 Take a sufficient quantity of a sample representative of the lot being evaluated to conduct the test. While the test consumes less than 10 g (0.02 lb) of sample, a sample of approximately 0.23 L ($\frac{1}{2}$ pt) is suggested to ensure that it is representative and will permit rechecks, if necessary.

6.2 As urea-formaldehyde resin solutions have a varying tendency toward mild settling or stratification, agitate the lot thoroughly before sampling, and mix the sample well before it is used in the test.

7. Procedure

7.1 *Preparation of Test Specimens*—Place a portion of the resin solution in the weighing dispenser and weigh to ± 1 mg. Transfer a sufficient amount of the solution to yield 0.45 ± 0.05 g (0.001 lb) of dried residue, from the dispenser to a tared drying dish which has been previously dried for 1 h at $105 \pm 1^\circ\text{C}$ ($221 \pm 2^\circ\text{F}$), and cooled and held in the desiccator until

¹ This test method is under the jurisdiction of ASTM Committee D-14 on Adhesives and is the direct responsibility of Subcommittee D14.30 on Wood Adhesives.

Current edition approved Sept. 10, 1996. Published November 1996. Originally published as D 1490 – 57 T. Last previous edition D 1490 – 93.

² *Annual Book of ASTM Standards*, Vol 15.06.

time of use. Reweigh the dispenser and determine, by difference to ± 1.0 mg (0.000002 lb), the exact weight of the specimen transferred to the drying dish. Prepare a total of three such specimens from the contents of the weighing dispenser. Pipet 5 mL (0.01 pt) of water into each dish and mix the water and resin thoroughly by gently rotating the dish.

7.2 Drying the Specimens—Place the drying dishes containing the diluted specimens in the temperature oven, previously adjusted to $105 \pm 1^\circ\text{C}$ ($221 \pm 2^\circ\text{F}$) with the oven vents and air flow adjusted to maintain an air turnover of 16 ± 1 times per min. Do this within 30 min after the specimens have been placed in the dishes. Open the oven door for the minimum practicable time (never longer than 15 s). Place the dishes on the shelf, which has been positioned in accordance with 5.3, grouping them about the center in the vicinity of the thermometer bulb. The dishes remain in the oven for a total of $3 \text{ h} \pm 5$ min.

7.3 Weighing the Dried Specimens—Remove the dishes containing the specimens from the oven after the 3-h drying period in accordance with 7.2, place them in the desiccator, and cool to room temperature. Then remove them from the desiccator and immediately weigh each specimen to ± 1 mg (0.000002 lb). Discard the dishes after their first use.

8. Calculation

8.1 Calculate the percent of nonvolatile matter as follows:

$$\text{Nonvolatile matter, \%} = (A/B) \times 100$$

where:

- A = weight of dish containing dried residue, less tared weight of dish, and
- B = weight of dispenser before specimen is removed, less weight of dispenser after specimen is removed.

9. Report

9.1 Report the following information:

- 9.1.1 Date of test,
- 9.1.2 Laboratory where test is performed,
- 9.1.3 Manufacturer's code number and lot number of resin tested,
- 9.1.4 Designation of test,
- 9.1.5 Individual and average nonvolatile values obtained, %, and
- 9.1.6 Any conditions that deviated from those prescribed in this test method.

10. Precision and Bias

10.1 A precision and bias statement does not exist for this test method because resources necessary for round-robin testing have not been forthcoming.

11. Keywords

11.1 nonvolatile content; urea-formaldehyde

The American Society for Testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.

This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

This standard is copyrighted by ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (<http://www.astm.org>).