Designation: D1490 – 01 (Reapproved 2013)

Standard Test Method for Nonvolatile Content of Urea-Formaldehyde Resin Solutions[1]

This standard is issued under the fixed designation D1490; 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 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:*[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 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.

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 ±1°C (±2°F) at the required immersion.

5.3 *Constant-Temperature Oven,* capable of maintaining a temperature of 105 ± 1°C (221 ± 2°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 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*—luminum foil dishes, with 57 to 58-mm inside diameter and 17 mm deep, with flat bottoms, having a tolerance of ±0.076 mm.

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

6. Sampling

6.1 Take a sufficient quantity of the resin lot being evaluated to conduct the test. While the test consumes less than 10 g of resin, a sample of approximately 0.23 L (½ pt) is suggested to ensure that it is representative and will permit rechecks, if necessary. Record the lot number of the resin being used.

6.2 As urea-formaldehyde resin solutions have a varying tendency toward mild settling or stratification, agitate the resin 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 sample in the weighing dispenser and weigh to ±1.0 mg. Transfer a sufficient amount of the sample to yield 0.45 ± 0.05 g of dried residue, to a tared drying dish which has been previously dried for 1 h at 105 ± 1°C (221 ± 2°F), and cooled and held in the desiccator until time of use. Reweigh the dispenser and determine, by difference to ±1.0 mg, 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 tared drying dish and mix the water and resin thoroughly by gently rotating the dish.

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

Current edition approved May 1, 2013. Published May 2013. Originally approved in 1957. Last previous edition approved in 2006 as D1490 – 01 (2006). DOI: 10.1520/D1490-01R13.

[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.

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

7.2 *Drying the Specimens*—Place the drying dishes containing the diluted specimens in the temperature oven, previously adjusted to 105 ± 1°C (221 ± 2°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 h ±5 min.

7.3 *Weighing the Dried Specimens*—Remove the dishes containing the dried 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 for at least 5, but not more than 15 min. Then remove them from the desiccator and immediately weigh each specimen to ±1.0 mg. 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 The precision and bias statement for this test method has not been determined yet. Results are being expected by April 2003.

11. Keywords

11.1 nonvolatile content; urea-formaldehyde

SUMMARY OF CHANGES

Subcommittee D14.30 has identified the location of selected changes to this standard since the last issue, (D1490 – 96$^{\varepsilon 1}$), that may impact the use of this standard. (Approved October 10, 2001.)

(1) Deleted the definitions in Section 3 as they can be found in Terminology D907.
(2) Terminology was corrected in Sections 6 and 7 to reflect that:
(a) Resin refers to the lot of material being tested.
(b) Sample refers to the amount of material taken from the resin and will be used during the testing.
(c) Specimen refers to the material placed in the individual tared drying dishes.