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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Nonvolatile Content of Latexes[1]

This standard is issued under the fixed designation D 4758; 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 a quality control test for nonvolatile content of latex vehicles. The specified time-temperature conditions (180°C, 20 min) were selected to allow test completion in 1 h or less. For latex vehicles used in certain air-dry or low-temperature bake coatings, as well as for those that contain temperature-sensitive materials, the use of a lower temperature and other bake time will more accurately reflect the effective nonvolatile content (Note 1). Alternative time-temperature conditions should be agreed upon between the producer and user.

NOTE 1—The test conditions of Test Method D 2369 (110°C, 60 min) have been found suitable for use with many latex vehicles.

1.2 This test method is not intended to be employed for determining the volatile organic content (VOC) of formulated coatings.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 2369 Test Method for Volatile Content of Coatings[2]

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens[3]

E 300 Practice for Sampling Industrial Chemicals[4]

3. Significance and Use

3.1 This test method is designed to quantify the weight percent of a commercial, synthetic latex product that, when incorporated into a coating product, constitutes the binder content of the applied coating.

4. Apparatus

4.1 *Oven*, forced-ventilation Type IIB, as specified in Specification E 145, with closed vent.

4.2 *Balance*, sensitive to 0.1 mg.

4.3 *Desiccator*.

4.4 *Weighing dish*, aluminum, approximately 57 mm in diameter by 18 m deep.

4.5 *Syringe*, 5-mL disposable.

5. Sampling

5.1 Procedures described in the Slurry Sampling section of Practice E 300 shall be used for sampling latexes.

6. Procedure

6.1 For each latex to be tested, wash two aluminum dishes with a suitable reagent grade solvent (for example, toluene) or heat to constant weight to assure that volatile contaminants are removed. Determine the tare weight of the aluminum dishes to 0.1 mg.

6.2 Thoroughly mix the sample on a mechanical shaker or can roller to assure homogeneity.

6.3 Draw 3.5 mL of the sample into the syringe and weigh to 0.1 mg.

6.4 Transfer 1.5 ± 0.1 mL of the latex into a tared weighing dish and reweigh the syringe to 0.1 mg. Calculate the latex specimen weight, *S*, as follows:

$$S = w_1 - w_2 \tag{1}$$

where:

w_1 = initial weight of syringe and latex, g,

w_2 = weight of syringe and latex remaining after discharging specimen, g.

6.5 Repeat 6.4 for the duplicate determination.

6.6 Transfer the aluminum dishes to an oven operating at 180 ± 4°C and heat for 20.0 ± 1 min. (Note 2). Remove from the oven, cool in a desiccator for 5 min at room temperature and weigh to 0.1 mg. Determine the weight of residue, *N*, in each dish as follows:

$$N = W_1 - W_2 \tag{2}$$

where:

W_1 = weight of dish and residue, g,

W_2 = tare weight of aluminum dish, g.

NOTE 2—Add distilled water to viscous test specimen prior to baking.

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[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.33 on Polymers and Resins.

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[2] *Annual Book of ASTM Standards*, Vol 06.01.

[3] *Annual Book of ASTM Standards*, Vol 14.02.

[4] *Annual book of ASTM Standards*, Vol 15.05.

7. Calculation

7.1 Calculate the mean weight percent nonvolatile material (% NVM) where Subscripts 1 and 2 refer to the individual data from the duplicate determinations:

$$\% NV = \frac{N_1/S_1 + N_2/S_2}{2} \times 100 \quad (3)$$

8. Report

8.1 Report the nonvolatile content to 0.01 weight %.

9. Precision and Bias

9.1 An interlaboratory study was conducted on this test method in which one operator in each of five laboratories made duplicate determinations on each of two days on six commercial latices containing 44 and 65% nonvolatile matter. The latex polymer types were three all-acrylics, a vinyl acetate-acrylic copolymer, and acrylic terpolymer and a vinyl acetate-vinyl chloride-ethylene copolymer. Two laboratories could not run the test on two latexes because they had gelled, and in the statistical analysis all results obtained on one latex were rejected because they differed significantly from the others. The pooled within-laboratory standard deviation was found to be 0.09% absolute with 20 degrees of freedom and the between-laboratories standard deviation 0.16% absolute with 16 degrees of freedom. Based on these standard deviations, the following criteria should be used for judging the acceptability of results at the 95 % confidence level:

9.1.1 *Repeatability*—Two results, each the mean of duplicate determinations, obtained by the same operator should be considered suspect if they differ by more than 0.27% absolute.

9.1.2 *Reproducibility*—Two results, each the mean of duplicate determinations obtained by operators in different laboratories, should be considered suspect if they differ by more than 0.48 % absolute.

9.2 *Bias*—Bias cannot be determined as no standard latex is available.

10. Keywords

10.1 accelerated testing; air dry coatings; baked coatings; latex paints; latex vehicles; low temperature bake coatings; nonvolatile matter content; temperature tests (subheading low)