



Designation: D1994 – 07

## Standard Test Method for Determination of Acid Numbers of Hot-Melt Adhesives<sup>1</sup>

This standard is issued under the fixed designation D1994; 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 determination of acid numbers of hot-melt adhesives.

1.2 This test method is applicable for hot-melt and hot-melt/acid systems that are soluble under the conditions described. The hot melt must also give light- or medium-colored solutions when dissolved. If this is not the case another method must be used.

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

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.* Specific caution statements are given in 7.1 and 7.2.

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

D907 Terminology of Adhesives

E691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method

### 3. Terminology

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

### 4. Significance and Use

4.1 Acidic hot-melt adhesives are useful in many applications, as the acid functionality can contribute to better substrate wetting and better adhesion to polar, nonporous surfaces.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D10 on Packaging and is the direct responsibility of Subcommittee D10.14 on Tape and Labels.

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<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.

4.2 Acidic hot-melt adhesives are also quite corrosive to conventional iron and steel adhesive application equipment. The acid number determination will tell an equipment manufacturer if corrosion-resistant equipment for an application should be recommended. The need for corrosion-resistant equipment will vary depending on the acid number of the hot-melt adhesive and type of metal that will be bonded.

### 5. Reagents

5.1 *Potassium Hydrogen Phthalate*—pH standard, dried and purified (suitable as an acidimetric standard).

5.2 *Potassium Hydroxide/Methanol Titrant* (0.1N)—Dissolve 6 to 7 g of potassium hydroxide (KOH) in methanol, industrial grade, and dilute to 1 L with methanol. This solution should be standardized before use (see Section 6).

5.3 *Phenolphthalein Indicating Solution* (2.5 g/L)—Dissolve 0.5 g of phenolphthalein in 200 mL of methanol.

5.4 *Toluene*—Reagent grade.

5.5 *Deionized Water*.

### 6. Calibration and Standardization

6.1 *Preparation of Standard Acid Solution*—Dissolve 0.25 to 0.35 g of potassium hydrogen phthalate in 100 mL of deionized water.

6.2 *Titration of Standard Acid Solution*—Add 2 mL of the phenolphthalein indicating solution and titrate the entire standard acid solution using the methanolic KOH solution prepared in 5.2.

6.3 To calculate the normality of the methanolic KOH, use the following formula:

$$N_{KOH} = \frac{(\text{g of phthalate}) \times 1000}{204.23 (\text{mL of KOH solution})}$$
$$= \frac{\text{g of phthalate}}{\text{mL of KOH solution}} \times 4.90$$

### 7. Procedure

7.1 Dissolve 1.80 to 2.10 g of adhesive in 200 mL of toluene. (Xylene, reagent grade, may provide a safer alternate solvent.) Use a thermocouple or thermometer to monitor the temperature of the solution, and heat the solution (with stirring) to 80 to 90°C (176 to 194°F) to accelerate dissolution.