Designation: D2379 – 09

Standard Test Method for Acidity of Formaldehyde Solutions[1]

This standard is issued under the fixed designation D2379; 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 acidity of commercially available formaldehyde solutions.

1.2 For purposes of determining conformance of an observed or a calculated value using this test method to relevant specifications, test result(s) shall be rounded off "to the nearest unit" in the last right-hand digit used in expressing the specification limit, in accordance with the rounding-off method of Practice E29.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 For hazard information and guidance, see the supplier's Material Safety Data Sheet.

1.5 *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 hazard statements are given in Section 7.

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1193 Specification for Reagent Water

D2380 Test Method for Methanol Content of Formaldehyde Solutions

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E200 Practice for Preparation, Standardization, and Storage of Standard and Reagent Solutions for Chemical Analysis

3. Summary of Test Method

3.1 A specimen is titrated with standard alkali to the bromthymol blue end point.

4. Significance and Use

4.1 This test method provides a measurement of acidity (as formic acid) in formaldehyde solutions. The results of these measurements can be used for specification acceptance.

5. Apparatus

5.1 *Buret,* 25-mL, calibrated in 0.1-mL divisions. A TFE-fluorocarbon resin stopcock is suitable for this purpose.

6. Reagents and Materials

6.1 *Purity of Reagents*—Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.[3] Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

6.2 *Purity of Water*—Reference to water shall be understood to mean reagent water conforming to Type IV or better of Specification D1193.

6.3 *Bromthymol Blue Indicator Solution (1.0 g/L)*—Dissolve 0.1 g of the water-soluble form of bromthymol blue indicator powder in 100 mL of water.

6.4 *Sodium Hydroxide, Standard Solution (0.1 N)*—Prepare and standardize 0.1 *N* sodium hydroxide (NaOH) solution as described in Practice E200.

7. Hazards

7.1 Formaldehyde and formaldehyde solutions are hazardous and exposure to them should be minimized to avoid acute effects and possible sensitization. Consult your supplier's Material Safety Data Sheet for specific hazard information.

7.2 Sodium hydroxide solutions are corrosive and hazardous. Exercise steps to prevent contact with the skin or eyes. Consult supplier's Material Safety Data Sheet for specific hazard.

[1] This test method is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.35 on Solvents, Plasticizers, and Chemical Intermediates.

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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.

[3] *Reagent Chemicals, American Chemical Society Specifications*, American Chemical Society, Washington, DC. For suggestions on the testing of reagents not listed by the American Chemical Society, see *Analar Standards for Laboratory Chemicals*, BDH Ltd., Poole, Dorset, U.K., and the *United States Pharmacopeia and National Formulary*, U.S. Pharmacopeial Convention, Inc. (USPC), Rockville, MD.

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

8. Procedure

8.1 Measure 50 mL of the sample into a 250-mL Erlenmeyer flask, add 3 or 4 drops of bromthymol blue indicator solution, and titrate with 0.1 *N* NaOH solution to a blue end point.

8.2 If good laboratory practice dictates that the concentration of NaOH be adjusted as a result of higher or lower acid levels, then adjust as necessary using Practice E200, and titrate to a blue end point.

9. Calculation

9.1 Calculate the percent of formic acid as follows:

$$\text{Formic acid, weight \%} = [(V \times N \times 0.046)/(S \times D)] \times 100 \quad (1)$$

where:

V = millilitres of NaOH solution, required for titration of the specimen,
N = normality of the NaOH solution,
0.046 = the milliequivalent weight of formic acid,
S = millilitres of sample used, and
D = specific gravity of sample.

The value of D from Test Method D2380, may be used, although specific gravity estimated to the second decimal is adequate.

10. Report

10.1 Report the percent formic acid to the nearest 0.001 %. Duplicate determinations which agree within 0.002 % absolute are acceptable for averaging (95 % confidence level).

11. Precision and Bias

11.1 In an interlaboratory study of this test method, the within-laboratory standard deviation was found to be 0.0007 % absolute at 60 degrees of freedom, and the between-laboratories standard deviation 0.0031 % absolute at 9 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:

11.1.1 *Repeatability*—Two results, each the mean of duplicates, obtained by the same analyst on different days should be considered suspect if they differ by more than 0.002 % absolute.

11.1.2 *Reproducibility*—Two results, each the mean of duplicates, obtained by analysis in different laboratories, should be considered suspect if they differ by more than 0.010 % absolute.

NOTE 1—The above precision estimates are based on an interlaboratory study involving ten laboratories using three samples with two analysts performing duplicate runs on each of two days. The mean level of the acidity value of the samples studied was 0.02 %.

11.2 *Bias*—Bias of this test method has not been determined because primary standards do not exist.

12. Keywords

12.1 formaldehyde; formic acid

SUMMARY OF CHANGES

Committee D01.35 has identified the location of selected changes to this standard since the last issue (D2379 - 04) that may impact the use of this standard. (Approved June 1, 2009.)

(1) Modified 6.2.