Designation: D 5180 – 93 (Reapproved 1998)

Standard Test Method for Quantitative Test for Turbidity in Clear Liquids[1]

This standard is issued under the fixed designation D 5180; 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 measurement of turbidity of clear liquids. It is applicable to resin solutions, solvents, clear coatings, monomers, and any other liquids where clarity is specified. This test method should be used only for comparison of clarity of similar materials, and not to obtain absolute values for turbidity.

1.2 *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 1889 Test Methods for Turbidity of Water[2]

D 2090 Test Method for Clarity and Cleanliness of Paint and Ink Liquids[3]

E 691 Practice for Conducting an Interlaboratory Study to Determine the Precision of a Test Method[4]

3. Summary of Test Method

3.1 A specimen is placed in a vial and measured on a ratio recording turbidimeter. The instrument is calibrated in nephelometric turbidity units (NTU), with standards provided by the manufacturer. Turbidity of the specimen is read directly in NTU's. The instrumental values are insensitive to color and require no color correction.

4. Significance and Use

4.1 This test method is applicable to resin solutions, solvents, clear coatings, monomers, and any other liquid where clarity is specified. It is designed to provide an objective, instrumental method that is repeatable and reproducible.

NOTE 1—The only other ASTM test method for determining clarity of resin solutions is Test Method D 2090. Test Method D 2090 determines clarity by visual inspection versus the instrumental determination in this test method.

5. Apparatus

5.1 *Ratio Recording Turbidimeter*—Supplier and consumer should agree on a common instrument, since optics vary between instrument companies and that will effect results.

5.2 *Cylindrical Glass Vials with Screw Caps*, 30 mL, 25 mm outside diameter by 95 mm high. For very low values, follow instrument manufacturer's recommendation.

NOTE 2—Inexpensive vials, available from most scientific supply companies, are adequate for most paint materials. However, minor variations in clarity and thickness of the glass may be significant when measuring specimens with very low turbidity. For values of less than 5 NTU, use only manufacturer's specified vials.

5.3 *Secondary Standards*—See Test Methods D 1889 for procedure to calibrate secondary standards.

6. Procedure

6.1 Allow instrument to warm for at least 10 min before using.

6.2 Using the standards supplied with instrument, calibrate at least once a month, as directed in the instrument manual.

6.3 Before each use, check the instrument with the secondary standard supplied by the instrument supplier. If instrument is outside the manufacturer's specified range, recalibrate.

6.4 Carefully fill a clean, dry vial to within a centimetre of the top and cap tightly. Pour down the side of the vial, to minimize bubble formation. If bubbles are observed, allow them to dissipate before making the measurement. In most cases, bubbles may be removed rapidly by use of a sonic bath, centrifuging, or pulling a slight vacuum. Wipe off any lint or smudge from the outside surface before making the measurement.

NOTE 3—Bubbles will produce erroneously high results.

6.5 Place the vial in the instrument and record the reading. Use the lowest range setting possible. Measure at least two specimens in separate vials.

NOTE 4—Specimens that settle rapidly may decrease during measurement. If that happens, record the highest value observed.

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[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paints 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 11.01.

[3] *Annual Book of ASTM Standards*, Vol 06.03.

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

7. Report

7.1 Report the average of two results obtained in separate vials.

8. Precision and Bias

8.1 *Precision*—The precision of this test method as determined by the statistical examination of the interlaboratory test results (see Practice E 691), is as follows:

8.1.1 *Repeatability*—The difference between duplicate results by the same operator with the same apparatus on identical test material would, in the normal and correct operation of this test method, exceed the following values less than 1 % of the time.

Value	Repeatability
1.81	0.18
6.00	0.42
21.21	1.26

8.1.2 *Reproducibility*—The difference between the average of duplicates obtained by different operators working in different laboratories on identical material would be expected to exceed the following values less than 1 % of the time.

Value	Reproducibility
1.81	1.01
6.00	2.58
21.21	8.93

8.1.3 These data were obtained as follows:

8.1.3.1 Seven laboratories measured four materials in duplicate with values from about 1.8 NTU to 21.2 NTU. Two of the samples had similar values (about 6). The precision data reported for that range are the worst of the two.

8.1.4 None of the resins used for the interlaboratory study exhibited rapid settling. If that is the case (see 8.1), repeatability and reproducibility would be expected to be larger.

8.2 *Bias*—There is no accepted reference material for turbidity in resins, so bias could not be determined.

9. Keywords

9.1 clarity; cloudiness; resin clarity; resin turbidity; turbidity