



AMERICAN SOCIETY FOR TESTING AND MATERIALS

1916 Race St., Philadelphia, Pa. 19103

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Standard Test Method for EMULSION STABILITY OF SOLUBLE CUTTING OILS¹

This standard is issued under the fixed designation D 1479; 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.

¹NOTE—Section 2 was added editorially and sections renumbered in July 1984.

1. Scope

1.1 This test method covers the determination of the stability of emulsions of soluble cutting oils.

2. Applicable Documents

2.1 ASTM Standards:

D91 Test Method for Precipitation Number of Lubricating Oils²

D3244 Recommended Practice for Utilization of Test Data to Determine Conformance with Specifications³

3. Summary of Method

3.1 The soluble oil is dispersed at a suitable concentration in an appropriate test water. The emulsion is stored for 24 h, after which the bottom fifth is separated for determination of oil content. Comparing oil concentrations in stored and freshly prepared emulsions gives the “percentage of oil depletion.”

4. Apparatus

4.1 Beakers, 250-mL.

4.2 *Stirring Apparatus*, capable of maintaining a speed of 500 ± 50 rpm and mounted on a ringstand or other suitable support. Stirrer to be fitted with one beater⁴ having four blades formed by two $2\frac{1}{8}$ by $3\frac{3}{8}$ -in. (54.0 by 81.0-mm) ellipses with the planes intercepting at right angles.

4.3 *Hypodermic Syringes (Minus Needles)*,⁵ 1, 2, and 5-mL capacity.

4.4 *Hypodermic Needles*, 3-in. (76.2-mm) length, suitable for use with 1-mL syringe.

4.5 *Separatory Funnels*, cylindrical, open-top, 1.5-in. (38.1-mm) outside diameter, 125-mL.⁶

4.6 *Burets*, 25-mL.

4.7 *Cylinders*, graduated, 25-mL.

4.8 *Babcock Milk-Test Bottles*, U.S. Government Standard, total height 150 to 165 mm, bulb capacity about 45 mL, with straight necks 0.3 in. (7.6 mm) in outside diameter graduated in eight large divisions, each subdivided into ten small divisions; one small division is equivalent to 0.02 mL.

4.9 *Centrifuge*, conforming to the requirements given in Test Method D 91. It shall be capable of whirling the filled Babcock bottles at such a speed as to attain a relative centrifugal force of 500 to 600, measured at the tips of the tubes when extended. Calculate the required centrifuge speed as follows:

$$S = \sqrt{(\text{rcf} \times 100\,000)/(d \times 0.56)}$$

where:

S = speed in revolutions per minute,

rcf = relative centrifugal force, and

d = diameter of swing in centimetres, measured at tips of tubes.

5. Reagents

5.1 *Synthetic Hard Water (About 230 ppm Total Hardness)*—Weigh out the prescribed

¹ This test method is under the jurisdiction of ASTM Committee D-2 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.01 on Industrial Lubricants.

Current edition approved Aug. 31, 1964. Originally published as D 1479 – 57 T. Last previous edition D 1479 – 57 T.

² *Annual Book of ASTM Standards*, Vol 05.03.

⁴ A Sunbeam Mixmaster, Model 7B, or a Precision Variable Speed Mixer, fitted with only one four-bladed Mixmaster-type beater have been found suitable for this purpose.

⁵ Hypodermic syringes comparable to “B-D Yale No. 1 Y.T., 2T, and 5T,” Becton, Dickinson and Co., Rutherford, NJ, meet these requirements.

⁶ Cenco No. 15101, or equivalent.