Designation: D 1541 – 97

Standard Test Method for Total Iodine Value of Drying Oils and Their Derivatives[1]

This standard is issued under the fixed designation D 1541; 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[2] covers the determination of total iodine value.

1.2 This test method is applicable to oils, fatty acids, and bodied oils. While this test method is applicable to all oils and fatty acids and bodied oils, it is particularly useful for those drying oils or derivatives that have conjugated unsaturation.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of whoever uses this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific hazard statements are given in Sections 6 and 7.

2. Referenced Documents

2.1 *ASTM Standards:*

D 1193 Specification for Reagent Water[3]

D 1959 Test Method for Iodine Value of Drying Oils and Fatty Acids[4]

3. Terminology

3.1 *Definitions:*

3.1.1 *total iodine value*—a measure of the total unsaturation present in fats and oils (Note 1), expressed as the number of centigrams of iodine equivalent to the unsaturation present in 1 g of sample (weight percent of absorbed iodine).

NOTE 1—When the total iodine value is determined on oils having conjugated systems, the result is a measure of the total unsaturation. This is in contrast to the iodine value method described in Test Method D 1959 which determines only part of the total unsaturation of conjugated systems.

4. Significance and Use

4.1 This test method measures the total amount of unsaturation including conjugated unsaturation by addition of bromine in a catalyzed bromine solution to the double bonds. The amount of bromine absorbed is determined by back titration of the excess bromine, and then compared to a blank determination. This test method is preferred over Test Method D 1959 for products containing conjugated unsaturation.

5. Apparatus

5.1 *Iodine Flasks*, glass-stoppered, of 250-mL capacity.

NOTE 2—The test may be run either in a photographic-type darkroom under red safelight illumination[5] or in a darkened laboratory in which the light intensity is adjusted to 0.5 footcandle (5.4 1x) or less. The darkroom with red safelights permits the use of clear flasks. If the test shall be run in a darkened laboratory, low-actinic (amber) flasks, or clear flasks protected from light by covering as described below, must be used. Alternative modes of using clear flasks in a darkened laboratory are described as follows. The type of covering is left to the discretion of the analyst:

(1) Place the clear iodine flask in a suitable metal can so that the neck of the flask is level with the can rim. Over the top of the can, place a piece of heavy cardboard, with a hole precut in the center to just fit over the neck of the flask; the top of the flask should just protrude out of the hole in the cardboard cover. Then run the analysis as usual in a darkened laboratory.

(2) Wrap heavy aluminum foil around the iodine flasks so as to cover all but the top rim. The foil can be then removed at the latter stage of titration. Run the analysis in a darkened laboratory.

(3) Place the flask in an opaque bag that has a drawstring neck. The rim of the iodine flask should just protrude from the bag to allow addition of reagent.

5.2 *Graduates*, 5, 25, and 50-mL capacity.

5.3 *Volumetric Pipets*, 10, 20, and 50-mL capacity.

NOTE 3—The bulb of the 50-mL pipet should be covered with aluminum foil.

5.4 *Buret*, 50-mL capacity graduated in 0.1-mL divisions.

5.5 *Weighing Device for Sample*—A small, wide-mouth vial, fitted with a cork stopper and medicine dropper, may be used to weigh the sample by difference. Alternatively, the sample may be weighed directly into a 1-mL microbeaker, and carefully dropped into the iodine flask.

5.6 *Photoelectric Light Meter*—Any suitable meter for measuring room illumination in footcandles. If a darkroom and red safelight illumination are to be used, a meter is not required.

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[1] This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings and Materialsand is the direct responsibility of Subcommittee D01.32on Drying Oils.

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[2] This procedure is essentially identical with that of Planck, R. W., Pack, F. C., and Goldblatt, L. A., as published in the *Journal*, Am. Oil Chemists' Soc., Vol 30, 1953, p. 417, using the Rosenmund-Kuhnhenn reagent. Previously Benham, G. H., and Klee, L. J., published data on the use of this reagent for determining unsaturation in the *Journal*, Am. Oil Chemists' Soc., Vol 27, 1950, pp. 127–130.

[3] *Annual Book of ASTM Standards*, Vol 11.01.

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

[5] The sole source of supply of the red safelights Wratten No. 1 known to the committee at this time is Eastman Kodak Co., 343 State St. Rochester, NY 14650. If you are aware of alternative suppliers, please provide this information to ASTM Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,[1] which you may attend.