



# Standard Test Method for Spectrophotometric Diene Value of Dehydrated Castor Oil and Its Derivatives<sup>1</sup>

This standard is issued under the fixed designation D 1358; 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.

<sup>ε1</sup> NOTE—Unit of measurement statement and Keywords were added editorially in May 1995.

## 1. Scope

1.1 This test method covers the determination of the spectrophotometric diene value as a measure of the content of conjugated dienoic acids in dehydrated castor oil and its derivatives. Due to the high linoleic acid content in dehydrated castor oil and its derivatives, the absolute conjugated dienoic acid content cannot be determined by this test method.

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

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 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 6.

## 2. Terminology

2.1 *Description of Term Specific to This Standard:*

2.1.1 *spectrophotometric diene value*—under the conditions of this test method, the percent of conjugated dienoic acids.

## 3. Significance and Use

3.1 In the process of dehydrating castor oil, a double bond is formed in the ricinoleic acid to make either conjugated linoleic or normal linoleic fatty acid segments in the oil. This test method attempts to measure the amount of conjugated unsaturation by means of the absorbance at a specific wavelength which is in the ultraviolet range. Since some absorption is due to linoleic acid, a correction factor is included in the calculation. This test method is only applicable to dehydrated castor oil products.

## 4. Apparatus

4.1 *Spectrophotometer*—Ultraviolet photoelectric spectro-

photometer,<sup>2</sup> covering a spectral range from 200 to 350 nm, with a wavelength scale readable to 0.1 nm, and equipped with an absorption cell compartment<sup>3</sup> for holding 10.00-mm cells.

4.2 *Absorption Cells*, quartz, matched pairs of lengths 10.00  $\pm$  0.05 mm. The cells in a pair, when filled with water or *isooctane*, shall match within 0.01 absorbancy unit (Note 1). The cells may be the 10.00-mm nondemountable type made of quartz, or the demountable type consisting of a chemically resistant glass<sup>4</sup> cell body of outside diameter of about 22 mm with centered-ground glass stopper, threaded metal caps, polished crystalline quartz windows, and cork gaskets.

NOTE 1—If the cells do not match within 0.01 absorbancy unit, they may be filled with water or *isooctane* and calibrated against each other at the specified wavelength. The necessary correction in absorbancy units is then applied where necessary. Highest precision is obtained by the method of reversing cells. The absorbancy of the solution is read against the solvent blank. The cells are then cleaned and the solvent blank put in the cell previously used for the solution and the solution in the cell previously used for the blank and the absorbancy measured. The two absorbancies are then averaged to obtain  $A_s$ , the observed absorbancy. The cells should be rinsed with solvent, water, concentrated nitric acid, water, and solvent, in that sequence, before each reading.

4.3 *Filter Tube*, 810 by 45 mm (32 by 1 $\frac{3}{4}$  in.).

4.4 *Cork Stopper* covered with aluminum foil to fit loosely in the top of the filter tube.

4.5 *Dropping Bottle*, stoppered, for weighing the samples.

4.6 *Volumetric Flasks*, glass-stoppered, having capacities of 100 mL, 50 mL, and 25 mL.

4.7 *Volumetric Pipets*, precision grade, assorted sizes, for making dilutions when required.

## 5. Reagents and Materials

5.1 *Silica Gel*, 28 to 200-mesh.<sup>5</sup>

<sup>2</sup> The Beckman Model DU photoelectric quartz spectrophotometer, Catalog No. 2500 DU, Beckman Laboratories, S. Pasadena, CA, has been found satisfactory for this purpose.

<sup>3</sup> The cell compartment assembly, as Catalog No. 2510, and the ultraviolet accessory set, as Catalog No. 2501, that includes the No. 2230 hydrogen discharge lamp, the No. 2511 adapter, No. 23-10-10-89 cells, and No. 2504 cover, both available from Beckman Laboratories, S. Pasadena, CA, have been found satisfactory for this purpose.

<sup>4</sup> Borosilicate glass has been found satisfactory for this purpose.

<sup>5</sup> Silica gel available from Davison Chemical Co., Baltimore, MD, as Code 11-08, or the equivalent, has been found satisfactory for this purpose.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D-1 on Paint and Related Coatings, Materials, and Applications, and is the direct responsibility of Subcommittee D01.32 on Drying Oils.

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