



Designation: ~~D1686-96(Reapproved2004)~~ Designation: D1686 – 10

## Standard Test Method for Color of Solid Aromatic Hydrocarbons and Related Materials in the Molten State (Platinum-Cobalt Scale)<sup>1</sup>

This standard is issued under the fixed designation D1686; 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.

### 1. Scope\*

1.1 This test method covers the visual measurement of the color of thermally stable solids melting below 150°C. It is applicable only to materials in which the color-producing bodies present have light absorption characteristics quite similar to those of the standards used.

~~1.2 The following applies to all specified limits in this test method: for purposes of determining conformance with this test method, an observed value or a calculated value 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~~

1.2 In determining the conformance of the test results using this method to applicable specifications, results shall be rounded off in accordance with the rounding-off method of Practice E29.

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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 *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.* For specific hazard statements see Sections 7 and 9.

### 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

D1193 [Specification for Reagent Water](#)

D3438 [Practice for Sampling and Handling Naphthalene, Maleic Anhydride, and Phthalic Anhydride](#)

D3852 [Practice for Sampling and Handling Phenol, Cresols, and Cresylic Acid](#)

D6809 [Guide for Quality Control and Quality Assurance Procedures for Aromatic Hydrocarbons and Related Materials](#)

E29 [Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications](#)

2.2 *Other Document:*

OSHA Regulations, 29 CFR paragraphs 1910.1000 and 1910.1200<sup>3</sup>

### 3. Significance and Use

3.1 Color by this test method is a measure of color-producing impurities present in the thermally stable solids. This test method is suitable for setting specifications and for use as an internal quality control tool.

### 4. Apparatus

4.1 *Color Comparison Tubes*—Matched 100-mL, tall-form Nessler tubes, provided with ground-on, optically clear, glass caps. Tubes should be selected so that the height of the 100-mL graduation mark is  $300 \pm 3$  mm above the bottom of the tube. The use of heat-resistant tubes is preferred for safety reasons.

4.2 *Color Comparator*—A color comparator constructed to permit visual comparison of light transmitted through tall-form, 100-mL Nessler tubes in the direction of their longitudinal axes. The comparator should be constructed so that white light is reflected off a white plate and directed with equal intensity through the tubes, and should be shielded so that no light enters the tubes from the side.

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee D16 on Aromatic Hydrocarbons and Related Chemicals and is the direct responsibility of Subcommittee D16.02 on Oxygenated Aromatics.

Current edition approved June/Jan. 1, 2004/2010. Published June 2004/January 2010. Originally approved in 1959. Last previous edition approved in 2000/2004 as D1686 – 96 (20094). DOI: ~~10.1520/D1686-96R04.10.1520/D1686-10.~~

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, <http://www.access.gpo.gov>.

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

4.3 *Oven*—An oven, preferably of the forced draft type and capable of maintaining a constant temperature  $\pm 1^{\circ}\text{C}$  in the range up to  $150^{\circ}\text{C}$ . Alternatively, the use of an aluminum heating block provided with proper temperature control or other similar equipment is permissible.

**TABLE 1 Platinum-Cobalt Color Standards<sup>A</sup>**

Color Standard No.	Stock Solution, mL	Color Standard No.	Stock Solution, mL
5	1	35	7
10	2	40	8
15	3	50	10
20	4	60	12
25	5	70	14
30	6	100	20

<sup>A</sup> Other color standards may be prepared by proportional dilution.

## 5. Reagents

5.1 *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.<sup>4</sup> 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.

5.2 *Purity of Water*—Unless otherwise indicated, references to water shall be understood to mean Type IV reagent water conforming to Specification D1193.

5.3 *Cobalt Chloride* ( $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$ ).

5.4 *Hydrochloric Acid* (*sp gr 1.19*)—Concentrated hydrochloric acid (HCl).

5.5 *Potassium Chloroplatinate* ( $\text{K}_2\text{PtCl}_6$ ).

## 6. Standards

6.1 *Platinum-Cobalt Stock Solution*—Dissolve 1.245 g of  $\text{K}_2\text{PtCl}_6$  and 1.000 g of  $\text{CoCl}_2 \cdot 6\text{H}_2\text{O}$  in water. Add 100 mL of HCl and dilute to 1 L with water. This solution has a color of 500.<sup>5</sup>

6.2 *Platinum-Cobalt Standards*<sup>6</sup>—From the stock solution, prepare color standards, as given in Table 1, by diluting the required volumes to 100 mL with water in the Nessler tubes. If desired, these standards may be made permanent by sealing on the caps with a suitable colorless cement.

## 7. Hazards

7.1 Consult OSHA regulations, supplier's Material Safety Data Sheets, and local regulations for all materials used in this test method.

7.2 **Warning:** When handling molten solids in open tubes, adequate ventilation must be provided and proper protection should be used to prevent thermal burns.

## 8. Sampling

8.1 Sample the material in accordance with Practices D3438 or D3852.

## 9. Procedure

9.1 Melt approximately 150 g of the sample and simultaneously preheat a Nessler tube and cap in an oven maintained at constant temperature at 10 to  $20^{\circ}\text{C}$  above the solidification point of the sample. The sample must not be heated to more than  $20^{\circ}\text{C}$  above its solidification point.

9.2 As soon as the sample is completely liquid, mix by stirring with a clean dry glass rod, then quickly fill the preheated Nessler tube to the 100-mL mark with the sample and cap the tube. Place the tube in the comparator and immediately compare with the standards.

NOTE 1—A variation of more than 2 to 3 mm in depth can affect the test results.

<sup>4</sup> *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.

<sup>5</sup> The stock solution with color No. 500 may be purchased as such from chemical supply firms. Use of the purchased standard is satisfactory.

<sup>6</sup> The preparation of these platinum-cobalt standards was originally described by A. Hazen, *American Chemical Journal*, Vol 14, p. 300 (1892). The description given in Test Method D1686 is identical with that given in the "Standard Methods for the Examination of Water and Sewage," American Public Health Assn., Tenth Edition, 1955, p. 88. A description is also given by W. W. Scott, "Standard Methods of Chemical Analysis," D. Van Nostrand Co., Inc., Fifth Ed., Vol 2, p. 2048.