



Designation: D 936 - 89

AMERICAN SOCIETY FOR TESTING AND MATERIALS
1916 Race St., Philadelphia, Pa. 19103

Reprinted from the Annual Book of ASTM Standards, Copyright ASTM
If not listed in the current combined index, will appear in the next edition.

An American National Standard

Standard Test Method for Aromatic Hydrocarbons in Olefin-Free Gasolines by Silica Gel Adsorption¹

This standard is issued under the fixed designation D 936; 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.

This standard has been approved for use by agencies of the Department of Defense and replaces Method 3702 of Federal Test Method Standard No. 791b. Consult the DoD Index of Specifications and Standards for the specific year of issue which has been adopted by the Department of Defense.

1. Scope

1.1 This test method covers the determination of total aromatic content of gasolines and other debutanized hydrocarbon mixtures that distill below 204°C (400°F) and contain less than 1 % of olefinic hydrocarbons.

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

1.3 *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety problems 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 7 and Annex A1.

2. Referenced Documents

2.1 ASTM Standards:

D941 Test Method for Density and Relative Density (Specific Gravity) of Liquids by Lipkin Bicapillary Pycnometer²

D1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²

E 11 Specification of Wire-Cloth Sieves for Testing Purposes³

3. Summary of Test Method⁴

3.1 The sample is passed downward through a column packed with fine, activated silica gel and, when all of the sample has been adsorbed on the gel, alcohol is added as an eluent. The alcohol causes desorption of the hydrocarbons, forcing them down the column. In this process of adsorption and desorption, the hydrocarbons are separated according to their adsorption affinities so that the components issue from the bottom of the silica gel column in the following order:

saturates, saturates plus aromatics, aromatics, aromatics plus alcohol, and alcohol. The percolate is collected in small fractions and the aromatic content of the sample is calculated from measured volumes and refractive indices of the fractions. Samples containing less than 4 % aromatics are fortified with a known amount of toluene and those containing more than 80 % aromatics are diluted with a saturated hydrocarbon or hydrocarbon mixture boiling in the gasoline range; correction is made in the calculation for the toluene or diluent added.

4. Significance and Use

4.1 A precise knowledge of the liquid volume percent of the aromatic hydrocarbons of gasolines and petroleum fractions from which gasolines are blended is of value in assessing the performance properties of the gasolines. Such knowledge is also of value in measuring the conversion of paraffins and cycloparaffins to aromatics by catalytic reforming. This test method provides a procedure for making such a precise determination.

5. Interference

5.1 Paraffins and cycloparaffins do not interfere, regardless of their concentration. Olefinic hydrocarbons, when present in concentrations greater than one percent, interfere in the normal use of this test method. Compounds containing sulfur or nitrogen interfere by being included with the aromatic hydrocarbons.

6. Apparatus

6.1 *Adsorption Column*, as shown in Fig. 1, consisting of an eluent reservoir, a sample reservoir, and wide and narrow sections of a water-jacketed tubing. The column should be surrounded with a transparent protective shield when operating at pressures in excess of 69 kPa (10 psi).

6.2 *Receiver*, graduated, of 11-mL capacity, as shown in Fig. 2.

NOTE 1—While not strictly required, a cathetometer, capable of measuring liquid levels to ± 0.1 mm, is desirable for more accurate and convenient calibration of the receiver (see Section 9).

6.3 *Sample Containers*, of approximately 5, 10, and 25-mL capacities. It is convenient to use sets of numbered sample vials with molded plastic caps, each set supported in a drilled wooden block.

6.4 *Vibrator*, for packing of the silica gel. (A rubber padded vibrator of the type used by barbers is satisfactory.)

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 D02.04 on Hydrocarbon Analysis.

Current edition approved Oct. 27, 1989. Published December 1989. Originally published as D 936 - 47. Last previous edition D 936 - 83.

² Annual Book of ASTM Standards, Vol 05.01.

³ Annual Book of ASTM Standards, Vol 14.02.

⁴ For a more complete discussion of this test method, see Mair, B. J., "Separation and Determination of Aromatic and Monoolefin Hydrocarbons in Mixtures with Paraffins and Naphthenes by Adsorption," *Journal of Research, National Institute of Standards and Technology*, JRMSB, Vol 34, No. 5, 1945, p. 435.