This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

Designation: D5580 – 21

Standard Test Method for Determination of Benzene, Toluene, Ethylbenzene, *p/m*-Xylene, *o*-Xylene, C_9 and Heavier Aromatics, and Total Aromatics in Finished Gasoline by Gas Chromatography[1]

This standard is issued under the fixed designation D5580; 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 covers the determination of benzene, toluene, ethylbenzene, the xylenes, C_9 and heavier aromatics, and total aromatics in finished motor gasoline by gas chromatography.

1.2 The aromatic hydrocarbons are separated without interferences from other hydrocarbons in finished gasoline. Nonaromatic hydrocarbons having a boiling point greater than *n*-dodecane may cause interferences with the determination of the C_9 and heavier aromatics. For the C_8 aromatics, *p*-xylene and *m*-xylene co-elute while ethylbenzene and *o*-xylene are separated. The C_9 and heavier aromatics are determined as a single group.

1.3 This test method covers the following concentration ranges, in liquid volume %, for the preceding aromatics: benzene, 0.1 % to 5 %; toluene, 1 % to 15 %; individual C_8 aromatics, 0.5 % to 10 %; total C_9 and heavier aromatics, 5 % to 30 %, and total aromatics, 10 % to 80 %.

1.4 Results are reported to the nearest 0.01 % by either mass or by liquid volume.

1.5 This test method includes a relative bias section for U.S. EPA spark-ignition engine fuel regulations reporting for benzene based on Practice D6708 accuracy assessment between Test Method D5580 and Test Method D3606 as a possible Test Method D5580 alternative to Test Method D3606. The Practice D6708 derived correlation equation is only applicable for fuels in the benzene concentration range from 0.0 % to 2.31 % by volume as measured by Test Method D5580. The applicable Test Method D3606 range for benzene is from 0.0 % to 2.38 % by volume as reported by Test Method D3606.

1.6 This test method includes a relative bias section for U.S. EPA spark-ignition engine fuel regulations for total aromatics reporting based on Practice D6708 accuracy assessment between Test Method D5580 and Test Method D5769 as a possible Test Method D5580 alternative to Test Method D5769. The Practice D6708 derived correlation equation(s) is only applicable for fuels in the total aromatic concentration range from 5.4 % to 31.6 % by volume as measured by Test Method D5580 and a distillation temperature T_{95}, at which 95 % of the sample has evaporated, as measured by Test Method D86 is in the range of 149.1 °C to 196.6 °C (300.4 °F to 385.9 °F).

1.6.1 The applicable Test Method D5769 range for total aromatics is from 3.7 % to 29.4 % by volume as reported by Test Method D5769 and the distillation temperature T_{95}, at which 95 % of the sample has evaporated, when tested according to Test Method D86 ranged from 149.1 °C to 196.6 °C (300.4 °F to 385.9 °F).

1.7 This test method includes a relative bias section for spark-ignition engine fuels (gasolines) for benzene reporting based on Practice D6708 accuracy assessment between Test Method D5580 and Test Method D5769 as a possible Test Method D5580 alternative to Test Method D5769. The Practice D6708 derived correlation equation for benzene is applicable in the test method inclusive valid reporting concentration ranges, as determined from Practice D6708 data set and precision working limits of Test Method D5580, from 0.08 % to 2.34 % by volume as measured by Test Method D5580.

1.8 Many of the common alcohols and ethers that are added to gasoline to reduce carbon monoxide emissions and increase octane, do not interfere with the analysis. Ethers such as methyl *tert*-butylether (MTBE), ethyl *tert*-butylether (ETBE), *tert*-amylmethylether (TAME), and diisopropylether (DIPE) have been found to elute from the precolumn with the nonaromatic hydrocarbons to vent. Other oxygenates, including methanol and ethanol elute before benzene and the aromatic hydrocarbons. 1-Methylcyclopentene has also been found to elute from the precolumn to vent and does not interfere with benzene.

1.9 The values stated in SI units are to be regarded as standard.

1.9.1 *Exception*—The values given in parentheses are for information only.

[1] This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.04.0L on Gas Chromatography Methods.

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

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