



Designation: D 6623 – 01

An American National Standard

Standard Test Method for Determination of Individual Components in Spark Ignition Engine Fuels by High Resolution Gas Chromatography¹

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INTRODUCTION

This test method consists of three individual procedures designated as A, B, and C. Procedure A (Detailed Hydrocarbon Analysis-DHA) was the first procedure submitted to be tested and developed by ASTM. Procedure B (Individual Hydrocarbon Analysis-IHA) is derived from the revised Canadian [CAN/CGSB-3.0 No. 14-3-94](#) test method. Procedure C (DHC) is derived and is consistent with the French Standard NF M07-086. Procedures A and B employ 100 metre poly (dimethyl) siloxane open tubular capillary columns and procedure C employs a 50 metre poly (dimethyl) siloxane capillary column. In addition, Procedure A requires the use of a short precolumn (injector end) located in the GC oven and connected to the 100 metre capillary column. The precolumn is used to optimize separation selectivity. Similar samples were used to obtain the precision statements for Procedures A and B while the precision for Procedure C was obtained with a different sample set. All three procedures used similar ASTM approved statistical procedures for the calculation of the precision statements. Although the three procedures share similar instrumentation requirements and practice of the gas chromatographic art, the scope as indicated, apparatus description, reagents and materials, system optimization, calibration, calculation and precision sections are presented separately for each procedure to allow the user to perform effectively each procedure as practiced in the original interlaboratory cooperative study. It is very important that the user of this test method specify clearly which procedure (A, B, or C) was used when comparing results with other laboratories or reporting results. [Appendix X1](#) of this test method contains comparison data for Procedures A and B for several interlaboratory cooperative study samples with other types of test methods for several selected oxygenates and hydrocarbon types. Comparison data for Procedure C is not available since it used a different set of gasolines in the round robin.

1. Scope

1.1 Procedures A and B:

1.1.1 Test Procedures A and B provide for the determination of individual hydrocarbon components of spark-ignition engine fuels and their mixtures containing oxygenate blends (MTBE, ETBE, ethanol, and so forth.) with boiling ranges up to 225°C. Other light liquid hydrocarbon mixtures typically encountered in petroleum refining operations, such as, blending stocks (naphthas, reformates, alkylates, and so forth.) may also be analyzed; however, statistical data was obtained only with blended spark-ignition engine fuels.

1.1.2 Based on the cooperative study results, individual component concentrations and precision are determined in the

range of 0.01 to approximately 30 % mass percent. The procedures may be applicable to higher and lower concentrations for the individual components; however, the user shall verify the accuracy if the procedures are used for components with concentrations outside the specified ranges.

1.1.3 Test Procedures A and B also determine methanol, ethanol, t-butanol methyl t-butyl ether (MTBE), ethyl t-butyl ether (ETBE), t-amyl-methyl-ether (TAME) in spark ignition engine fuels in the concentration range of 1 to 30 mass %. However, the cooperative study data provided sufficient statistical data for MTBE in Procedure B only.

1.1.4 Although a majority of the individual hydrocarbons present are determined, some co-elution of compounds is encountered. If this test method is utilized to estimate bulk hydrocarbon group-type composition (PONA) the user of such data should be cautioned that some error will be encountered due to co-elution and a lack of identification of all components present. Samples containing significant amounts of olefinic or naphthenic, or both (for example, virgin naphthas) constituents

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D.02.04.0L on Hydrocarbon Analysis.

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