



Standard Test Method for Detailed Analysis of Petroleum Naphthas through *n*-Nonane by Capillary Gas Chromatography¹

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INTRODUCTION

Despite the many advances in capillary gas chromatography instrumentation and the remarkable resolution achievable, it has proven difficult to standardize a test method for the analysis of a mixture as complex as petroleum naphtha. Because of the proliferation of numerous, similar columns and the endless choices of phase thickness, column internal diameter, length, etc., as well as instrument operating parameters, many laboratories use similar *but not identical* methods for the capillary GC analysis of petroleum naphthas. Even minute differences in column polarity or column oven temperature, for example, can change resolution or elution order of components and make their identification an individual interpretive process rather than the desirable, objective application of standard retention data. To avoid this, stringent column specifications and temperature and flow conditions have been adopted in this test method to ensure consistent elution order and resolution and reproducible retention times. Strict adherence to the specified conditions is essential to the successful application of this test method.

1. Scope

1.1 This test method covers the determination of hydrocarbon components of petroleum naphthas as enumerated in Table 1. Components eluting after *n*-nonane (bp 150.8°C) are determined as a single group.

1.2 This test method is applicable to olefin-free (<2 % olefins by liquid volume) liquid hydrocarbon mixtures including virgin naphthas, reformates, and alkylates. Olefin content can be determined by Test Method D 1319. The hydrocarbon mixture must have a 98 % point of 250°C or less as determined by Test Method D 3710.

1.3 Components that are present at the 0.05 mass % level or greater can be determined.

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

1.5 *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 warning statements are given in Section 7.

2. Referenced Documents

2.1 ASTM Standards:

D 1319 Test Method for Hydrocarbon Types in Liquid Petroleum Products by Fluorescent Indicator Adsorption²

D 3700 Practice for Obtaining LPG Samples Using a Floating Piston Cylinder³

D 3710 Test Method for Boiling Range Distribution of Gasoline and Gasoline Fractions by Gas Chromatography³

D 4057 Practice for Manual Sampling of Petroleum and Petroleum Products³

3. Summary of Test Method

3.1 A representative sample of the naphtha is introduced into a gas chromatograph equipped with a methyl silicone bonded phase fused silica capillary column. Helium carrier gas transports the vaporized sample through the column in which the components are separated. Components are sensed by a flame ionization detector as they elute from the column. The detector signal is processed by an electronic data acquisition system or integrating computer. Each eluting peak is identified by comparing its retention index to a table of retention indices and by visual matching with a standard chromatogram. The table of retention indices has been established by running

¹ This test method is under the jurisdiction of ASTM Committee D02 on Petroleum Products and Lubricants and is the direct responsibility of Subcommittee D02.04 on Hydrocarbon Analysis.

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² *Annual Book of ASTM Standards*, Vol 05.01.

³ *Annual Book of ASTM Standards*, Vol 05.02.