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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 hydrocar-

bon components of petroleum naphthas as enumerated in Table 1. Components eluting after *n*-nonane (bp 150.8°C) are determined as a single group.

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TABLE 1 Typical Retention Characteristics of Naphtha Components

Compound	Retention Time, min	Adjusted Retention Time, min	Kovats Retention Index @35°C	Linear Retention Index
Methane	3.57	0.00	100.0	...
Ethane	3.65	0.08	200.0	...
Propane	3.84	0.27	300.0	...
Isobutane	4.14	0.57	367.3	...
<i>n</i> -Butane	4.39	0.82	400.0	...
2,2-Dimethylpropane	4.53	0.96	415.5	...
Isopentane	5.33	1.76	475.0	...
<i>n</i> -Pentane	5.84	2.27	500.0	...
2,2-Dimethylbutane	6.81	3.24	536.2	...
Cyclopentane	7.83	4.26	564.1	...
2,3-Dimethylbutane	7.89	4.32	565.5	...
2-Methylpentane	8.06	4.49	569.5	...
3-Methylpentane	8.72	5.15	583.4	...
<i>n</i> -Hexane	9.63	6.06	600.0	...
2,2-Dimethylpentane	11.22	7.65	624.2	...
Methylcyclopentane	11.39	7.82	626.5	...
2,4-Dimethylpentane	11.68	8.11	630.3	...
2,2,3-Trimethylbutane	12.09	8.52	635.4	...
Benzene	13.29	9.72	649.1	...
3,3-dimethylpentane	13.84	10.27	654.8	...
Cyclohexane	14.19	10.62	658.3	...