Designation: D 5739 – 00

An American National Standard

Standard Practice for Oil Spill Source Identification by Gas Chromatography and Positive Ion Electron Impact Low Resolution Mass Spectrometry[1]

This standard is issued under the fixed designation D 5739; 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 practice covers the use of gas chromatography and mass spectrometry to analyze and compare petroleum oil spills and suspected sources.

1.2 The probable source for a spill can be ascertained by the examination of certain unique compound classes that also demonstrate the most weathering stability. To a greater or lesser degree, certain chemical classes can be anticipated to chemically alter in proportion to the weathering exposure time and severity, and subsequent analytical changes can be predicted. This practice recommends various classes to be analyzed and also provides a guide to expected weathering—induced analytical changes.

1.3 This practice is applicable for moderately to severely degraded petroleum oils in the distillate range from diesel through Bunker C; it is also applicable for all crude oils with comparable distillation ranges. This practice may have limited applicability for some kerosenes, but it is not useful for gasolines.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

D 1129 Terminology Relating to Water[2]

D 3325 Practice for Preservation of Waterborne Oil Samples[3]

D 3326 Practices for Preparation of Samples for Identification of Waterborne Oils[2]

D 3328 Test Methods for Comparison of Waterborne Petroleum Oils by Gas Chromatography[3]

D 3414 Test Method for Comparison of Waterborne Petroleum Oils by Infrared Spectroscopy[3]

D 3415 Practice for Identification of Waterborne Oils[4]

D 3650 Test Method for Comparison of Waterborne Petroleum Oils by Fluorescence Analysis[3]

D 5037 Test Method for Comparison of Waterborne Petroleum Oils by High Performance Liquid Chromatography[3]

E 355 Practice for Gas Chromatography Terms and Relationships[4]

3. Summary of Practice

3.1 The recommended chromatography column is a capillary directly interfaced to the mass spectrometer (either quadrupole or magnetic).

3.2 The low-resolution mass spectrometer is operated in the positive ion electron impact mode, 70 eV nominal.

3.3 Mass spectral data are acquired, stored, and processed with the aid of commercially available computer-based data systems.

4. Significance and Use

4.1 This practice is useful for assessing the source for an oil spill. Other less complex analytical procedures (Test Methods D 3328, D 3414, D 3650, and D 5037) may provide all of the necessary information for ascertaining an oil spill source; however, the use of a more complex analytical strategy may be necessary in certain difficult cases, particularly for significantly weathered oils. This practice provides the user with a means to this end.

4.1.1 This practice presumes that a "screening" of possible suspect sources has already occurred using less intensive techniques. As a result, this practice focuses directly on the generation of data using preselected targeted compound classes. These targets are both petrogenic and pyrogenic and can constitute both major and minor fractions of petroleum oils; they were chosen in order to develop a practice that is universally applicable to petroleum oil identification in general

[1] This practice is under the jurisdiction of ASTM Committee D19 on Water and is the direct responsibility of Subcommittee D19.06 on Methods for Analysis for Organic Substances in Water.

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[2] *Annual Book of ASTM Standards*, Vol 11.01.

[3] *Annual Book of ASTM Standards*, Vol 11.02.

[4] *Annual Book of ASTM Standards*, Vol 14.01.

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

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