



# Standard Practice for Using Field-Portable Fiber Optics Synchronous Fluorescence Spectrometer for Quantification of Field Samples for Aromatic and Polycyclic Aromatic Hydrocarbons<sup>1</sup>

This standard is issued under the fixed designation E 2143; 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 provides a rapid method for the screening of environmental samples for aromatic hydrocarbons (AHs) and polycyclic aromatic hydrocarbons (PAHs). The screening takes place in the field and provides immediate feedback on limits of contamination by substances containing AHs and PAHs. Quantification is obtained by the use of appropriately characterized, site-specific calibration curves. Remote sensing by use of optical fibers is useful for accessing difficult to reach areas or potentially dangerous materials or situations. When contamination of field personnel by dangerous materials is a possibility, use of remote sensors may minimize or eliminate the likelihood of such contamination taking place.

1.2 This test method is applicable to AHs and PAHs present in samples extracted from soils or in water. This test method is applicable for field screening or, with an appropriate calibration, quantification of total AHs and PAHs.

1.3 *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 Related to Water<sup>2</sup>

D 4489 Practice for Sampling of Waterborne Oils<sup>3</sup>

D 5412 Test Method for Quantification of Complex Polycyclic Aromatic Hydrocarbon Mixtures or Petroleum Oils in Water<sup>3</sup>

E 131 Terminology and Symbols Related to Molecular Spectroscopy<sup>4</sup>

E 388 Test Method for Spectral Bandwidth and Wavelength Accuracy of Fluorescence Spectrometers<sup>4</sup>

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee E13 on Molecular Spectroscopy and is the direct responsibility of Subcommittee E13.09 on Optical Fibers and Wave Lengths.

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<sup>2</sup> Annual Book of ASTM Standards, Vol 11.01.

<sup>3</sup> Annual Book of ASTM Standards, Vol 11.02.

<sup>4</sup> Annual Book of ASTM Standards, Vol 03.06.

E 578 Test Method for Linearity of Fluorescence Measuring Systems<sup>4</sup>

E 579 Test Method for Limit of Detection of Fluorescence of Quinine Sulfate<sup>4</sup>

## 3. Terminology

3.1 For definitions of terms used in this test method refer to Terminology D 1129 and E 131.

## 4. Summary of Test Method

4.1 This test method consists of extracting the AHs and PAHs from soil samples or preparation of water samples followed by synchronous fluorescence analysis with a field-portable instrument. The samples require serial dilutions of samples to establish a linear response. These measurements are made using standard fluorescence cuvettes. While some optimization of selectivity can be accomplished by varying the wavelength difference between excitation and emission monochromators, generally spectra generated from petroleum contaminants with a wavelength difference such as 6 or 18 nm provide good results and no preliminary spectra are required (see Test Method D 5412).

4.2 Different soils have varying partition coefficients. Therefore, representative samples of a subset of the extracts or the water samples should be analyzed by gas chromatography (GC) or other appropriate methods. The purpose is to establish a site-specific calibration curve to be used for quantification of total AHs and PAHs in the environmental samples of interest.

4.3 When desirable, determination of AHs and PAHs may be made remotely using an optical fiber.

## 5. Significance and Use

5.1 This technique is designed for on-site rapid screening and characterization of environmental soil and water samples resulting in significant cost savings for environmental remediation projects. Remote analysis can be made with optical fibers when situations warrant or demand use of this option.

5.2 Quantification of total AHs and PAHs in these environmental samples is accomplished by having a subset of the samples analyzed by an alternate technique and generating a site-specific calibration curve.

5.3 Synchronous fluorescence provides sufficient spectral