



# Standard Practice for Using Flame Photometric Detectors in Gas Chromatography<sup>1</sup>

This standard is issued under the fixed designation E840; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This practice is intended as a guide for the use of a flame photometric detector (FPD) as the detection component of a gas chromatographic system.

1.2 This practice is directly applicable to an FPD that employs a hydrogen-air flame burner, an optical filter for selective spectral viewing of light emitted by the flame, and a photomultiplier tube for measuring the intensity of light emitted.

1.3 This practice describes the most frequent use of the FPD which is as an element-specific detector for compounds containing sulfur (S) or phosphorus (P) atoms. However, nomenclature described in this practice are also applicable to uses of the FPD other than sulfur or phosphorus specific detection.

1.4 This practice is intended to describe the operation and performance of the FPD itself independently of the chromatographic column. However, the performance of the detector is described in terms which the analyst can use to predict overall system performance when the detector is coupled to the column and other chromatographic system components.

1.5 For general gas chromatographic procedures, Practice [E260](#) should be followed except where specific changes are recommended herein for use of an FPD.

1.6 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.7 *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.* For specific safety information, see Section 4, Hazards.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>2</sup>

[E260 Practice for Packed Column Gas Chromatography](#)  
[E355 Practice for Gas Chromatography Terms and Relationships](#)

### 2.2 CGA Standards:<sup>3</sup>

[CGA G-5.4 Standard for Hydrogen Piping Systems at Consumer Locations](#)  
[CGA P-1 Safe Handling of Compressed Gases in Containers](#)  
[CGA P-9 The Inert Gases: Argon, Nitrogen and Helium](#)  
[CGA P-12 Safe Handling of Cryogenic Liquids](#)  
[CGA V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures](#)  
[HB-3 Handbook of Compressed Gases](#)

## 3. Terminology

3.1 *Definitions*—For definitions relating to gas chromatography, refer to Practice [E355](#).

3.2 *Descriptions of Terms*—Descriptions of terms used in this practice are included in Sections 7-17.

3.3 *Symbols*—A list of symbols and associated units of measurement is included in [Annex A1](#).

## 4. Hazards

4.1 *Gas Handling Safety*—The safe handling of compressed gases and cryogenic liquids for use in chromatography is the responsibility of every laboratory. The Compressed Gas Association, (CGA), a member group of specialty and bulk gas suppliers, publishes the following guidelines to assist the laboratory chemist to establish a safe work environment. Applicable CG publications include CGA P-1, CGA G-5.4, CGA P-9, CGA V-7, CGA P-12, and HB-3.

## 5. Principles of Flame Photometric Detectors

5.1 The FPD detects compounds by burning those compounds in a flame and sensing the increase of light emission

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee [E13](#) on Molecular Spectroscopy and Separation Science and is the direct responsibility of Subcommittee [E13.19](#) on Separation Science.

Current edition approved Jan. 1, 2013. Published January 2013. Originally approved in 1981. Last previous edition approved in 2005 as E840 – 95 (2005). DOI: 10.1520/E0840-95R13.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

<sup>3</sup> Available from Compressed Gas Association (CGA), 4221 Walney Rd., 5th Floor, Chantilly, VA 20151-2923, <http://www.cganet.com>.