



Standard Practice for Testing Thermal Conductivity Detectors Used in Gas Chromatography¹

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1. Scope

1.1 This practice is intended to serve as a guide for the testing of the performance of a thermal conductivity detector (TCD) used as the detection component of a gas chromatographic system.

1.2 This practice is directly applicable to thermal conductivity detectors which employ filament (hot wire) or thermistor sensing elements.

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

1.4 For general gas chromatographic procedures, Practice E 260 should be followed except where specific changes are recommended herein for the use of a TCD. For definitions of gas chromatography and its various terms see Practice E 355.

1.5 For general information concerning the principles, construction, and operation of TCD see Refs. (1-4).²

1.6 *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 4.³

2. Referenced Documents

2.1 ASTM Standards:

E 260 Practice for Packed Column Gas Chromatography⁴

E 355 Practice for Gas Chromatography Terms and Relationships⁴

2.2 CGA Standards:

CGA P-1 Safe Handling of Compressed Gases in Containers⁵

CGA G-5.4 Standard for Hydrogen Piping Systems at Consumer Locations⁵

CGA P-9 The Inert Gases: Argon, Nitrogen and Helium⁵

CGA V-7 Standard Method of Determining Cylinder Valve Outlet Connections for Industrial Gas Mixtures⁵

CGA P-12 Safe Handling of Cryogenic Liquids⁵

HB-3 Handbook of Compressed Gases⁵

3. Significance and Use

3.1 Although it is possible to observe and measure each of the several characteristics of a detector under different and unique conditions, it is the intent of this practice that a complete set of detector specifications should be obtained at the same operating conditions. It should be noted also that to specify a detector's capability completely, its performance should be measured at several sets of conditions within the useful range of the detector. The terms and tests described in this practice are sufficiently general so that they may be used at whatever conditions may be chosen for other reasons.

3.2 Linearity and speed of response of the recorder used should be such that it does not distort or otherwise interfere with the performance of the detector. Effective recorder response, Refs. (5, 6) in particular, should be sufficiently fast that it can be neglected in sensitivity of measurements. If additional amplifiers are used between the detector and the final readout device, their characteristics should also first be established.

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 CGA publications include: CGA P-1, CGA G-5.4, CGA P-9, CGA V-7, CGA P-12, and HB-3.

5. Sensitivity (Response)

5.1 Definition:

¹ This practice is under the jurisdiction of ASTM Committee E13 on Molecular Spectroscopy and is the direct responsibility of Subcommittee E13.19 on Chromatography.

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² The boldface numbers in parentheses refer to the list of references at the end of this practice.

³ See Appendix X1.

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

⁵ Available from Compressed Gas Association, Inc., 1725 Jefferson Davis Highway, Arlington, VA 22202-4100.