



Standard Test Method for Simultaneous Measurement of Sulfur Compounds and Minor Hydrocarbons in Natural Gas and Gaseous Fuels by Gas Chromatography and Atomic Emission Detection¹

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1. Scope

1.1 This test method is for the determination of volatile sulfur-containing compounds and minor hydrocarbons in gaseous fuels including components with higher molar mass than that of propane in a high methane gas, by gas chromatography (GC) and atomic emission detection (AED). Hydrocarbons include individual aliphatic components from C_4 to C_6 , aromatic components and groups of hydrocarbons classified according to carbon numbers up to C_{12} at least, such as C_6 - C_7 , C_7 - C_8 , C_8 - C_9 and C_9 - C_{10} , etc. The detection range for sulfur and carbon containing compounds is approximately 20 to 100 000 picograms (pg). This is roughly equivalent to 0.04 to 200 mg/m³ sulfur or carbon based upon the analysis of a 0.25 mL sample.

1.2 This test method describes a GC-AED method employing a specific capillary GC column as an illustration for natural gas and other gaseous fuel containing low percentages of ethane and propane. Alternative GC columns and instrument parameters may be used in this analysis optimized for different types of gaseous fuel, provided that appropriate separation of the compounds of interest can be achieved.

1.3 This test method does not intend to identify all individual sulfur species. Unknown sulfur compounds are measured as mono-sulfur containing compounds. Total sulfur content of a sample can be found by summing up sulfur content present in all sulfur species.

1.4 This method is not a Detailed Hydrocarbon Analysis (DHA) method and does not intend to identify all individual hydrocarbon species. Aliphatic hydrocarbon components lighter than *n*-hexane, benzene, toluene, ethyl benzene, *m,p*-xylenes and *o*-xylene (BTEX) are generally separated and identified individually. Higher molar mass hydrocarbons are determined as groups based on carbon number, excluding

BTEX. The total carbon content of propane and higher molar mass components in a sample can be found by summing up carbon content present in all species containing carbon.

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

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.*

2. Referenced Documents

2.1 ASTM Standards:²

- D1265 Practice for Sampling Liquefied Petroleum (LP) Gases, Manual Method
- D1945 Test Method for Analysis of Natural Gas by Gas Chromatography
- D1946 Practice for Analysis of Reformulated Gas by Gas Chromatography
- D3609 Practice for Calibration Techniques Using Permeation Tubes
- D4626 Practice for Calculation of Gas Chromatographic Response Factors
- D5287 Practice for Automatic Sampling of Gaseous Fuels
- D5504 Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Chemiluminescence
- D5623 Test Method for Sulfur Compounds in Light Petroleum Liquids by Gas Chromatography and Sulfur Selective Detection
- D6228 Test Method for Determination of Sulfur Compounds in Natural Gas and Gaseous Fuels by Gas Chromatography and Flame Photometric Detection
- E840 Practice for Using Flame Photometric Detectors in Gas Chromatography

¹ This test method is under the jurisdiction of ASTM Committee D03 on Gaseous Fuels and is the direct responsibility of Subcommittee D03.05 on Determination of Special Constituents of Gaseous Fuels.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.