



Standard Guide for Purity of Carbon Dioxide Used in Supercritical Fluid Applications¹

This standard is issued under the fixed designation E1747; 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.

INTRODUCTION

The rapid commercial development of carbon dioxide for use in supercritical fluid extraction (SFE) and supercritical fluid chromatography (SFC) has hastened the need to establish common purity standards to be specified by specialty gas suppliers. As a consequence of its isolation from petrochemical side-streams or as a by-product of fermentation or ammonia synthesis, carbon dioxide contains a wide range of impurities that can interfere with analytical quantification or instrument operation. This guide is intended to serve as a guide to specialty gas suppliers for testing the suitability of carbon dioxide for use in SFC and SFE applications.

1. Scope

1.1 This guide defines purity standards for carbon dioxide to ensure the suitability of liquefied carbon dioxide gas for use in SFE and SFC applications (see Guide E1449 for definitions of terms). This guide defines quantitation, labeling, and statistical standards for impurities in carbon dioxide that are necessary for successful SFE or SFC laboratory work, and it suggests methods of analysis for quantifying these impurities.

1.2 This guide is provided for use by specialty gas suppliers who manufacture carbon dioxide specifically for SFE or SFC applications. SFE or SFC carbon dioxide (CO₂) products offered with a claim of adherence to this guide will meet certain absolute purity and contaminant detectability requirements matched to the needs of current SFE or SFC techniques. The use of this guide allows different SFE or SFC CO₂ product offerings to be compared on an equal purity basis.

1.3 This guide considers contaminants to be those components that either cause detector signals that interfere with those of the target analytes or physically impede the SFE or SFC experiment.

1.4 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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 limitations prior to use.

2. Referenced Documents

2.1 ASTM Standards:²

- D2504 Test Method for Noncondensable Gases in C₂ and Lighter Hydrocarbon Products by Gas Chromatography
- D2820 Test Method for C Through C Hydrocarbons in the Atmosphere by Gas Chromatography (Withdrawn 1993)³
- D3670 Guide for Determination of Precision and Bias of Methods of Committee D22
- D3686 Practice for Sampling Atmospheres to Collect Organic Compound Vapors (Activated Charcoal Tube Adsorption Method)
- D3687 Practice for Analysis of Organic Compound Vapors Collected by the Activated Charcoal Tube Adsorption Method
- D4178 Practice for Calibrating Moisture Analyzers
- D4532 Test Method for Respirable Dust in Workplace Atmospheres Using Cyclone Samplers
- E260 Practice for Packed Column Gas Chromatography
- E355 Practice for Gas Chromatography Terms and Relationships
- E594 Practice for Testing Flame Ionization Detectors Used in Gas or Supercritical Fluid Chromatography

¹ This guide 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 Nov. 1, 2011. Published December 2011. Originally approved in 1995. Last previous edition approved in 2005 as E1747 – 95 (2005). DOI: 10.1520/E1747-95R11.

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.

³ The last approved version of this historical standard is referenced on www.astm.org.