



Standard Guide for Open-Path Fourier Transform Infrared (OP/FT-IR) Monitoring of Gases and Vapors in Air¹

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1. Scope

1.1 This guide covers active open-path Fourier transform infrared (OP/FT-IR) monitors and provides guidelines for using active OP/FT-IR monitors to obtain concentrations of gases and vapors in air.

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

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:*²

E131 Terminology Relating to Molecular Spectroscopy

E168 Practices for General Techniques of Infrared Quantitative Analysis (Withdrawn 2015)³

E1421 Practice for Describing and Measuring Performance of Fourier Transform Mid-Infrared (FT-MIR) Spectrometers: Level Zero and Level One Tests

E1655 Practices for Infrared Multivariate Quantitative Analysis

¹ This guide is under the jurisdiction of ASTM Committee E13 on Molecular Spectroscopy and Separation Science and is the direct responsibility of Subcommittee E13.03 on Infrared and Near Infrared Spectroscopy.

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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.

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

3. Terminology

3.1 For definitions of terms relating to general molecular spectroscopy used in this guide refer to Terminology E131. A complete glossary of terms relating to optical remote sensing is given in Ref (1).⁴

3.2 *Definitions:*

3.2.1 *background spectrum, n*—a single-beam spectrum that does not contain the spectral features of the analyte(s) of interest.

3.2.2 *bistatic system, n*—a system in which the IR source is some distance from the detector. For OP/FT-IR monitoring, this implies that the IR source and the detector are at opposite ends of the monitoring path.

3.2.3 *monitoring path, n*—the location in space over which concentrations of gases and vapors are measured and averaged.

3.2.4 *monitoring pathlength, n*—the distance the optical beam traverses through the monitoring path.

3.2.5 *monostatic or unistatic system, n*—a system with the IR source and the detector at the same end of the monitoring path. For OP/FT-IR systems, the beam is generally returned by a retroreflector.

3.2.6 *open-path monitoring, n*—monitoring over a path that is completely open to the atmosphere.

3.2.7 *parts per million meters, n*—the units associated with the quantity path-integrated concentration and a possible unit of choice for reporting data from OP/FT-IR monitors because it is independent of the monitoring pathlength.

3.2.8 *path-averaged concentration, n*—the result of dividing the path-integrated concentration by the pathlength.

3.2.8.1 *Discussion*—Path-averaged concentration gives the average value of the concentration along the path, and typically

⁴ The boldface numbers in parentheses refer to a list of references at the end of this standard.