



Designation: D8460 – 22

Standard Test Method for Quantification of Volatile Organic Compounds Using Proton Transfer Reaction Mass Spectrometry¹

This standard is issued under the fixed designation D8460; 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.

1. Scope

1.1 This test method describes a technique of quantifying the results from measuring various volatile organic compound contents using a chemical ionization mass spectrometer resulting in the production of positively charged target compound ions. Depending on the nature of production of so-called primary ions, the associated instruments having the capability to perform such analyses are either named Proton Transfer Reaction Mass Spectrometers (PTR-MS), Selected Ion Flow Tube Mass Spectrometers (SIFT-MS) or, in the most generic term, Mid-pressure chemical ionization mass spectrometers (MPCI-MS). Within this standard, the term PTR-MS is used to represent any of these instrumentations.

1.2 Either of the instrument types can be used with the two main mass analyzers on the market, that is, with either quadrupole (QMS) or time-of-flight (TOFMS) mass analyzer. This method relates only to the quantification portion of the analysis. Due to large differences in user interfaces and operating procedures for the instruments of the main instrument providers, the specifics on instrument operation are not described in this method.

1.3 Details on the theoretical aspects concerning ion production and chemical reactions are included in this standard as far as required to understand the quantification aspects and practical operation of the instrument in the field of vapor intrusion analyses. Specifics on the operation and/or calibration of the instrument need to be identified by using the user's manual of the individual instrument vendor. A comprehensive discussion on the technique including individual mass-line interferences and in-depth comparison with alternate methods are given in multiple publications, such as Yuan et al. (2017) (1) and Dunne et al. (2018) (2)².

1.4 *Units*—Values stated in SI units are to be regarded as standard. No other units of measurement are included in this

standard. Reporting of test results in units other than SI shall not be regarded as nonconformance with this standard.

1.5 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026.

1.5.1 The procedures used to specify how data are collected/recorded or calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of this standard to consider significant digits used in analysis methods for engineering data.

1.6 This standard may involve hazardous materials, operations, and equipment. *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.7 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:³

D653 Terminology Relating to Soil, Rock, and Contained Fluids

D1357 Practice for Planning the Sampling of the Ambient Atmosphere

D3740 Practice for Minimum Requirements for Agencies

¹ This test method is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.21 on Groundwater and Vadose Zone Investigations.

Current edition approved May 1, 2022. Published June 2022. DOI: 10.1520/D8460-22

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

³ 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.