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Standard Practice for Calculation of Gas Chromatographic Response Factors¹

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1. Scope

1.1 This practice covers a procedure for calculating gas chromatographic response factors. It is applicable to chromatographic data obtained from a gaseous mixture or from any mixture of compounds that is normally liquid at room temperature and pressure or solids, or both, that will form a solution with liquids. It is not intended to be applied to those compounds that react in the chromatograph or are not quantitatively eluted. Normal C₆ through C₁₁ paraffins have been chosen as model compounds for demonstration purposes.

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

- D2268 Test Method for Analysis of High-Purity *n*-Heptane and Isooctane by Capillary Gas Chromatography
- D2427 Test Method for Determination of C₂ through C₅ Hydrocarbons in Gasolines by Gas Chromatography
- D2804 Test Method for Purity of Methyl Ethyl Ketone By Gas Chromatography
- D2998 Test Method for Polyhydric Alcohols in Alkyd Resins (Withdrawn 2004)³
- D3329 Test Method for Purity of Methyl Isobutyl Ketone by

Gas Chromatography

- D3362 Test Method for Purity of Acrylate Esters by Gas Chromatography (Withdrawn 2011)³
- D3465 Test Method for Purity of Monomeric Plasticizers by Gas Chromatography
- D3545 Test Method for Alcohol Content and Purity of Acetate Esters by Gas Chromatography
- D3695 Test Method for Volatile Alcohols in Water by Direct Aqueous-Injection Gas Chromatography
- D4307 Practice for Preparation of Liquid Blends for Use as Analytical Standards
- E260 Practice for Packed Column Gas Chromatography

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *response factor (R)*—a constant of proportionality used to convert the observed chromatographic response of specific compounds to either mass or volume percent composition. The observed response may be measured as peak areas or peak heights. Depending on the calculation formula, the response factor (*R*) is applied by either multiplying or dividing the observed response by the determined factor.

3.1.2 In this practice, the response factors determined are multiplying factors.

4. Summary of Practice⁴

4.1 Individual C₆ to C₁₁ *n*-paraffins are precisely weighed and combined in an inert, tight-sealing glass vial. Different concentration levels of the blend components to cover concentration ranges of interest may be obtained by dilution with a suitable solvent. As diluent, a *n*-paraffin, such as *n*-dodecane, that is, higher boiling than the blend components is suitable. The quantitative blends are analyzed, in duplicate, by gas chromatography using either thermal conductivity, flame-ionization or other forms of detection. From the mass or volume composition of the blend and the raw area or peak height measurements, mass or volume response or relative response factors for each blend component are calculated.

¹ This practice is under the jurisdiction of ASTM Committee D02 on Petroleum Products, Liquid Fuels, and Lubricants and is the direct responsibility of Subcommittee D02.04.0L on Gas Chromatography Methods.

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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.

⁴ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR: D02-1200.