



Standard Practice for Color Measurement of Fluorescent Specimens Using the One-Monochromator Method¹

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INTRODUCTION

The fundamental procedure for evaluating the color of a fluorescent object is to obtain spectrometric data for specified illuminating and viewing conditions, and then use this data to compute tristimulus values based on an International Commission on Illumination (CIE) standard observer and a CIE standard illuminant. For a fluorescent object-color specimen, the spectral radiance factors used to calculate tristimulus values are made up of two components — an ordinary reflectance factor and a fluorescence factor ($\beta = \beta_S + \beta_F$). The magnitude of the fluorescent radiance factors, and consequently the measured total radiance factors and derived color values, vary directly with the spectral distribution of the instrument source illuminating the specimen. Consequently, the colorimetry of fluorescent object-color specimens requires greater control of the measurement parameters in order to obtain precise spectrometric and colorimetric data. In order to obtain repeatable and reproducible color values for fluorescent objects it is necessary that the illumination at the specimen surface closely duplicate the standard illuminant used in the color calculations. The considerations involved and the procedures used to obtain spectrometric data and compute colorimetric values for fluorescent specimens using a one-monochromator spectrometer are contained in this practice.

1. Scope

1.1 This practice applies to the instrumental color measurement of fluorescent specimens excited by near ultraviolet and visible radiation that results in fluorescent emission within the visible range. It is not intended for other types of photoluminescent materials such as phosphorescent, chemiluminescent, or electroluminescent, nor is this practice intended for the measurement of the fluorescent properties for chemical analysis.

1.2 This practice describes the instrumental measurement requirements, calibration procedures, and material standards needed for the color measurement of fluorescent specimens when illuminated by simulated daylight approximating CIE Standard Illuminant D65 (CIE D65).

1.3 This practice is limited in scope to colorimetric spectrometers providing continuous broadband polychromatic illumination of the specimen and employing only a viewing monochromator for analyzing the radiation leaving the specimen.

1.4 This practice can be used for calculating total tristimulus values and total chromaticity coordinates for fluorescent colors in the CIE Color System for either the CIE 1931 Standard Colorimetric Observer or the CIE 1964 Supplementary Standard Colorimetric Observer.

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 regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

D985 Test Method for Brightness of Pulp, Paper, and Paperboard (Directional Reflectance at 457 nm) (Withdrawn 2010)³

D2244 Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates

¹ This practice is under the jurisdiction of ASTM Committee E12 on Color and Appearance and is the direct responsibility of Subcommittee E12.05 on Fluorescence.

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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.