Evaluation of the Limits of Linearity by the Fluorescence Spectrophotometer (ASTM E578)

INTRODUCTION

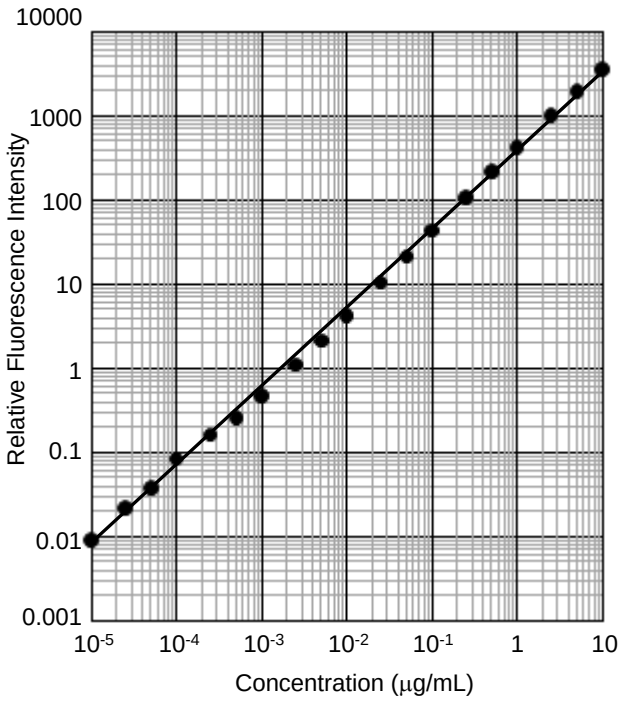
ASTM (American Society for Testing and Materials) is a kind of American industrial standards. Standard No. ASTM E578 introduces the test method for the linearity of fluorescence photometers by using quinine sulfate. Quinine sulfate in 0.1 M sulfuric acid solution, at the excitation wavelength of 350 nm, emits blue fluorescence with a wavelength of 450 nm. The fluorescence spectrum mode was used for the analysis in order to confirm the peak shape.
By using F-7000 fluorescence spectrophotometer, it was possible to confirm the linearity (dynamic range) over about 6 orders of concentration range (0.00001 – 10 µg/mL) without adjusting sensitivity parameters such as analytical conditions. Hitachi fluorescence spectrophotometers (F-7000 and F-2700) ensure linearity over about 6 orders of magnitude not only for the spectrum measurement mode, but also for the quantitative analysis mode and time change measurement mode. The results obtained by this test method are also useful for the comparison of performances between different fluorescence spectrophotometers and for the confirmation of instrument conditions.

SAMPLE

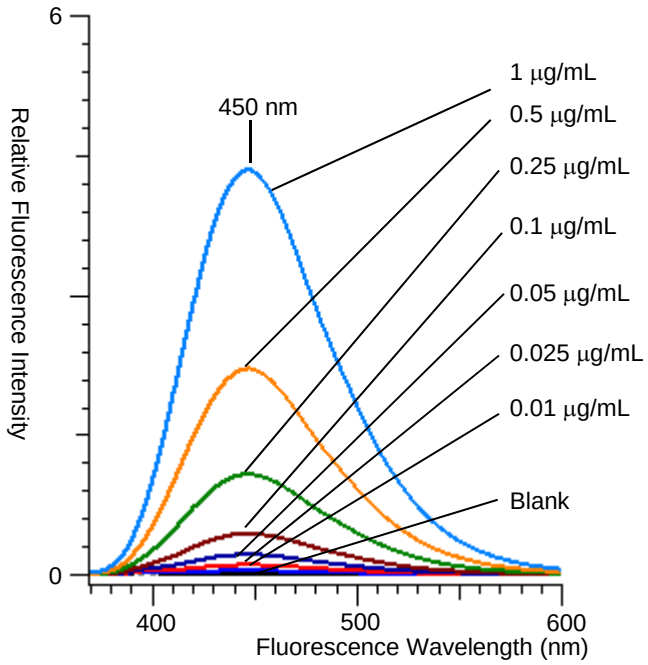
Sample : NIST SRM 936 Series A (quinine sulfate)
National Institute of Standards & Technology (NIST)
Solvent : 0.1 M Sulfuric acid
Preparation : Weigh out 0.1 g of NIST SRM 936 (quinine sulfate powder) and make up the volume to 100 mL with 0.1 M sulfuric acid (concentration; 1000 µg/mL).

ANALYTICAL CONDITIONS

Instrument	: F-7000	Slit on excitation side	: 10 nm	Response	: Automatic
Excitation wavelength	: 350 nm	Slit on fluorescence side	: 10 nm	Detector	: R928F
Fluorescence wavelength	: 450 nm	Scan speed	: 240 nm/min	Photomultiplier Vol.	: 300 V



Linear Relationship at Excitation Wavelength of 350 nm and Fluorescence Wavelength of 450 nm [With Background Correction]



Fluorescence Spectrum at Excitation Wavelength of 350 nm

KEY WORDS
Bio/Medical Science/Food/Pharmaceutical, Medicine/Pharmaceutical, Quinine Sulfate, Fluorescence Spectrum, Calibration Curve, Dynamic Range, Linearity, ASTM, NIST SRM 936, Background Corrected, Corrected Spectrum, FL, F-7000

Fluorophotometer (FL)

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