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Certificate

Standard Reference Material 2014

Didymium Glass Filter for Checking the Wavelength Scale of Spectrophotometers

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Serial Number:

This SRM is intended for use in calibrating the wavelength scale in the visible wavelength region of scanning spectrophotometers having nominal bandwidths in the range 1.5 to 10.5 nm. Depending upon the bandwidth of the spectrophotometer, anywhere from 14 to 24 wavelength corrections can be determined from 400 to 760 nm. Detailed instructions on the use of this SRM and examples of its use are given in NBS Special Publication 260-66. Each didymium-glass filter is identified by the SRM number and a serial number.

The wavelengths of the transmittance minima as obtained from measurements on each filter are given in Table 1. These values are given for seven equally spaced values of the half-height width of triangular passbands. The minima number is identified in the figure that illustrates the spectral transmittance as a function of wavelength. The wavelength values of nine points of inflection on the spectral transmittance curve as obtained on three filters are given in Table 2. These inflection points are representative of the melt and are also identified in the figure. These inflection points should only be used with the transmittance minima as described in Sections 2.2 and 2.3 in SP 260-66.

The measurements on which these tables are based were made at 25 °C with a high-precision reference spectrophotometer that has a wavelength accuracy of 0.04 nm. Table 3 indicates the estimated random (as obtained from 4 sets of measurements on a single filter) and systematic errors of the transmittance minima given in Table 1. Table 2 also indicates the range of the measured wavelengths of the inflection points. Trial calibrations made on several instruments, using both minima and inflection points, indicate that wavelength corrections made with these SRM's can be accurate to 0.2 nm. The uncertainty of a calibration, however, will depend upon the stability and other characteristics of a particular instrument.

The technical and support aspects involved in the preparation, certification, and issuance of this SRM were coordinated through the Office of Standard Reference Materials by R. K. Kirby.

The spectral transmittance as a function of wavelength for this filter is given in Table 4. These values are not certified but are provided for use as specified in SP 260-66. *They should not be used to check the photometric scale of a spectrophotometer.*

It is recommended that the filter be handled only by its edges and when not in use it should be stored in the box provided. If cleaning is necessary, wet the filter with water and rub gently with optical lens tissue soaked with a mild soap solution, rinse with distilled water, rinse with isopropyl alcohol, and rinse again with distilled water. Dry after each rinsing by wiping lightly with optical lens tissue.

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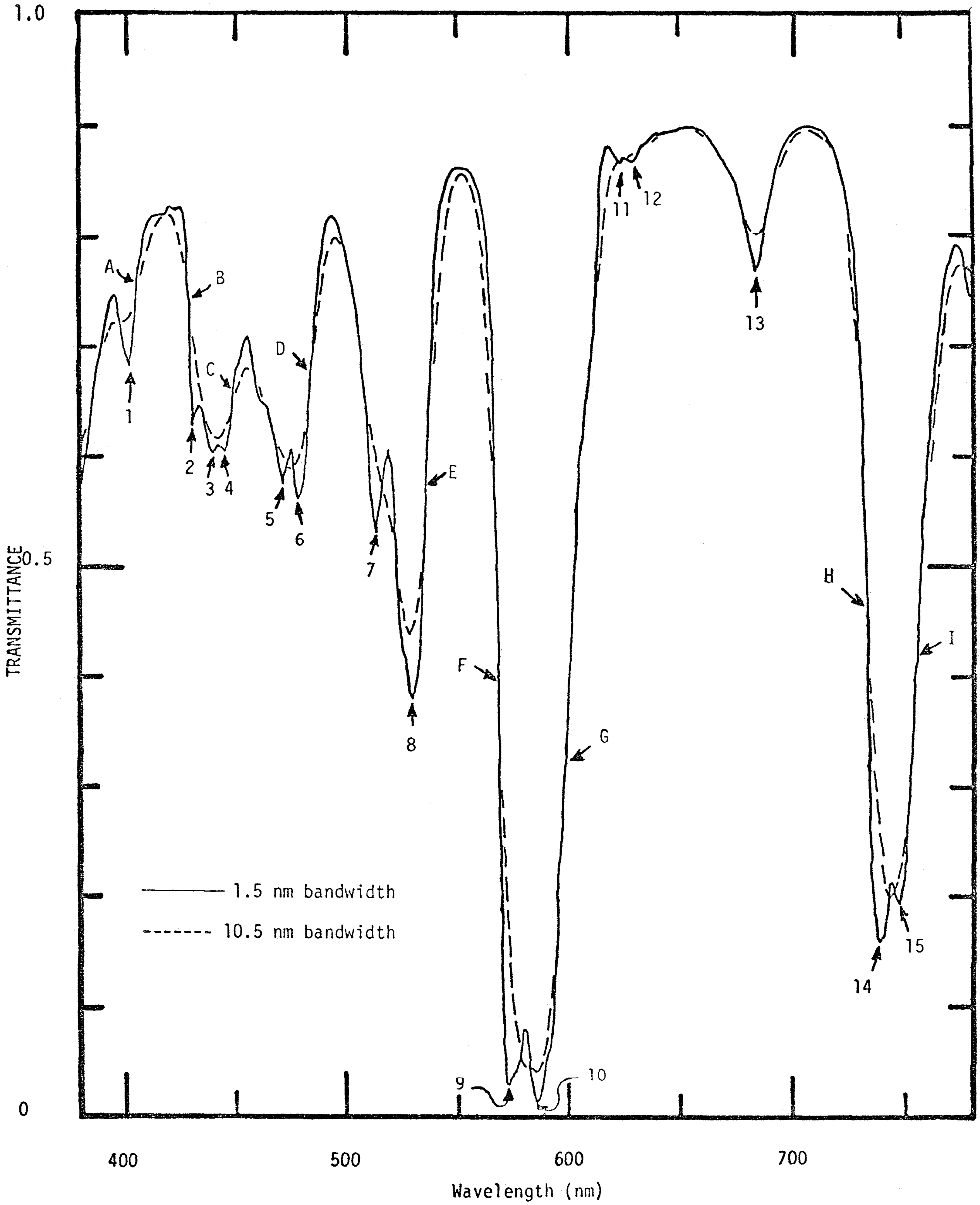
George A. Uriano, Chief
Office of Standard Reference Materials



Spectral transmittance of a typical didymium glass filter. Numbers indicate the principal points of minimum transmittance and letters indicate the principal points of inflection.

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Table 2

Wavelengths and Transmittances at Nine Selected Points of Inflection

Point Identification	Wavelength (nm)	Range* (nm)	Transmittance†
A	406.38	+.08 −.06	0.7562
B	429.42	+.05 −.05	.7293
C	449.45	+.06 −.06	.6514
D	484.77	+.10 −.15	.6743
E	536.52	+.06 −.09	.5801
F	568.16	+.08 −.04	.4008
G	598.99	+.05 −.07	.3346
H	733.45	+.06 −.03	.4730
I	756.48	+.01 −.02	.4215

*The range of wavelengths within which the wavelength for the given transmittance will fall for symmetric triangular passbands with half-height bandwidths from 1.5 to 10.5 nm.

†These values of transmittance are not certified.

Table 3

Estimated Random and Systematic Errors of the Transmittance Minima

Band Number	Nominal Wavelength of Minimum Transmittance	Standard Deviation for Indicated Bandwidth						
		1.5 nm	3.0 nm	4.5 nm	6.0 nm	7.5 nm	9.0 nm	10.5 nm
1	402 nm	0.015 nm (0.07)†	0.018 nm	0.020 nm	0.021 nm	0.025 nm	0.029 nm	–
2	431	0.013 (0.06)	0.010	–	–	–	–	–
3	440	0.021 (0.05)	0.013	0.050	0.028	0.009	0.005	0.007 nm (0.25)
4	446	0.023 (0.06)	0.029	–	–	–	–	–
5	473	0.011 (0.08)	0.012	0.032	–	–	–	–
6	479	0.015 (0.15)	0.013	0.009	0.009	0.009	0.014	0.017 (0.25)
7	513	0.022 (0.08)	0.016	0.014	0.013	0.010	–	–
8	530	0.012 (0.21)	0.010	0.010	0.011	0.010	0.011	0.010 (0.25)
9	573	0.004 (0.05)	0.010	0.010	0.012	0.014	–	–
10	585	0.007 (0.06)	0.004	0.007	0.008	0.008	0.007	0.007 (0.25)
11	624	0.058 (0.06)	0.061	–	–	–	–	–
12	630	0.210 (0.02)	0.120	0.171	0.133	0.091	–	–
13	685	0.019 (0.05)	0.029	0.024	0.017	0.014	0.014	0.012 (0.25)
14	740	0.009 (0.25)	0.013	0.011	0.010	0.009	0.009	0.010 (0.25)
15	748	0.020 (0.04)	0.016	–	–	–	–	–

†Values in parentheses are estimates of the systematic error. The estimates for the 1.5 nm bandwidth were obtained from the data taken at 1.5 nm intervals as compared to data taken at 0.15 nm intervals. The method of estimating the systematic errors for the 10.5 nm bandwidth is described in Section 3.4 in SP 260-66.