PerkinElmer Secondary Spectrometric Calibration Standards

Certificate of Calibration ***for*** ***Report Number: 1098-20130913***

ACCREDITED
CALIBRATION
CERT. 3112.01

PerkinElmer
16 Avenue de Quebec
Villebon Sur Yvette 91140
France

Ordinate Calibration

Calibration Data for Gray Glass Secondary Calibration Standards:

Standard	Number	Ordinate Reading (Absorbance) at the following wavelengths:				
		440.0 nm	546.1 nm	635.0 nm	1700.0 nm	2300.0 nm
G1	1098	0.3387	0.3039	0.3292	0.3808	0.2975
G2	1098	1.0209	0.9762	0.9712	0.5905	0.4316
G3	1442	0.5054	0.4737	0.4885	0.3900	0.2947

The uncertainty of the given absorbance values is +/-0.003 A at 440.0 nm, 546.1 nm, 635.0 nm, 1700.0 nm and 2300.0 nm.
The uncertainty is the expanded uncertainty expressed at an approximate level of confidence of 95% and a coverage factor of k=2 based on JCGM 100:2008 Evaluation of measurement data - Guide to the expression of uncertainty in measurement.

Conditions of Calibration

The following settings were used on the Lambda 900 UV/Vis/NIR Spectrometer employed to obtain the calibration data quoted on this certificate:

Measurement of Calibration

Ordinate mode	Absorbance		
Slit mode UV/Vis	Fix	Slit UV/Vis	1 nm
Integration time UV/Vis	5 s		
Slit mode NIR	Servo	Slit NIR	Servo
Integration time NIR	5 s	Gain	2

The PerkinElmer "Certification Software" program – "Photometric Accuracy Vis/NIR" method utilizing the instrument set-up parameters as outlined above was used to measure the absorbance of the standards at the prescribed wavelengths reflected in the Calibration Data grid.

This set of Spectrometric Solution was calibrated on a PerkinElmer high performance Lambda 900 UV/Vis/NIR Spectrometer.

Serial Number: 89015

This instrument is used solely for calibration purposes. The most recent quality control check of this instrument was performed on:

Date / Time: 3/21/2013

using the standard PerkinElmer quality control procedure. A set of NIST or NBS/PTB Standard Reference Standard Materials:

NIST model SRM 1930 filter set S/N 155 Calibration Date 01/05/2012 NRC Calibration Report No.PAR 2012 2956

was used during this procedure. Measurements were performed at an ambient temperature of: 22.8 C° and the humidity of: 50 %

Date / Time: 9/13/2013 / 9:27:09 AM

Operator: Cam Le Horvath Signature:

PerkinElmer LAS, Inc. , 710 Bridgeport Avenue, Shelton, CT 06484-4794, USA

End of Report

Secondary Spectrometric Calibration Standards

Certificate of Calibration

Abscissa Calibration

Calibration Data for Holmium (H) Secondary Calibration Standard. The relevant peak positions of the holmium oxide secondary standard were measured as:

Standard	Number	Peak Positions [nm]:				
H	1098	279.40	360.90	460.00	536.20	1937.80

The tolerance of the given peak positions are +/-0.25 nm in the ultra violet and visible range (279.3 nm, 360.8 nm, 460.1 nm and 536.4 nm) and +/- 1.50 nm for the peak in the near infrared range (1938.0 nm). The values are based on a spectral bandwidth of 1 to 2 nm. The uncertainty is the sum of the accuracy of the instrument, the reproducibility of the peak detection, and an estimated bias due to the possible systematic errors.

Conditions of Calibration

The following settings were used on the Lambda 900 UV/Vis/NIR Spectrometer employed to obtain the calibration data quoted on this certificate:

Measurement of Calibration

Ordinate mode	Absorbance	Data Interval	0.10 nm
Slit mode UV/Vis	Fix	Slit UV/Vis	1.00 nm
Integration time UV/Vis	0.24 s		
Slit mode NIR	Servo	Slit NIR	Servo
Gain	2		
Integration time NIR	0.24 s		

The instrument's scan program facility was used to measure the peak wavelengths of the standard given above.

This set of Spectrometric Solution was calibrated on a PerkinElmer high performance Lambda 900 UV/Vis/NIR Spectrometer.

Serial Number: 89015

This instrument is used solely for calibration purposes. The most recent quality control check of this instrument was performed on:

Date / Time: 3/21/2013

using the standard PerkinElmer quality control procedure. A set of NIST or NBS/PTB Standard Reference Standard Materials:

NIST model SRM 1930 filter set S/N 155 Calibration Date 01/05/2012 NRC Calibration Report No.PAR 2012 2956

was used during this procedure. Measurements were performed at an ambient temperature of: 22.8 C° and the humidity of: 50 %

Date / Time: 9/13/2013 / 7:46:01 AM

Operator: Cam Le Horvath Signature:

PerkinElmer LAS, Inc. , 710 Bridgeport Avenue, Shelton, CT 06484-4794, USA