



REPORT OF CALIBRATION

Certificate No. : SP20-005

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.54	241.2	0.34	0.19	2.00
279.40	279.2	0.20	0.19	2.00
288.70	288.4	0.30	0.19	2.00
334.22	334.0	0.22	0.19	2.00
361.26	360.8	0.46	0.19	2.00
418.48	418.2	0.28	0.19	2.00
446.70	446.6	0.10	0.19	2.00
453.20	453.0	0.20	0.19	2.00
460.06	460.0	0.06	0.19	2.00
536.90	537.0	-0.10	0.19	2.00
637.94	637.6	0.34	0.19	2.00
440.74	440.4	0.34	0.19	2.00
472.22	472.0	0.22	0.19	2.00
513.70	513.6	0.10	0.19	2.00
528.72	528.4	0.32	0.19	2.00
574.60	574.4	0.20	0.19	2.00
585.48	585.6	-0.12	0.19	2.00
684.63	684.4	0.23	0.19	2.00
740.27	740.0	0.27	0.19	2.00
748.28	748.0	0.28	0.19	2.00
807.16	806.8	0.36	0.19	2.00
879.70	879.4	0.30	0.19	2.00



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Calibration Results : Without adjustment

Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
420	0.0000	0.000	0.0000	0.0042	2.00
	0.5791	0.578	0.0011	0.0042	2.00
	1.0488	1.046	0.0028	0.0042	2.00
440	2.1914	2.185	0.0064	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
	0.5618	0.561	0.0008	0.0042	2.00
465	1.0260	1.026	0.0000	0.0042	2.00
	2.1259	2.121	0.0049	0.0091	2.00
	0.0000	0.000	0.0000	0.0042	2.00
546.1	0.5240	0.523	0.0010	0.0042	2.00
	0.9639	0.965	-0.0011	0.0042	2.00
	1.9788	1.977	0.0018	0.0092	2.00
590	0.0000	0.000	0.0000	0.0042	2.00
	0.5194	0.520	-0.0006	0.0042	2.00
	0.9991	1.001	-0.0019	0.0042	2.00
635	1.9970	1.999	-0.0020	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
	0.5523	0.554	-0.0017	0.0042	2.00
635	1.0810	1.083	-0.0020	0.0042	2.00
	2.0369	2.037	-0.0001	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
635	0.5596	0.561	-0.0014	0.0042	2.00
	1.0513	1.053	-0.0017	0.0042	2.00
	1.9268	1.927	-0.0002	0.0092	2.00

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Photometric Accuracy :

Wavelength (nm.)	CRMs Values (Abs)	UUC Reading (Abs)	Correction (Abs)	Uncertainty (Abs)	Coverage factor k
235	0.0000	0.000	0.0000	0.0076	2.00
	0.7498	0.747	0.0028	0.0076	2.00
257	0.0000	0.000	0.0000	0.0076	2.00
	0.8712	0.864	0.0072	0.0076	2.00
313	0.0000	0.000	0.0000	0.0076	2.00
	0.2920	0.292	0.0000	0.0076	2.00
350	0.0000	0.000	0.0000	0.0076	2.00
	0.6459	0.639	0.0069	0.0076	2.00

Remark : - UUC - Unit Under Calibration


- N/A - Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor k.

which for a normal distribution corresponds to a coverage probability of approximately 95%.

- End of Certificate -

DQE Services DQE Services Co.,Ltd.
 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



CERTIFICATE OF CALIBRATION

Certificate No. : SP20-001 Page 1 of 5

Customer : United Analyst and Engineering Consultant Co.,Ltd. (Head Office)

Address : 3 Soi Udomsuk 41, Sukhumvit Road, Banchak, Phrakhanong, Bangkok 10260

Location of calibration : Laboratory 213

Equipment : Spectrophotometer

Manufacturer : Merck

Model : Pharo 100

Serial No. : 12390016



ID No. : UAE.LAB.009/2556

Received Date : 27 January 2563

Calibration Date : 27 January 2563

Issue Date : 29 January 2563

Condition of Instrument : Used

Calibrated by :  Approved by : 

(Mr. Tanawut Rittidach) (Miss Chonthicha Sangern)


Technical Manager Quality Manager

The calibration result is applied only to the above calibrated item and was found accurate as shown on date and place of calibration only.
 The measurement capability of the laboratory and its traceability to recognized national standards and to the unit of measurement realized at the corresponding national standards laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the DQE Services Co., Ltd.

FM-510-02 R03 11/03/2019

เอกสารไม่ควบคุม

DQE Services DQE Services Co.,Ltd.
 32 Soi Ladprao-Wanghin 55, Ladprao-Wanghin Rd., Ladprao, Ladprao, Bangkok 10230
 Phone : +66 (0)2 538 2054, Email : dqeservicesinfo@gmail.com



REPORT OF CALIBRATION

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Environment Condition : Ambient Temperature 25 ± 5 °C

Relative humidity 50 ± 15 %RH

Calibration method : In-house method CP-01 Calibration of UV-Vis Spectrophotometer Based on ASTM E275-08

Certified Reference Materials :

Material	Serial No.	Certificate No.	Due date
Absorbance Standard set	25760	80102	7/11/2021
Absorbance Standard set	25757	80105	7/11/2021
Wavelength Standard set	25806	80103	7/11/2021
Wavelength Standard set	25758	80104	7/11/2021

Traceability : This certification is traceable to the International System of Unit maintained at National Institute of Standards and Technology (NIST) through Starna Scientific Limited

Spectral Band Width of UUC : 4.0 nm.

Scan Speed of UUC : N/A

Scan Interval of UUC : N/A nm.

Resolution of UUC : Photometric 0.001 Abs.

Wavelength 1.0 nm.

FM-510-02 R03 11/03/2019

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Wavelength Accuracy :

CRMs Values (nm.)	UUC Reading (nm.)	Correction (nm.)	Uncertainty (nm.)	Coverage factor k
241.54	N/A	N/A	N/A	2.00
279.40	N/A	N/A	N/A	2.00
288.70	N/A	N/A	N/A	2.00
334.22	332	2.22	0.61	2.00
361.26	359	2.26	0.61	2.00
418.48	418	0.48	0.61	2.00
446.70	446	0.70	0.61	2.00
453.20	453	0.20	0.61	2.00
460.06	460	0.06	0.61	2.00
536.90	537	-0.10	0.61	2.00
637.94	638	-0.06	0.61	2.00
440.74	440	0.74	0.61	2.00
472.22	471	1.22	0.61	2.00
513.70	513	0.70	0.61	2.00
528.72	528	0.72	0.61	2.00
574.60	574	0.60	0.61	2.00
585.48	585	0.48	0.61	2.00
684.63	684	0.63	0.61	2.00
740.27	738	2.27	0.61	2.00
748.28	746	2.28	0.61	2.00
807.16	804	3.16	0.61	2.00
879.70	877	2.70	0.61	2.00

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Calibration Results : Without adjustment

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	2.1914	2.193	-0.0016	0.0092	2.00
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465	2.1259	2.125	0.0009	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
	0.5240	0.521	0.0030	0.0042	2.00
546.1	0.9639	0.965	-0.0011	0.0042	2.00
	1.9788	1.978	0.0008	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
590	0.5194	0.518	0.0014	0.0042	2.00
	0.9991	1.001	-0.0019	0.0042	2.00
	1.9970	1.997	0.0000	0.0092	2.00
635	0.0000	0.000	0.0000	0.0042	2.00
	0.5523	0.551	0.0013	0.0042	2.00
	1.0810	1.080	0.0010	0.0042	2.00
635	2.0369	2.034	0.0029	0.0092	2.00
	0.0000	0.000	0.0000	0.0042	2.00
	0.5596	0.559	0.0006	0.0042	2.00
635	1.0513	1.050	0.0013	0.0042	2.00
	1.9268	1.925	0.0018	0.0092	2.00

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235	0.0000	N/A	N/A	N/A	2.00
	0.7498	N/A	N/A	N/A	2.00
257	0.0000	N/A	N/A	N/A	2.00
	0.8712	N/A	N/A	N/A	2.00
313	0.0000	N/A	N/A	N/A	2.00
	0.2920	N/A	N/A	N/A	2.00
350	0.0000	N/A	N/A	N/A	2.00
	0.6459	N/A	N/A	N/A	2.00

Remark : - UUC - Unit Under Calibration

- N/A - Not Available

- The result expanded uncertainty of measurement U is stated as the standard uncertainty of measurement multiplied by the coverage factor

which for a normal distribution corresponds to a coverage probability of approximately 95%.

- End of Certificate -