

ภาคผนวก ง

เอกสารสอบเทียบเครื่องมือที่ใช้ในการวิเคราะห์



ALS Laboratory Group (Thailand) Co., Ltd.
104 Phatthanakan Rd.,
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รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ผลสอบ

Sample Name	Parameter	Equipment Name	ID No.	Calibrated Date	Next Cal	Freq. Calibrate (Months)
Noise	Leq 24 hrs	Sound Calibrator	RYG_FS0215	9-Aug-21	9-Aug-22	12
Noise	Leq 24 hrs	Sound Level Meter	RYG_FS0024	4-Oct-21	4-Oct-22	12
Noise	Noise Annoyance	Sound Calibrator	RYG_FS0215	9-Aug-21	9-Aug-22	12
Noise	Noise Annoyance	Sound Level Meter	RYG_FS0024	4-Oct-21	4-Oct-22	12
Rayong Lab	pH at 25 °C	pH meter	RYG_EN0183	17-Mar-22	17-Mar-23	12
Rayong Lab	Color (at Original pH)	Spectrophotometer	RYG_EN0037	1-Apr-21	1-Oct-22	18
Rayong Lab	Color (at pH 7.0)	Spectrophotometer	RYG_EN0037	1-Apr-21	1-Oct-22	18
Rayong Lab	BOD (5 days at 20°C)	DO meter with Sensor	RYG_EN0032	14-Feb-22	15-Aug-23	18
Rayong Lab	BOD (5 days at 20°C)	Incubator	RYG_EN0154	22-Apr-22	21-Oct-23	18
Rayong Lab	COD	Spectrophotometer	RYG_EN0037	1-Apr-21	1-Oct-22	18
Rayong Lab	Total Suspended Solids	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Total Suspended Solids	Hot Air Oven	RYG_EN0010	5-May-21	3-Nov-22	18
Rayong Lab	Total Dissolved Solids 180°C	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Total Dissolved Solids 180°C	Hot Air Oven	RYG_EN0010	5-May-21	3-Nov-22	18
Rayong Lab	Oil & Grease	Electronic Balance	RYG_EN0002	23-Mar-22	23-Mar-23	12
Rayong Lab	Oil & Grease	Hot Air Oven	RYG_EN0006	5-May-21	3-Nov-22	18
Rayong Lab	Oil & Grease	Water Bath	RYG_EN0061	5-May-21	3-Nov-22	18
Rayong Lab	Temperature	Digital Thermometer	RYG_FS0067	7-Jul-21	7-Jul-22	18
Water Lab	Total Organic carbon	TOC Analyzer	BKK_EN0066	25-Oct-21	25-Oct-22	12

SITHIPORN ASSOCIATES CO.,LTD. CALIBRATION LABORATORY



451-451/1 Sirinthorn Rd. Bangbunru, Bangplud Bangkok 10700 THAILAND.
Tel.0-2435-8800 Fax.0-2433-1679 e-mail:cal-center@sithiphorn.com http://www.sithiphorn.com

Cert. No. : ACC21009

Pages : 1 of 3

Calibration Certificate

Equipment : SOUND CALIBRATOR

Manufacturer : RION

Model : NC-74

Serial No.: 34178123

ID No.: RYG_FS0215

Condition As Found : GOOD

Customer :

ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHWAEANG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location :

Ambient Temperature : (23.0 ± 3) °C

Pressure : (101.3 ± 3) kPa

Relative Humidity : (50.0 ± 20) %

Received Date :

05 AUGUST 2021

Calibration Date :

09 AUGUST 2021

Date of Issue :

11 AUGUST 2021

Calibrated by :

Nahakorn Pisupaisan

Approved by :

T. Petchurai
(Thanakul Petchurai)



This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Cert. No. : ACC21009
Job No. : VC64AC0058
Pages : 2 of 3

Calibration Procedure : CP-AC-03

Calibration Method :

This equipment was calibrated by based on IEC-60942-2003 Standard.
The sound pressure level, frequency and total distortion of the sound calibrator was measured using the reference microphone.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	8846A	1997025	EEL.BP. 06/0264	05-Feb-22
Digital Multimeter	33461A	MY53220116	EEL.BP. 04/0264	10-Feb-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KA1	34560495	AA-3003-21	16-Feb-22
Audio Analyzer	AVR-3360A	V744B6069	EF-0010-21	10-Feb-22

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACC21009
Job No. : VC64AC0058
Pages : 3 of 3

Result of calibration :

1. Sound pressure level

Specified sound pressure level (dB)	Measured value (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit (dB)
94	94.06	0.06	0.14	0.40

2. Frequency

Specified Frequency (Hz)	Measured value (Hz)	Deviated value (%)	Uncertainty (%)	Tolerance limit (%)
1000	1001.5	0.1	0.1	1.0

3. Total distortion

Measured value (%)	Uncertainty (%)	Tolerance limit (%)
1.67	0.10	3.0

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate

Calibration Certificate

Equipment : SOUND LEVEL METER
Manufacturer : RION
Model : NL-42/ Microphone UC-52 / Preamplifier NH-24
Serial No.: 00233183 / 144835 / 23230
ID No.: RYG_FS0024

Condition As Found : GOOD

Customer : ALS LABORATORY GROUP (THAILAND) CO., LTD.
104 PHATTHANAKAN 40, PHATTHANAKAN ROAD,
KHAENG PHATTHANAKAN, KHET SUAN LUANG,
BANGKOK, 10250 THAILAND.

Location : -
Ambient Temperature : (23.0 ± 3) °C
Pressure : (101.3 ± 3) kPa
Relative Humidity : (50.0 ± 20) %

Received Date : 21 SEPTEMBER 2021
Calibration Date : 04-06 OCTOBER 2021
Date of Issue : 11 OCTOBER 2021

Calibrated by : Nathakorn Pisunpaisan

Approved by : 
(Thanakul Petchurai)

This certificate is issued in accordance with the requirements of ISO/IEC 17025 standard, may not be reproduced other than in full, except with the prior written approval of the head of Calibration Laboratory.

Continuation of Calibration Certificate

Calibration Procedure : CP-AC-01

Calibration Method :

This equipment was calibrated by based on IEC-61672-3 (2013) Standard for sound level meter (SLM).
The SLM had tests to Acoustical and Electrical signal tests of frequency weighting with Anechoic chamber and Reference Standard Instruments.

For tests results of each items were made by observation of each Instruments display and also with SLM's display.

Condition of this result of calibration :

1. Reference Standard Instruments :

Instrument	Model	Serial No.	Cert. No.	Due Date
Waveform Generator	33210A	MY48017076	EF-0012-21	10-Feb-22
Waveform Generator	33511B	MY52302742	EF-0011-21	10-Feb-22
Digital Multimeter	33461A	MY53220104	EEL.BP. 05/0264	10-Feb-22
Digital Multimeter	33461A	MY53220076	EEL.BP. 03/0264	08-Feb-22
Digital Multimeter	8846A	1997025	EEL.BP. 06/0264	05-Feb-22
Programmable Attenuator	MAT-1070	62100114	1500-07774E	08-Mar-22
Condenser Microphone	4180	2977900	AA-1008-21	05-Feb-22
Measuring Amplifier	NA-42KAI	34560495	AA-3003-21	16-Feb-22

2. This result of calibration was found accurate as shown on date and place of calibration for this calibrated item only.

3. This certificate is traceable to the international system of unit maintained at :

- 3.1 National Institute of Metrology (Thailand).
- 3.2 Thailand Institute of Scientific and Technological Research (TISTR).

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 3 of 8

Summary of Measurement Result :

Parameter	Pass	Fail	Uncertainty (dB)	Maximum-permitted uncertainty of measurement (dB)
1. Absolute sensitivity	✓	-	0.2	N/A
2. Self-generated noise	✓	-	0.2	N/A
3. Acoustical signal tests of frequency weightings				
125 Hz	✓	-	0.3	0.6
1000 Hz	✓	-	0.3	0.6
8000 Hz	✓	-	0.4	0.7
4. Electrical signal tests of frequency weightings				
For 10 Hz to 4 kHz	✓	-	0.3	0.6
For > 4 kHz to 10 kHz	✓	-	0.3	0.7
For > 10 kHz to 20 kHz	-	-	-	1.0
5. Frequency and time weightings at 1 kHz	✓	-	0.2	0.2
6. Long - term stability	✓	-	0.1	0.1
7. Level linearity on the reference level range	✓	-	0.2	0.3
8. Level linearity including the level range control	✓	-	0.2	0.3
9. Tone burst response	✓	-	0.2	0.3
10. Peak C sound level	✓	-	0.2	0.35
11. Overload indication	✓	-	0.2	0.25
12. High level stability	✓	-	0.1	0.1

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 4 of 8

Result of calibration :

1. Absolute sensitivity

Reference Acoustic Signal (dB)	Measured Value (dB)	Deviation (dB)	Acceptance Limit (dB)
93.9 (93.96)	93.9	0.0	±0.3

2. Self-generated noise

2.1 Normal test

Measured Value (dB)
22.9

2.2 The microphone of the sound level meter was replaced by electrical signal input device.

Frequency Weighting	Measured value (dB)
A - weight	13.8
C - weight	19.7
Flat	25.4

3. Acoustical signal tests of frequency weightings

Meter free-field acoustic response at a level of 84 dB

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight
125	-0.1	-0.1	-0.1
1000	0.0	-0.1	0.0
8000	0.3	0.4	0.4

Acceptance Limits

± 1.5
± 1.0
±5.0

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 5 of 8

4. Electrical signal tests of frequency weightings

Weighting network response with relative to 1 kHz.

Frequency (Hz)	Deviation from various frequency weighting response curve (dB)		
	Flat	C-weight	A-weight Acceptance Limits
63	0.0	0.0	±2.0
125	0.0	0.0	±1.5
250	0.0	0.0	±1.5
500	0.0	0.1	±1.5
1000	0.0	0.0	±1.0
2000	0.0	0.1	±2.0
4000	0.0	0.0	±3.0
8000	0.0	0.1	±5.0

5. Frequency and time weightings at 1 kHz

5.1 Frequency weightings at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	0.0	-
C - weight	94.0	0.0	±0.2
Flat	94.0	0.0	±0.2

5.2 Time weighting at 1 kHz

Frequency Weighting	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	94.0	0.0	-
Slow	94.0	0.0	±0.1
Leq	94.0	0.0	±0.1

6. Long - term stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	94.0	94.0	0.0	±0.3

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 6 of 8

7. Level linearity on the reference level range

Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
137.0	137.0	0.0	±1.1
136.0	136.0	0.0	±1.1
135.0	135.0	0.0	±1.1
134.0	134.0	0.0	±1.1
133.0	133.0	0.0	±1.1
132.0	132.0	0.0	±1.1
131.0	131.0	0.0	±1.1
129.0	129.0	0.0	±1.1
124.0	124.0	0.0	±1.1
119.0	119.0	0.0	±1.1
114.0	114.0	0.0	±1.1
109.0	109.0	0.0	±1.1
104.0	104.0	0.0	±1.1
99.0	99.0	0.0	±1.1
94.0	94.0	0.0	±1.1
89.0	89.0	0.0	±1.1
84.0	84.0	0.0	±1.1
79.0	79.0	0.0	±1.1
74.0	74.0	0.0	±1.1
69.0	69.0	0.0	±1.1
64.0	64.0	0.0	±1.1
59.0	59.0	0.0	±1.1
54.0	54.0	0.0	±1.1
49.0	49.0	0.0	±1.1
44.0	44.0	0.0	±1.1
39.0	39.0	0.0	±1.1
34.0	34.0	0.0	±1.1
30.0	30.0	0.0	±1.1
29.0	29.1	0.1	±1.1
28.0	28.1	0.1	±1.1
27.0	27.1	0.1	±1.1
26.0	26.1	0.1	±1.1
25.0	25.2	0.2	±1.1

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 7 of 8

8. Level linearity including the level range control

Range	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Auto	94.0	94.0	0.0	±1.1

9. Tone burst response

Time Weighting	Tone burst duration, Tb (ms)	Cycle	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Fast	0.25	1	108.0	107.9	-0.1	1.5 ; -5.0
	2	8	117.0	117.0	0.0	1.0 ; -2.5
	200	800	134.0	134.1	0.1	±1.0
Slow	2	8	108.0	108.0	0.0	1.5 ; -5.0
	200	800	127.6	127.6	0.0	±1.0
	0.25	1	99.0	98.9	-0.1	1.5 ; -5.0
SEL	2	8	108.0	108.0	0.0	1.0 ; -2.5
	200	800	128.0	128.1	0.1	±1.0

10. Peak C sound level

Number of cycle in test signal	Anticipated Value (dB)	Measured Value, Lepeak (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.0	0.0	-
One	136.4	136.2	-0.2	±3.0

Number of cycle in test signal	Anticipated Value (dB)	Measured Value (dB)	Deviated Value (dB)	Acceptance Limits (dB)
Continuous	133.0	133.1	0.1	-
Positive half cycle	135.4	135.2	-0.2	±2.0
Negative half cycle	135.4	135.2	-0.2	±2.0

Continuation of Calibration Certificate

Cert. No. : ACL21117
Job No. : VC64AC0070
Pages : 8 of 8

11. Overload indication

Measured value (dB)		Deviated Value (dB)	Acceptance Limits (dB)
Positive one-half cycle	Negative one-half cycle	-0.1	±1.5
89.6	89.5		

12. High level stability

Frequency Weighting	SLM Display at initial (dB)	SLM Display at final (dB)	Deviated Value (dB)	Acceptance Limits (dB)
A - weight	137.0	137.0	0.0	±0.3

The reported uncertainty is based on a standard uncertainty multiplied by coverage factor $k = 2$ or any value following calculation, providing a level of confidence of approximately 95 %

End of Calibration Certificate



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/44 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2710-9484



NSC-TS17817925
CALIBRATION 0008

Cert.No.: 22CH405
Page.: 1 of 3

Certificate of Calibration

Equipment : pH Meter
Manufacturer : Mettler Toledo
Model : Seven Compact S220
Serial No. : C104059460
ID No. : RYG_EN0183
Condition As-Received : Used Item
Received Date : 16 March 2022
Calibration Date : 17 March 2022
Reference : 2203-0611DSC-4
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
Rayong Branch
616/10 Moo 5 T.Maenam Khu,
A.Pluakdaeng, Rayong 21140, Thailand
(25 ± 2.5) °C
(50 ± 15) %
In - house method :
- CP-CH5 by direct measurement with standard
voltage calibrator and direct measurement with
certified reference material (CRM)
- CP-CH8 by comparison with standard thermometer

REVIEW BY *N. Banphit*
APPROVED BY *D. Jai*
NEXT CAL. DATE *17/3/23*

Calibrated by : Warakorn Leimgagtrakul
Approved by : *Malee*
Malee Buikruea
Saithip Meangmai
Warakorn Leimgagtrakul
Issue Date : 22 March 2022

The Uncertainties are for a confidence probability of approximately 95%

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services;

A 0037307



Cert.No.: 22CH405
Page.: 2 of 3

Condition of this calibration result

1. Reference Standard Instrument : -
Instrument Serial No. ID No. Cert. No. Due Date
1) Document Process Calibrator 54030049 130RC116 21E2692 25 Aug 2022
2) Ref. Standard Thermometer 4982054 110RC044 2111201 26 Oct 2022
This certification is traceable to the International System of Unit maintained at:-
- Traceable to National Institute of Metrology (Thailand), NIMT
2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835
- Buffer Solution Manufacturer Lot No. Exp. date
pH 4.008 CPA chem 788995 01 Jan 2024
pH 6.982 CPA chem 761017 02 Aug 2022
pH 10.015 CPA chem 766824 04 Sep 2022
3. This certificate is valid only to the item calibrated on date and place of calibration.

Calibration Results

Function : mV Measurement
Performing standard curve by Fluke at pH (4,7,10)

Unit Under Calibration	Nominal Value	Standard Voltage Input		Actual Reading		Uncertainty of Measurement (±mV)	Coverage factor k
		pH	mV	mV	pH		
pH Meter	4.000	177.48	177.4	4.000	0.058	2.00	
S/N.: C104059460	7.000	0.00	-0.1	7.000	0.058	2.00	
	10.000	-177.48	-177.5	10.000	0.058	2.00	

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Cert.No.: 22CH405
Page: 3 of 3

Calibration Results

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4.7,10)

Unit Under Calibration	Standard pH Buffer Solution	Actual pH Reading	Actual mV Reading (mV)	Uncertainty of pH measurement (±)	Coverage factor k
pH Electrode S/N.: 1453404	4.008	4.010	177.7	0.0046	2.00
	6.982	6.988	3.6	0.0084	2.00
	10.015	10.010	-172.9	0.0073	2.05

Function : Temperature Measurement

(*) Without adjustment

This equipment was connected with Temperature Probe;

- Model : InLab Expert Pro-ISM
1453404
- Serial No. : _____
- Dimension of probe;
 - Length : 120 mm.
 - Diameter : 12 mm.
 - Immersion Depth : 100 mm.

Calibration Point (°C)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of measurement (± °C)	Coverage factor k
25.0	25.002	24.9	-0.102	0.13	2.00

Remark : - UUC* = Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k, providing a level of confidence of approximately 95 %.

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a 1100954



Certificate of Calibration

Certificate No. : 22E986
Page : 1 of 2

Equipment : pH Meter

Manufacturer : Mettler Toledo

Model : SevenCompact S220

Serial No. : C104059460

ID No. : RYG_EN0183

Condition As-Received: Used Item

Received Date: 16 March 2022

Calibration Date: 21 March 2022

Reference: 2203-0611DSC

Ambient Temperature: (23 ± 2) °C

Relative Humidity: (50 ± 10) %

Submitted by: ALS Laboratory Group (Thailand) Co.,Ltd. Rayong Branch

619/10 Moo 5 T.Maenam Khu, A.Pluakdaeng, Rayong
21140, Thailand

Procedure used:

Calibration were conducted using in-house calibration Procedure CP-E17 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1.Reference standards instruments :

Instrument

1) Multi-Product Calibrator

Model

5500A

Serial No.

6440007

Certificate No.

21E1444

Due Date

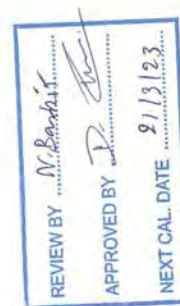
07 May 2022

2.This result of calibration was made on requested at the point specified by customer.

3.The certificate is valid only to the item calibrated on date and place of calibration.

4.This Certification is traceable to the International System of Unit maintained at:-

-National Institute of Metrology Thailand (NIMT)



Calibrated by : Pongsagorn Boonyaporn
Issue Date : 22 March 2022

Approved Signatory :

[] Phalinee Prabpaipal
[] Nuntawat Khamchai
[] Pornthippa Tameyakul

B 0284414



Certificate of Calibration

Cert. No.: 22E986
Page.: 2 of 2

Result of calibration :- (*) Without adjustment () After adjustment

Function: DC voltage measurement

Standard Value (mV)	UUC* Reading (mV)	Error (mV)	Uncertainty (± μ V)
-200.0000	-200.0	0.0	72
-150.0000	-150.0	0.0	69
-100.0000	-100.0	0.0	65
-50.0000	-50.0	0.0	62
0.0000	0.0	0.0	58
50.0000	50.0	0.0	62
100.0000	100.0	0.0	65
150.0000	150.0	0.0	69
200.0000	200.0	0.0	72

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95 %

*UUC= Unit Under Calibration.

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Equipment:

SPECTROPHOTOMETER

Certificate No.: C08210159

Model:

DR6000

Issued Date: 01 April 2021

Serial No. (or ID.):

1627845 (RYG_EN00037)

Job No.: KSPR2104738

Manufacturer:

HACH

Page: 1 of 3

Condition:

In Condition

Customer:

ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)

616/10 Moo 5 T.Maenam Khu,

A.Pluakdaeng, Rayong 21140, Thailand.

Environment Condition:

Temperature 25.1 °C ± 0.4 °C

Humidity 48.8 %RH ± 3.7 %RH

Calibration Place:

ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch) (Wet Chemistry Lab)

616/10 Moo 5 T.Maenam Khu,

A.Pluakdaeng, Rayong 21140, Thailand.

Calibration By:

Mr. Chattuphon Foithong

Calibration Date:

01 April 2021

The Method used:

In house method, SPCC-WI-24, base on ASTM E 275-08 and ASTM E 387-04

Traceability: This certificate is traceable to the CRM maintained by National Institute of Standards and Technology (NIST) through Starra Scientific Limited.

The standard for Wavelength Certificate No. 87146 and 87152

The standard for Photometric Certificate No. 87220 and 87139

The standard for Stray light Certificate No. 87163 and 87161

The standard for Spectral resolution Certificate No. 87173



(Mr. Chattuphon Foithong)
Person in charge

(Mr. Dumrong Boonsopon)
Authorized signatory

Person in charge

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.

The measurement uncertainty stated is the expanded uncertainty multiplied by the coverage factor ($k=2$) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM).

These results may be affected by deviations from specified conditions. The results relate only to the items tested, calibrated or sampled. The report shall not be reproduced except in full without approval of SPC RT Co., Ltd.

Certificate No.: C06210159

Page 2 of 3

Calibration Results:
Without Adjustment

Wavelength Accuracy (nm). The spectral bandwidth of Std at 2 nm and UUC at 2 nm

Standard Wavelength	Unit Under Calibration	Correction	Uncertainty
418.61	418.4	0.21	0.13
536.66	536.7	-0.04	0.13
637.98	638.3	-0.32	0.14
748.48	748.7	-0.22	0.14
807.03	807.4	-0.37	0.14

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
420 nm	0.0000	0.000	0.0000	0.0045
	0.5990	0.590	-0.0010	0.0045
	0.7616	0.762	-0.0004	0.0045
	1.0263	1.027	-0.0007	0.0045
440 nm	0.0000	0.000	0.0000	0.0045
	0.5787	0.579	-0.0003	0.0045
	0.7442	0.744	0.0002	0.0045
	1.0039	1.004	-0.0001	0.0045
465 nm	0.0000	0.000	0.0000	0.0045
	0.5292	0.530	-0.0008	0.0045
	0.6865	0.687	-0.0005	0.0045
	0.9534	0.954	-0.0006	0.0045
546.1 nm	0.0000	0.000	0.0000	0.0045
	0.5468	0.546	0.0008	0.0045
	0.6957	0.695	0.0007	0.0045
	0.9991	0.998	0.0011	0.0045
590 nm	0.0000	0.000	0.0000	0.0045
	0.5851	0.584	0.0011	0.0045
	0.7238	0.723	0.0008	0.0045
	1.0957	1.094	0.0017	0.0045
635 nm	0.0000	0.000	0.0000	0.0045
	0.5692	0.568	0.0012	0.0045
	0.6914	0.691	0.0004	0.0045
	1.0881	1.087	0.0011	0.0045

Certificate No.: C06210159

Page 3 of 3

Calibration Results:
Without Adjustment

Photometric Accuracy (Absorbance)

Wavelength	Standard absorbance	Unit Under Calibration	Correction	Uncertainty
235 nm	0.0000	0.000	0.0000	0.0080
	0.7307	0.730	0.0007	0.0080
257 nm	0.0000	0.000	0.0000	0.0080
	0.8516	0.850	0.0016	0.0080
313 nm	0.0000	0.000	0.0000	0.0080
	0.2836	0.285	-0.0014	0.0080
350 nm	0.0000	0.000	0.0000	0.0080
	0.6319	0.629	0.0029	0.0080
Stray light *				
Standard: cut-off		UUC: Wavelength (nm)	UUC: Transmission (%T)	Absorbance (A)
260.57 +/- 0.11 nm		260.6	1.5	1.824
392.03 +/- 0.11 nm		392.0	1.5	1.824

The stray light transmission reference is less than 1.0 T(%) and absorbance is greater than 2.0 (A)

Spectral Resolution *

Nominal Concentration 0.02 % v/v	Peak	Trough	Ratio	SBW
Standard Wavelength (nm)	268.72	266.76	1.39	2.00
UUC: Wavelength (nm)	268.2	266.1		
Std Absorbance (A)	0.4616	0.2797		
Absorbance (A)	0.416	0.300		

* Calibration Marked " Not TISI Accredited " in this Certificate have been included for completeness.

The End of Certificate

ใบตรวจสอบสภาพเครื่องวัดสิ่งแวดล้อม

เลขที่ใบงาน: KSPR2104738

หมายเลขเครื่อง: 1627845

รุ่น: DR6000

ชนิดเครื่องมือ: SPECTROPHOTOMETER

ตรวจสอบ (รับ)		รายการตรวจเช็ค	ตรวจสอบ (ส่ง)		หมายเหตุ
01 Apr 2021			01 Apr 2021		
ปกติ	ไม่ปกติ		ปกติ	ไม่ปกติ	
		General			
<input checked="" type="checkbox"/>	<input type="checkbox"/>	1. ความสมบูรณ์เครื่อง	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	2. ความสะอาด (ช่องใส่ตัวอย่าง, ภายใน-นอกเครื่อง)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	3. สวิตช์ ปิด – เปิด เครื่อง (On-Off Switch)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	4. ปุ่มกด (Keypad)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	5. หน้าจอ (Display, Screen Contrast)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		Spectrophotometer			
<input type="checkbox"/>	<input type="checkbox"/>	6. แรงดันไฟฟ้า (Battery Backup) >= 2.5 VDC	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	7. ตัวหมุนเลือกความยาวคลื่น (Wavelength Control)	<input type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	8. ความยาวคลื่น (Wavelength Check)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	656.1=656.1 nm
<input checked="" type="checkbox"/>	<input type="checkbox"/>	9. แหล่งกำเนิดแสง (UV < 3,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	10. แหล่งกำเนิดแสง (Visible < 5,000 hour)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	11. ช่องวัดหลายตัวอย่าง (Carousel Module)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
		pH Meter and Conductivity Meter			
<input type="checkbox"/>	<input type="checkbox"/>	12. อิเล็กโทรด (Electrode and Connection Cable)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	13. ระดับสารละลายใน Electrode (Level KCl)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	14. ฝาปิดกันปลาย Electrode (Dust Protection Hood)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	15. ขาจับอิเล็กโทรด (Stand)	<input type="checkbox"/>	<input type="checkbox"/>	
		Turbidimeter			
<input type="checkbox"/>	<input type="checkbox"/>	16. ค่าความขุ่นที่ต่ำสุด (No Sample)	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	17. ระดับการส่องสว่างของแสง (>= 2.5 ไม่นเกิน 3.0)	<input type="checkbox"/>	<input type="checkbox"/>	
		Automatic titrator			
<input type="checkbox"/>	<input type="checkbox"/>	18. สภาพ Piston Burettes	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	19. Function Rinsing and Dosing	<input type="checkbox"/>	<input type="checkbox"/>	
<input type="checkbox"/>	<input type="checkbox"/>	20. ระบบท่อสายยางและอุปกรณ์ประกอบ	<input type="checkbox"/>	<input type="checkbox"/>	

เพิ่มเติม/ข้อแนะนำ:

Mr. Chattuphon Folthong
Service Engineer


TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3 : EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000 FAX. 0-2719-9484

Cert.No.: 22TW34
Page.: 1 of 2

Certificate of Testing

Equipment : DO Meter
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Received Date : 11 February 2022
Test Date : 14 February 2022
Reference : 2202-0404DSC-4
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5 T.Maenam Khu, A.Pluakdaeng,
Rayong 21140, Thailand

REVIEW BY	N. Banwitt
APPROVED BY	D. Sathip
NEXT CAL. DATE	15/8/23

Laboratory Condition :
Temperature (25 ± 5) °C
Humidity (50 ± 20) %
Test Procedure : CP-CH9
by Comparison Technique with Azide Modification Method

Tested by : Walalak Sirinthean

Approved by : Sathip
Approved Signatory

() Malee Butkruea
(✓) Sathip Meangmai
() Warakorn Lengagatrakul

Issue Date : 18 February 2022



Cert.No.: 22TW34
Page.: 2 of 2

Result : Dissolved Oxygen Meter Adjustment With Air 100 %
Dissolved Oxygen Probe No.: 15E100464

Titration Method (Azide Modification Method) (mg/L)	DO Meter Reading (mg/L)	Standard Deviation (mg/L)
8.02	8.02	0.0084

This report was certified only for the instrument we tested. It is allowable to use for study the system efficiency. The environmental impact control and present to organization it may concerned Intend to use for advertising and referral purpose is prohibited. This report may not be reproduced other in full without written approval of the laboratory

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Saithip

a 1094744




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TEL. 0-2717-3000-27 FAX. 0-2719-9484



NEC-TS-1817025
CALIBRATION 0008

Cert. No.: 22LM12
Page.: 1 of 2

Certificate of Calibration

Equipment : DO Meter with Sensor
Manufacturer : YSI
Model : 5000-115V
Serial No. : 15E102796
ID No. : RYG_EN0032
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu, A. Pluakdaeng,
Rayong 21140, Thailand
Location : TPA On Site Calibration Laboratory
Received Order : 11 February 2022
Calibrated Date : 21 February 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
AC Line Voltage : (220 ± 22) V
Calibrated by : Kunchit Promprat
Approved by : 
Approved Signatory
() Ponthippa Tameyakul
(✓) Malee Bulkruea
() Suwit Imjai
Issue Date : 21 February 2022

The Uncertainties are for a confidence probability of approximately 95 %

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.

A 0038008



Equipment : DO Meter with Sensor
Condition As-Received : Used Item
Reference : 2202-0404DSC-5

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT01 according to comparison with Industrial Platinum Resistance Thermometer (IPT) into Temperature Bath.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function : Temperature measurement.

This instrument was connected with temperature sensor, S/N.: 15E100464

Calibration Point (°C)	Immersion Depth (mm)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty (± °C)	Coverage Factor k
20.00	45	20.001	19.88	-0.121	0.15	2.00

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k , providing a level of confidence of approximately 95 %.

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Walu

a 1095714



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MSC-TS1-TS17025
CALIBRATION 0008

Cert. No.: 22TM317
Page.: 1 of 3

Certificate of Calibration

Equipment : Low Temp. Incubator
Manufacturer : Memmert
Model : IPP750
Serial No. : V818.0084
ID No. : RYG_EN0154
Submitted by : ALS Laboratory Group (Thailand) Co., Ltd.
(Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng, Rayong 21140, Thailand
Location : BOD Room
Received Order : 22 April 2022
Calibration Date : 22 April 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Man Pattanapongpaiboon

REVIEW BY	<i>N. Sarnsil</i>
APPROVED BY	<i>D. Sarnsil</i>
NEXT CAL. DATE	21/10/23

Approved by : *Walu*
Approved Signatory
() Pornthippa Tameyakul
(☒) Malee Butkruea
() Suwit Imjai

Issue Date : 3 May 2022
The Uncertainties are for a confidence probability of approximately 95 %
This certificate may not be reproduced other than in full, except with the prior written approval of the head of Corporate Services 3: Equipment Calibration and Testing Services.

A 0040735



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2204-0146OC-1
Cert. No.: 22TM317
Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement
The temperature scale used was based on ITS-90.

Condition of this result of calibration

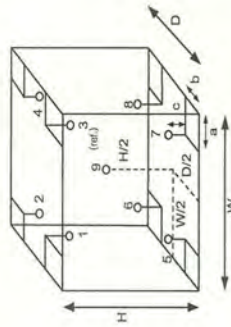
1. Reference standard instrument:-
Instrument **Model** **Serial No.** **Cert. No.** **Due Date**
1) Data Acquisition 34970A MY44031769 21LM12 02 Sep 2022
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	25	25
REL.Humid. (%)	54	58
AC Supply (Volt)	221	223



Probe Installation Details :

	Dimension of Chamber :
a = 10 cm	D = 0.60 m
b = 10 cm	W = 1.0 m
c = 10 cm	H = 1.2 m
	Capacity = 0.75 m ³

Position :	Ref. Std. ID No.:
1	9RTD-2/1
2	9RTD-2/2
3	9RTD-2/3
4	9RTD-2/4
5	9RTD-2/5
6	9RTD-2/6
7	9RTD-2/7
8	9RTD-2/8
9 (ref.)	9RTD-2/9

Wala

a 1106485



Equipment : Low Temp. Incubator
Condition As-Received : Used Item
Reference : 2204-0146OC-1
Cert. No.: 22TM317
Page.: 3 of 3

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor k
20.0	20.0	20.0	0.022	0.20	0.22	0.30	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
20.0	1	2	3	4	5	6	7	8	9 (ref.)
	20.209	20.174	20.199	20.110	20.075	20.062	20.027	20.069	20.030

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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Wala

a 1106484

Certificate of Calibration

Represent to Certificate of Calibration ,PTC/07/22103

Certificate No.: PTC/07/22103 Page: 1 of 2
Equipment: Digital Balance Condition: Normal
Manufacturer: Sartorius Serial No: 26207038
Model: MSE224S-100-DJ ID No: RYG_EN0002
Type of Balance: Single interval


Customer: ALS Laboratory Group (Thailand) Co.,Ltd.
616/10 Moo 5 T.Maenamkoo, A.Pluakdaeng,
Rayong 21140, Thailand

Environment Condition: Temperature 23.9 °C ± 0.3 °C
Humidity 58.1 %RH ± 4.4 %RH
Air density 1.17 kg/m³

Calibration Place: ALS Laboratory Group (Thailand) Co.,Ltd.
616/10 Moo 5 T.Maenamkoo, A.Pluakdaeng,
Rayong 21140, Thailand

The Method used: In house method, PTC-WI-07, base on Euramet cg. 18
Traceability: This certificate is traceable to the SI Units through Thai Calibration Service Co.,Ltd.
, NSC-ONSC Accreditation No.: Calibration 0189

Date Received: March 23, 2022
Calibration Date: March 23, 2022
Issued Date: March 25, 2022
Calibration By: Mr. Rungroje Metakul

Reviewed by: 
(Mr. Kiangsak Kalasri)
Laboratory Manager

Approved By: 
(Mr. Keattisak Kerdito)
Laboratory Manager

This certificate is issued the units of measurement according to the International System of Units (SI). It provides traceability of measurement to international or national standard or other recognized national standard laboratories.
The measurement uncertainty stated is the expanded uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to the Expression of Uncertainty in Measurement (GUM). The effect that the results relate only to the items calibrated.
This calibration certificate shall not be reproduced except in full only, without written approval from penta calibration co., ltd

Represent to Certificate of Calibration ,PTC/07/22103

Certificate No.: PTC/07/22103

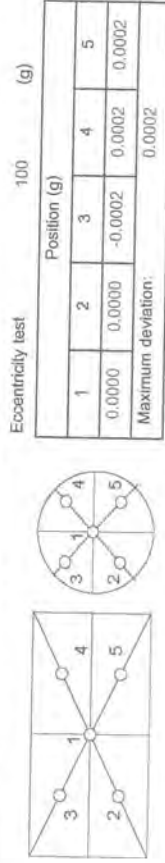
Page: 2 of 2

Measurement Results:

Without Adjustment :

Function Calibration: Non Adjustment

Eccentric Error: Weight to be 1/3, 1/2 or of Maximum capacity

Repeatability Test : Weight to be $1/2 \leq L_1 \leq$ Maximum capacity

Determination of the standard deviation of weighing balance., Readability 0.0001 (g)

Nominal test value (g)	Standard Deviation
200	0.00003

Error of indication : from nominal value., Readability 0.0001 (g)

Nominal Value (g)	Conventional Mass (g)	Indication (g)	Correction of Balance (g)	Uncertainty (g)	k
0	0.00000	0.0000	0.0000	0.000086	2.16
0.01	0.01000	0.0100	0.0000	0.00010	2.06
0.1	0.10000	0.1000	0.0000	0.00010	2.06
1	1.00000	1.0000	0.0000	0.00010	2.06
2	2.00000	1.9999	0.0001	0.00010	2.06
5	5.00001	5.0000	0.0000	0.00010	2.06
10	10.00000	10.0000	0.0000	0.00010	2.06
20	20.00003	19.9999	0.0001	0.00011	2.06
50	50.00004	49.9999	0.0001	0.00012	2.00
100	100.00004	100.0001	-0.0001	0.00017	2.00
200	200.00011	200.0000	0.0001	0.00027	2.00

Note: Weight of adjust (g)

The End of Certificate



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TEL. 0-2317-8800-27 FAX. 0-2710-6484



NIST Calibration Service
NIST-TEST-175722
CALIBRATION 0008

Cert. No.: 21TM827
Page.: 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven

Manufacturer : Memmert

Model : UFE 500

Serial No. : G511.1572

ID No. : RYG_EN0010

Submitted by : ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140 Thailand

Location : Oven Room

Received Order : 5 May 2021

Calibration Date : 5 May 2021

Ambient Temperature : $(26 \pm 10) ^\circ\text{C}$

Relative Humidity : $(50 \pm 30) \%$

Calibrated by : Khit Ruitanaprapachai

Approved by : 
Approved Signatory

() Pornthippa Tameyakul
(x) Malee Butkruea
() Suwit Imjai

Issue Date : 14 May 2021

The Uncertainties are for a confidence probability of approximately 95 %

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Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2105-0005OC-4

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD) and Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument Model Serial No. Cert. No. Due Date
1) Data Acquisition 34972A MY57013823 21LM3 26 Feb 2022

2. This certificate is valid only to the item calibrated on date and place of calibration.

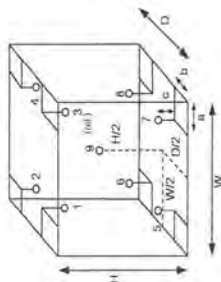
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (°) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	28	29
REL.Humid. (%)	59	56
AC Supply (Volt)	220	221



Probe Installation Details :

a = 5.0 cm D = 0.40 m
b = 5.0 cm W = 0.56 m
c = 5.0 cm H = 0.48 m
Capacity = 0.11 m³

Ref. Std. ID No.: @ Calibration Point		
Position :	(104) °C	(180) °C
1	21-17RTD-01	19-17TC-01
2	21-17RTD-02	19-17TC-02
3	17RTD-03	19-17TC-03
4	17RTD-04	19-17TC-04
5	17RTD-05	19-17TC-05
6	17RTD-06	19-17TC-06
7	17RTD-07	19-17TC-07
8	17RTD-08	19-17TC-08
9 (ref.)	17RTD-09	19-17TC-09

Walee



Equipment: Hot Air Oven
Condition As-Received: Used Item
Reference: 2105-0005OC-4
Result of Calibration: (*) Without Adjustment
Function of UUC: Temperature Source

Cert. No.: 21TM827
Page: 3 of 3

Calibration Point (°C)	UUC [*] Setting (°C)	UUC [*] Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
104.0	104.0	104.0	0.063	0.54	0.70	0.42	2
180.0	180.0	180.0	0.15	0.89	1.3	1.1	2

Calibration Point (°C)	Measured Temperature (°C)								
	Position								
	1	2	3	4	5	6	7	8	9 (ref.)
104.0	104.243	103.732	103.760	103.742	103.863	103.743	104.311	103.689	103.815
180.0	180.101	180.481	179.401	179.692	179.980	179.943	180.127	179.915	179.709

Average*: The average of 30 values in each position.

Temperature stability: One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity: The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation: The Difference of the maximum and minimum measured temperatures throughout observation.

UUC*: Unit Under Calibration

Note: The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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Walu.

a 1054286



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TEL. 0-2717-3000-27 FAX 0-2719-9464

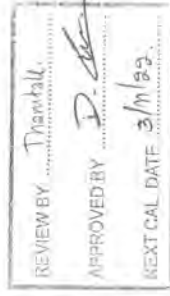


TEC-TIS-TIS17025
CALIBRATION 688

Cert. No.: 21TM829
Page: 1 of 3

Certificate of Calibration

Equipment: Hot Air Oven
Manufacturer: Memmert
Model: UM 400
Serial No.: b495.0899
ID No.: RYG_EN0006



Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. (Rayong Branch)
616/10 Moo 5 T. Maenam Khu,
A. Pluakdaeng,
Rayong 21140 Thailand

Location: Oven Room
Received Order: 5 May 2021
Calibration Date: 5 - 6 May 2021
Ambient Temperature: (26 ± 10) °C
Relative Humidity: (50 ± 30) %

Calibrated by: Khit Ruitanaprapachai

Approved by: Walu.
Approved Signatory

() Pornthippa Tameyakul
() Malee Burkruea
() Suwit Imjai

Issue Date: 14 May 2021

The Uncertainties are for a confidence probability of approximately 95 %

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Approval of the head of Corporate Services 3 : Equipment Calibration and Testing Services.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2105-0005OC-1
Cert. No.: 21TM829
Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Resistance Temperature Detector (RTD).
The temperature scale used was based on ITS-90.

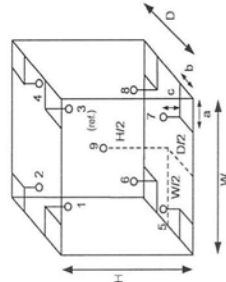
Condition of this result of calibration

1. Reference standard Instrument:-
Instrument **Model** **Serial No.** **Cert. No.** **Due Date**
1) Data Acquisition 34972A MY57013823 21LM3 26 Feb 2022
2. This certificate is valid only to the item calibrated on date and place of calibration.
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm
D = 0.33 m
W = 0.40 m
H = 0.40 m
Capacity = 0.053 m³

Dimension of Chamber :

Environment during calibration		
	Beginning	Finished
Temp. (°C)	29	30
REL.Humid. (%)	56	58
AC Supply (Volt)	221	222

Position :	Ref. Std. ID No.:
1	21-17RTD-01
2	21-17RTD-02
3	17RTD-03
4	17RTD-04
5	17RTD-05
6	17RTD-06
7	17RTD-07
8	17RTD-08
9 (ref.)	17RTD-09

Wala

a 1054310



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2105-0005OC-1
Cert. No.: 21TM829
Page.: 3 of 3
Result of Calibration :-
(*) Without Adjustment
Function of UUC* : Temperature Source

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
70.0	70.0	70.0	0.21	1.8	2.0	0.55	2
Measured Temperature (°C)							
Calibration Point (°C)	Position						
	1	2	3	4	5	6	7
	70.404	70.277	70.607	70.307	68.789	69.257	68.846
70.0							

Average* : The average of 30 values in each position.

Temperature stability : One-half of the greatest maximum difference of measured temperature at any one sensor.

Temperature uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.

Overall Variation : The Difference of the maximum and minimum measured temperatures throughout observation.

UUC* : Unit Under Calibration

Note : The reported uncertainty of measurement was included stability and excluded uniformity .

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

-000-

Wala

a 1054309



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES & EQUIPMENT CALIBRATION AND TESTING SERVICES
334/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3880-27 FAX. 0-2719-9484



Cert. No.: 21TM673
Page.: 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNB22
Serial No. : L513.0648
ID No. : RYG_EN0061

REVIEW BY	<i>Tawatchai</i>
APPROVED BY	<i>D. Bu</i>
NEXT CAL DATE	3/1/22

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd. (Rayong Branch)
618/10 Moo 5 T. Maenam Khu.
A. Pluakdaeng.
Rayong 21140 Thailand
Location : Wet Chemistry Lab

Received Order : 5 May 2021
Calibration Date : 5 May 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Tawatchai Pama

Approved by : *Tawatchai*
Approved Signatory

() Pornthippa Tameyakul
() Malee Bulkruea
() Suwit Imjai

Issue Date : 14 May 2021

The Uncertainties are for a confidence probability of approximately 95 %

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Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2105-00050C-3
Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT04 according to direct measurement method with Data Acquisition which connected with Industrial Platinum Resistance Thermometer (IPRT).

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument	Model	Serial No.	Cert. No.	Due Date
1) Data Acquisition	34970A	MY44060450	21LM4	06 Mar 2022

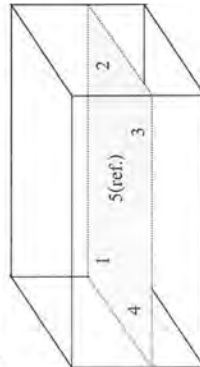
2. This certificate is valid only to the item calibrated on date and place of calibration.

3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

	Environmental		AC Voltage Supply (Volt)
	(°C)	(%R.H.)	
Beginning of Calibration	22	68	230
Finished of Calibration	20	64	231



Front

Position :	Ref. Std. S/N.:
1	4803988-001
2	4803988-002
3	4803988-003
4	4803988-004
5(ref.)	4803988-005

Tawatchai



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2105-0005OC-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 21TM673
Page.: 3 of 3

Calibration point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Average* Standard Reading (°C)				
			Position				
			1	2	3	4	5 (ref.)
85.0	85.0	85.0	84.891	84.893	84.880	84.892	84.917

Calibration point (°C)	Uniformity (°C)	Stability (± °C)	Uncertainty (± °C)	Coverage Factor <i>k</i>
85.0	0.089	0.052	0.22	2

Average* : The average of 30 values in each position.
Uniformity : The maximum difference of measured temperatures at any sensors and the measured temperature at the reference location which are observed at the same time or at as close an observation time as possible to determine the temperature pattern or homogeneity within the chamber under steady-state conditions.
Stability : One-half of the greatest maximum difference of measured temperature at any one probe.
UUC* : Unit Under Calibration
Note : The reported uncertainty of measurement was included stability and excluded uniformity.

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor *k*, providing a level of confidence of approximately 95 %.

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malu

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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
53/4/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484

Certificate of Calibration

Certificate No. : 21T1200
Page : 1 of 2

Equipment : Digital Thermometer With Sensor

Manufacturer: Testo

Model : 106

Serial No.: 31281494/504

ID No.: RYG_FS0467

Condition As-Received: Used Item

Received Date: 02 July 2021

Calibration Date: 07 July 2021
to 08 July 2021

Reference: 2107-0069DSC

Ambient Temperature: (25 ± 3) °C

Relative Humidity: (50 ± 20) %

Submitted by: ALS Laboratory Group (Thailand) Co., Ltd. Rayong Branch

616/10 Moo 5 T.Maenam Khu. A.Plukdaeng, Rayong

21140, Thailand

Procedure used: Calibration were conducted using in-house calibration procedure CP-T01 according to comparison with Platinum Resistance Thermometer (PRT) into liquid bath temperature controller.
The temperature scale used was based on ITS-90.

Condition of this result of calibration

1.Reference standards instruments :

Instrument

1) Digital Thermometer

2) Platinum Resistance Thermometer

2.The certificate is valid only to the item calibrated on date and place of calibration.

3.This Certificate is traceable to the International System of Unit maintained at:-

-National Institute of Metrology Thailand (NIMT)

Model 1529-R

Serial No. B19520

935-14-95

261589/1

261680

26 Jun 2022

26 Jun 2022

REVIEW BY	Taweesit
APPROVED BY	Supt S
NEXT CAL. DATE	7/12/22

Calibrated by : Yossapon Poljorn

Issue Date : 09 July 2021

Approved Signatory :

[] Phalinee Prabpalpal

[] Chatchawan Khunpluek

[x] Wanlop Larprum

B 0265214



Cert. No.: 21T1200
Page.: 2 of 2

Result of Calibration:-

Function: Temperature measurement

Dimension of probe : Diameter 3 mm., Length 55 mm. Sheath material : Stainless Steel

Without Adjustment

Immersion Depth (mm.)	Standard Temperature (°C)	UUC* Reading (°C)	Error (°C)	Uncertainty of Measurement (±°C)
50	25.0029	24.9	-0.1029	0.12
50	30.0018	29.9	-0.1018	0.12
50	40.0035	40.0	-0.0035	0.12

UUC* : Unit Under Calibration

The reported uncertainty of measurement was based on standard uncertainty multiplied by a coverage factor $k = 2$, providing a level of confidence of approximately 95%.

-000-

a 1063351



Automation Service Co.,Ltd.

929,929/1 Soi Pattanakarn 30, Pattanakarn Rd., Suanluang, Bangkok 10250
Head Office : Tel. 02-319-9994 ext 1 Fax 02-319-4851 E-mail : als@automation.co.th
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Lamphun Branch : 122/5 M.4, T.Ban Klang, A.Muang, Lamphun 51000 Tel/Fax. 053-581-876
website : www.automation.co.th

MTOC : L-1010/2021

Report No. : ALS-799

ASI Maintenance Report

Instrument : Automatic Sample Injector Measuring : Vial 40 mL
Model : ASI-L Place of Installation : -
Serial No. : H57415200799 Department : LABORATORY
Manufacture : Shimadzu
Customer : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaen Suan Luang, Khet Suan Luang,
Bangkok 10250 Thailand

Date of Maintenance : 25 / 10 / 2021

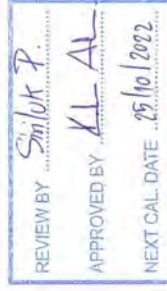
Ambient Condition : Temperature $22.6 \pm 5^\circ\text{C}$

: Humidifier $65 \pm 15\% \text{RH}$

Maintenance By : T. Pimi
(Mr. Tawatchai Somsri)
Technician

Approved By : N. Phongsak
(Mr. Nipon Phongsomsak)
Technician Manager

User Name : Siriluk P.
(Miss Siriluk Puengpangs)



SHIMADZU ANALYZER
1/3



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Lamphun Branch : 122/5 M.4, T.Ban Klang, A.Muang, Lamphun 51000 Tel/Fax. 053-581-476
website : www.automation.co.th

MTOC : L-1010/2021

Report No. : ALS-799

Maintenance Sheet

Customer : ALS Laboratory Date : 25 / 10 / 2021
Model : ASI-L Serial No. H57415200799

Item	Carry out maintenance work	Result	Exchange	Comment
1.	Arm Drive section Check Arm Drive Belt for wear and tension Check grease of Screw Arm Drive	O.K. O.K. O.K.		
2.	Rinse pump (only ASI-V 24ml, 40ml) Check pump rate(>40mL/min) Check pump and tube connection for leakage	O.K. O.K. O.K.		
3.	Check if outlet flow is in proper condition Check and if necessary exchange consumable, Maintenance parts	O.K. O.K.		See appropriate list of maintenance parts
4.	Check Stirrer [When installed]	O.K.		
5.	Verify ASI function via mechanical check	O.K.		

Inspection by :

T. Pmi

(Mr. Tawatchai Somsil)
Technician

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2/3



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website : www.automation.co.th

MTOC : L-1010/2021

Report No. : ALS-799

List of Consumable, Maintenance parts

Pos.	Part Number	Part Name	Result	Exchange	Recommended Interval
1.	017-27021-01	Grease Paste, Lubricant 100g	O.K.	✓	1 time per year
2.	032-22661-02	Belt, 60S2m596, Arm Drive	O.K.		1 time per year
3.	034-03067-02	Spring, F-642, Arm Drive	O.K.		Depending on condition
4.	042-00405-11	Pump Head, for ASI Rinse Pump	O.K.		Depending on condition
5.	638-41448-01	(only ASI-V 24mL, 40mL) Std. Needle Type1 24mL, 40mL* (for tube 2, 1x1, 6), [Sparge needle]	N/A		After 300 h of operating
6.	638-41448-02	Std. Needle Type1 125mL* (for tube 2, 1x1, 6)	N/A		Depending on condition
7.	631-41660-03	Flare Pipe 2x1.5x700mm* (for Standard Needle Type1 24mL, 40mL, 125mL)	N/A		Depending on condition (may cut to origin length 600mm)
8.	638-41450-01	Needle for Suspended Particles,* 0.8mm (only ASI-V 24mL, 40mL)	N/A		Depending on condition
9.	638-41450-01	Std. Needle Type2 125mL* (for tube 1, 4x0, 9)	N/A		Depending on condition
10.	638-41472-01	Std. Needle Type2 24mL, 40mL* (for tube 1, 4x0, 9)	O.K.		Depending on condition
11.	631-41660-02	Flare Pipe 1, 4x0, 9x600mm* (for Suspended + Needle Type2)	O.K.		Depending on condition
12.	638-41449-01	Double Needle, only 24mL, 40mL (simultaneous sparge type)*	N/A		Depending on condition
13.	631-41660-01	Flare Pipe 1, 1x0, 6x600mm* (for Double Needle 24mL, 40mL)	N/A		Depending on condition

*Note: needed parts depending on installed needle types!

Inspection by :

T. Pmi

(Mr. Tawatchai Somsil)
Technician

SHIMADZU ANALYZER
3/3

MTOC: L-1009/2021

Report No. : ALS-416

TOC-L Maintenance Report

Instrument	: Total Organic Carbon Analyzer	Measuring	: TC 0 ~ 30000 mg/L
Model	: TOC-LCSH	Place of Installation :-	
Serial No.	: H54425300416	Department	: LABORATORY
Manufacture	: Shimadzu		
Customer	ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd., Khwaen Suan Luang, Khet Suan Luang, Bangkok 10250 Thailand		

Date of Maintenance : 25 / 10 / 2021

Ambient Condition : Temperature $22.6 \pm 5^\circ\text{C}$
: Humidifier $65 \pm 15\%\text{RH}$

Maintenance By : T. Pomsri
(Mr. Tawatchai Somsri)
Technician

Approved By : 
(Mr. Nipon Phungsomsak)
Technician Manager

User Name : Sinluh P.
(Miss Sinluh Pungsum)

SHIMADZU ANALYZER
1/4

MTOC: L-1009/2021

Report No. : ALS-416

Maintenance Sheet

Customer: ALS Laboratory Date: 25 / 10 / 2021

Model: TOC-LCSH Serial No. H54425300416

Item	Carry out maintenance work	Result	Exchange	Comment
1.	Check functionality of the device Check furnace temperature (Standard cat. 680 °C / for TN cat. 720 °C) Check dehumidifier temperature (1 °C) Check the entire flow line related to leakage Check baseline status (OK) Check carrier gas pressure (200 ±10 kPa) Check carrier gas flow rate (150 mL/min)	O.K. O.K. O.K. O.K. O.K. O.K.		
2.	Tubes Check all tubing for contamination, if necessary clean them Check all tubing for tight connection	O.K. O.K.		
3.	Container and Drainage Fill up humidifier with pure water to max. level Check filling of dilution water and acid container Rinse Drain Pot, after wards refill again with pure water	O.K. O.K. O.K.		
4.	Check if outlet flow is in proper conditions TC and IC Injection Clean injector Block Check injector Block for wear Check injection tube adjustment Check injection for leakage Check injection for clogging IC Measurement (N-type) Check acidification in syringe Check sparging in syringe	O.K. O.K. O.K. O.K. O.K. O.K. O.K. O.K.		
5.	Eye check of 8-Port valve, for sample residues or moist spots that indicate possible leakage	O.K.		
6.	Check and if necessary exchange consumable, Maintenance parts	O.K.		See list of consumable, maintenance parts

Inspection by :

(Mr. Tawatchai Somsri)
Technician

SHIMADZU ANALYZER
2/4



Automation Service Co.,Ltd.

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Rayong Branch : 1/15 Hwapong Rd., A. Muang, Rayong 21150 Tel. 038-692-152 Fax. 038-692-345
Lamphun Branch : 122/5 M.4, T.Ban Klang, A.Muang, Lamphun 51000 Tel/Fax. 033-561-876
website : www.automation.co.th

MTOC : L-1009/2021

Report No. : ALS-416

Item	Carry out maintenance work	Result	Exchange	Comment
8.	Due to instrument condition, clean the instrument inside and outside.	O.K.		
9.	After checking the system and exchanging of consumable and maintenance parts a new 1-3 point calibration have to be done.	O.K.		Addition test 1.
10.	After wards the calibration perform check sample measurement.	O.K.		Addition test 2.

Addition test

Test no.	Test conditions	Meas. value	Result
1.	Calibration TC standard solution at 0, 0.1, 0.5, 1, 5, 10, 20 injection volume 50 µL No. of measurement 2 times (Max.3) Criteria : $R^2 = 0.995$ or more	1.0000	Attachment : ALS-416 Page 1/4 - 2/4 Pass
2.	Measurement of reagent water and TC standard solution at 5.0 mg/L injection volume 50 µL No. of measurement 2 times (Max.3) and calculate accuracy by Meas. of TC standard - Meas. of Reagent water Criteria : Accuracy % Recovery 10% or less	5.222 - 0.1141 = 5.1079 ppm	Attachment : ALS-416 Page 3/4 - 4/4 Pass

Inspection by : 

(Mr. Tawatchai Somsri)
Technician

SHIMADZU ANALYZER
3/4



Automation Service Co.,Ltd.

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website : www.automation.co.th

MTOC : L-1009/2021

Report No. : ALS-416

List of Consumable, Maintenance parts

Pos.	Part Number	Part Name	Result	Exchange	Recommended Interval
1.	036-11209-84	O-ring, 4D P10A (Viton , for TC,IC Slider)	O.K.	✓	1 time per year, Depending on condition
2.	036-11219-84	O-ring, 4D P20 (for sealing TC-Combustion tube)	O.K.	✓	1 time per year, Depending on condition
3.	638-15025	O-ring, PIFE (for TC,IC-Slider)	O.K.	✓	1 time per year, Depending on condition
4.	630-00105-01	Platinum net, (2pcs-set) (to support catalyst)	O.K.	✓	6 month same time as catalyst exchange
5.	630-00557	Silica Wool (to support catalyst)	O.K.	✓	6 month same time as catalyst exchange
6.	630-00992	Halogen Scrubber	O.K.	✓	6 month
7.	630-00996	High Sensitivity TC Catalyst (When installed)	N/A		Depending on condition
8.	638-60116	Regular Catalyst (33g) (When installed)	O.K.	✓	6 month
9.	638-56251-01	8-Port valve rotor	O.K.	✓	1 time per year
10.	638-41323	TC-Combustion Tube	O.K.	✓	6 month same time as catalyst exchange
11.	631-43404-01	Packing, gasket slider (for TC-Injection tube)	O.K.		1 time per year, Depending on condition
12.	638-59296	Syringe 5mL	O.K.		Depending on condition
13.	638-59296-01	Plunger Tip (for syringe 5mL)	O.K.	✓	6 month
14.	042-00405-11	IC reagent supply pump head	O.K.		1 time per year
15.	630-00999	CO2-Absorber (for cell space purge)	O.K.	✓	1 time per year
16.	630-00964	Molecular Sieves 13x	O.K.		1 time per year

Note. Table indicates the guidelines replacement periods when NPOC measurement is performed on sample that are comparatively as clean as tap water ,use standard catalyst and at a rate of about 500 sample per month (operating five days a week)

Inspector By



(Mr. Tawatchai Somsri)
Technician

SHIMADZU ANALYZER
4/4

TOC-Control L Report

System Administrator: ALS LAB
2021_10_25_001_PMCtx

Instr. Information

Instrument Options
Catalyst: TOC/AS/IC Unit/
Regular Sensitivity

Cali. Curve

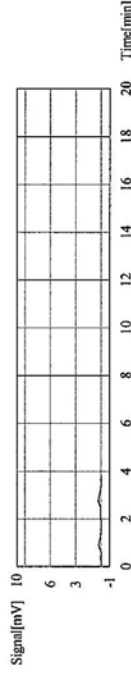
Sample Name: Untitled
Sample ID: NFOC 01-20 ppm 2021_10_25_15_19_29.oal
Status: Completed

Standard NFOC

Conc: 0.000mg/L

Standard	Conc	Signal	Time
1	0.6035	1.000	10.00
2	0.7385	1.000	10.00

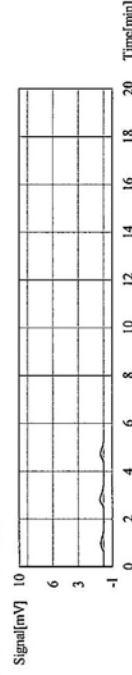
Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 0.8710
SD Area: 0.09546
CV Area: 14.23%



Conc: 0.1000mg/L

Standard	Conc	Signal	Time
1	1.067	10.00	10.00
2	1.265	10.00	10.00
3	1.102	10.00	10.00

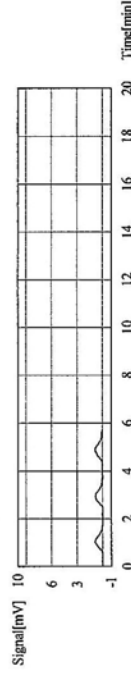
Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 1.087
SD Area: 0.02475
CV Area: 2.28%



Conc: 0.5000mg/L

Standard	Conc	Signal	Time
1	3.907	1.000	10.00
2	3.168	1.000	10.00
3	2.990	1.000	10.00

Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 2.949
SD Area: 0.05869
CV Area: 1.99%



Conc: 1.000mg/L

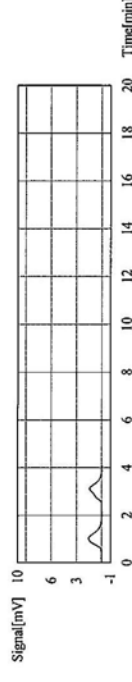
Standard	Conc	Signal	Time
1	5.035	1.000	10.00
2	5.000	1.000	10.00



TOC-Control L Report

System Administrator: ALS LAB
2021_10_25_001_PMCtx

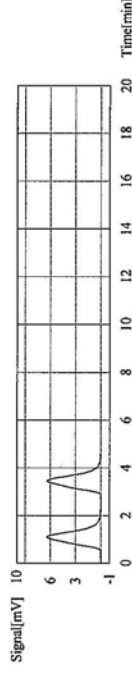
Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 5.024
SD Area: 0.02970
CV Area: 0.59%



Conc: 5.000mg/L

Standard	Conc	Signal	Time
1	22.21	4.000	10.00
2	22.24	4.000	10.00

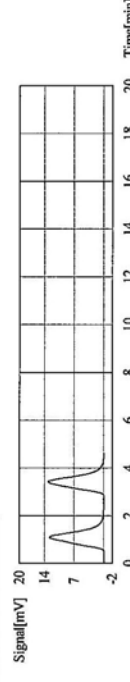
Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 22.23
SD Area: 0.02121
CV Area: 0.10%



Conc: 10.00mg/L

Standard	Conc	Signal	Time
1	43.42	2.000	10.00
2	43.07	2.000	10.00

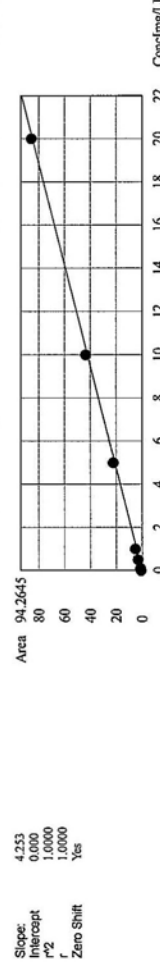
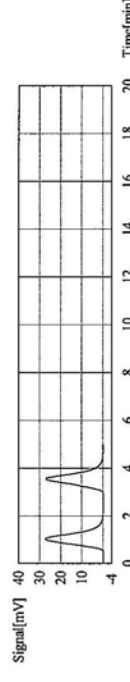
Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 43.56
SD Area: 0.1909
CV Area: 0.44%



Conc: 20.00mg/L

Standard	Conc	Signal	Time
1	85.75	1.000	10.00
2	85.64	1.000	10.00

Acid Add: 1.500%
Spurge Gas Flow: 80ml
Sp. Time: 90.00sec
Mean Area: 85.69
SD Area: 0.07778
CV Area: 0.09%



TOC-Control L Report

System Administrator: ALS LAB
2021_10_25_001_PML.txt

Inst:Information
Instrument Options
Catalyst
TOC/ASI/C Unit/
Regular Sensitivity

Sample
Sample Name: water
Sample ID: Untitled
Origin: Clean NPOC_normal.net
Status: Completed
Chk. Result

Unknown	NPOC	1.000	NPOC:0.1141ppm
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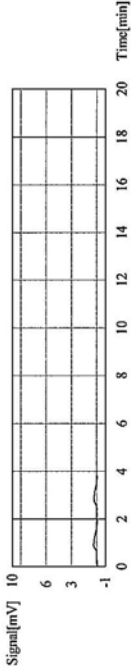
1. Det

Anal.: NPOC

1	1.406	0.1143ppm	150ul	1.000	NPOC normal 0 - 10 ppm, 2018_06_23_10_19_32 cal	10/25/2021 2:22:32 PM
2	1.400	0.1138ppm	150ul	1.000	NPOC normal 0 - 10 ppm, 2018_06_23_10_19_32 cal	10/25/2021 2:33:31 PM

Mean Area
Mean Conc.
SD Area
CV Area
SD Conc
CV Conc

1.403
0.1141ppm
0.00024
0.300%
0.00034
0.300%



TOC-Control L Report

System Administrator: ALS LAB
2021_10_25_001_PML.txt

Inst:Information
Instrument Options
Catalyst
TOC/ASI/C Unit/
Regular Sensitivity

Sample
Sample Name: Std TC 5 ppm
Sample ID: Untitled
Origin: NPOC 0.1-20 ppm.net
Status: Completed
Chk. Result

Unknown	NPOC	1.000	NPOC:5.222mg/L
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1. Det

Anal.: NPOC

1	22.36	5.257mg/L	50ul	1.000	NPOC 0.1-20 ppm, 2021_10_25_13_19_29 cal	10/25/2021 4:55:09 PM
2	22.06	5.187mg/L	50ul	1.000	NPOC 0.1-20 ppm, 2021_10_25_13_19_29 cal	10/25/2021 4:57:54 PM

Mean Area
Mean Conc.
SD Area
CV Area
SD Conc
CV Conc

22.21
5.222mg/L
0.2121
0.752%
0.04988
0.966%

