



Measurement Results:

Without adjustment

| Position heating block | Calibration point (°C) | Setting (°C) | UUC Reading (°C) |
|------------------------|------------------------|--------------|------------------|
| Right | 150 | 150 | 150 |

| Measurement Temperature (°C) @ Probe No. | | | |
|--|-----------------------|-------------------------|--------------------|
| Position | Standard Reading (°C) | Correction of UUC. (°C) | Uncertainty (± °C) |
| #16 | 149.46 | -0.54 | 0.64 |
| #17 | 149.79 | -0.21 | 0.64 |
| #18 | 149.27 | -0.73 | 0.64 |
| #19 | 150.14 | 0.14 | 0.64 |
| #20 | 149.38 | -0.62 | 0.64 |
| #21 | 150.81 | 0.81 | 0.64 |
| #22 | 150.80 | 0.80 | 0.65 |
| #23 | 150.71 | 0.71 | 0.64 |
| #24 | 149.86 | -0.14 | 0.64 |
| #25 | 149.23 | -0.77 | 0.64 |
| #26 | 150.61 | 0.61 | 0.64 |
| #27 | 149.10 | -0.90 | 0.64 |
| #28 | 150.71 | 0.71 | 0.64 |
| #29 | 149.10 | -0.90 | 0.64 |
| #30 | 150.74 | 0.74 | 0.64 |

UUC Characterization

| UUC Setting (°C) | UUC Reading (°C) | Measured Uniformity (°C) | Measured Stability (± °C) |
|---------------------|---------------------|-----------------------------|------------------------------|
| 150 | 150 | 1.55 | 0.12 |

Note: UUC = Unit Under Calibration

Definitions

UUC Reading : The average reading of indicating device which forms the integral part of UUC.

Standard Reading : The average reading of standards at any positions or location.

Measured Uniformity : The maximum difference of measured temperatures between of any probes and the measured temperature at the reference location which are observed at same time or at close observation time as possible to determine the temperature pattern or homogeneity with any holes of UUC at steady-state. The reference probe is preferably located in the geometric center of UUC.

Measured Stability : The one-half of greatest maximum difference of measured temperatures at any one probe.

The End of Certificate



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CHO32

Page.: 1 of 3

Certificate of Calibration

Equipment : UV-VIS Spectrophotometer
Manufacturer : Hach
Model : DR 3900
Serial No. : 1687645
ID No. : SGK_CL0038
Condition As-Received: Used Item
Received Date : 24 January 2022
Calibration Date : 24 January 2022
Reference : 2201-0617OC-1
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Songkhla Branch
114/1 Moo 8, Kanjanavanij Rd., Banphru, Hatyai,
Songkhla 90250 , Thailand
Calibration Place : Chemistry Room
Ambient Temperature : (24.9 - 25.2) °C (On-Site)
Relative Humidity : (39.2 - 45.2) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-01
Calibrated by : Kunchit Promprat

| | |
|----------------|------------|
| REVIEW BY | Ananta B. |
| APPROVED BY | Kanitta B. |
| NEXT CAL. DATE | 24/1/23 |

Approved by :

Malee

Approved Signatory

- (☒) Malee Butkruea
(☐) Saithip Meangmai
(☐) Warakorn Lerngagtrakul

Issue Date :

7 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.

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Cert. No. : 22CHO32

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

| <u>Material</u> | <u>Serial No.</u> | <u>Certificate No.</u> | <u>Due date</u> |
|----------------------------|-------------------|------------------------|-----------------|
| 1. Absorbance Standard set | 8331 | 86623 | 08 Sep 2022 |
| 2. Wavelength Standard set | 29829 | 94776 | 02 Sep 2023 |
| 3. Wavelength Standard set | 29829 | 94777 | 02 Sep 2023 |

2. This 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 Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral BandWidth : 5 nm
Scan Speed : - nm/min

Calibration Results : without adjustment

Wavelength Accuracy

| Certified Values of Reference Material (nm) | UUC Reading (nm) | Uncertainty of Measurement (\pm nm) | Coverage Factor <i>k</i> |
|--|-------------------------------|---|---|
| 418.40 | 418 | 0.59 | 2.00 |
| 479.88 | 480 | 0.59 | 2.00 |
| 513.75 | 514 | 0.59 | 2.00 |
| 537.00 | 536 | 0.59 | 2.00 |
| 638.00 | 638 | 0.59 | 2.00 |
| 747.61 | 748 | 0.59 | 2.00 |
| 807.04 | 807 | 0.59 | 2.00 |

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Cert. No. : 22CHO32

Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

| Wavelength (nm) | Certified Values of Reference Material (Abs) | UUC Reading (Abs) | Uncertainty of Measurement (\pm Abs) | Coverage Factor <i>k</i> |
|--------------------|--|------------------------|--|--------------------------------|
| 420.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5723 | 0.572 | 0.0033 | 2.00 |
| | 0.7522 | 0.751 | 0.0031 | 2.00 |
| | 1.0907 | 1.090 | 0.0033 | 2.00 |
| 440.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5616 | 0.560 | 0.0034 | 2.00 |
| | 0.7345 | 0.732 | 0.0032 | 2.00 |
| | 1.0646 | 1.063 | 0.0033 | 2.00 |
| 465.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5118 | 0.514 | 0.0034 | 2.00 |
| | 0.6773 | 0.679 | 0.0031 | 2.00 |
| | 0.9809 | 0.984 | 0.0033 | 2.00 |
| 546.1 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5228 | 0.522 | 0.0030 | 2.00 |
| | 0.6861 | 0.684 | 0.0030 | 2.00 |
| | 0.9941 | 0.993 | 0.0030 | 2.00 |
| 590.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5546 | 0.552 | 0.0029 | 2.00 |
| | 0.7159 | 0.712 | 0.0030 | 2.00 |
| | 1.0369 | 1.033 | 0.0030 | 2.00 |
| 635.0 | Zero | 0.000 | 0.0028 | 2.00 |
| | 0.5401 | 0.538 | 0.0029 | 2.00 |
| | 0.6835 | 0.680 | 0.0029 | 2.00 |
| | 0.9889 | 0.986 | 0.0030 | 2.00 |

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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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CALIBRATION CERTIFICATE

Issued Date : 12-Nov-2021

Certificate No. : 21PH192

CSR No. : A012/00583

Page. : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Chemical Laboratory

Instrument Name : pH meter

Manufacturer : Mettler Toledo

Model : S220

Serial No. : B625631849

ID No. : SGK_CL0030

Electrode No. : 6404000

Received Date : 9-Nov-2021

Calibrated Date : 9-Nov-2021

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$

Relative Humidity : $(55 \pm 15) \%$

| | |
|-------------|--------------|
| REVIEW BY | Suttharak T. |
| APPROVED BY | Kanitta H. |
| CAL. DATE | 10/05/2023 |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- HACH : LANGE United For Water Quality
- WK : WK Electric Co., Ltd.
- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Jessadagon Lemhud

Approved by :


Sakeereen Heemhad / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-----------------------------------|--------|------------|----------------|-------------|
| Standard Solution | 4.005 | C02840 | 1617 | 24-Aug-2022 |
| Standard Solution | 7.000 | C02841 | 1618 | 24-Aug-2022 |
| Standard Solution | 10.012 | C02843 | 1619 | 24-Aug-2022 |
| Temperature/Electrical Calibrator | MC2-MF | 23642 | WK2102-006-229 | 21-Feb-2022 |
| Digital Thermometer With Sensor | 1529 | B4C223 | QR21-2009 | 15-Sep-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Electrical Measurement

| Applied Voltage (mV) | pH meter Reading (mV) | Correction (mV) | Uncertainty (± mV) |
|---------------------------|----------------------------|----------------------|-------------------------|
| 177.48 | 177.5 | -0.02 | 0.17 |
| 0.00 | 0.0 | 0.00 | 0.13 |
| -177.48 | -177.5 | 0.02 | 0.17 |

2. Sample Test Measurement

| Standard Buffer Solutions (pH) | pH meter Reading (pH) | Correction (pH) | Uncertainty (± pH) |
|-------------------------------------|----------------------------|----------------------|-------------------------|
| 4.007 | 3.99 | 0.017 | 0.011 |
| 6.999 | 7.02 | -0.021 | 0.014 |
| 10.011 | 10.01 | 0.001 | 0.036 |

3. Temperature Measurement

| Cal Point (°C) | Standard Temperature (°C) | UUC Reading (°C) | Correction (°C) | Uncertainty (± °C) |
|---------------------|--------------------------------|-----------------------|----------------------|-------------------------|
| 25 | 24.93 | 25.0 | -0.07 | 0.11 |

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

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkhla 90250 Thailand

Tel: 081 599 0417 Fax: 074 805 133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 8-Feb-2022

Certificate No. : 22EB149

CSR No. : A023/01123

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Chemical Laboratory
Instrument Name : Electronic Balance
Manufacturer : Sartorius
Model : MSE224S-100-DU
Serial No. : 34705158
ID No. : SGK_CL0045
Resolution : 0.0001 g
Received Date : 5-Feb-2022
Calibrated Date : 5-Feb-2022
Ambient Temperature : (30 ±10) °C
Relative Humidity : (50 ±20) %

| | |
|----------------|------------|
| REVIEW BY | Ananta B. |
| APPROVED BY | Kanitta H. |
| NEXT CAL. DATE | 5/02/2023 |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.001 based on UKAS LAB 14 : 2015

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Tcs : Thai Calibration Service Co.,Ltd.

Calibrated by : Imron Rattanaylum

Approved by :

Sakeereen Heemhad / Technical Manager

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Certificate No. : 22EB149

CSR No. : A023/01123

Page. : 2 of 3

Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|---------------------|---------|-------------|-----------|------------|
| Standard Weight Set | 2mg-2kg | 11119514/01 | M2107051S | 6-Jul-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :: (✓) Without Adjustment () After Adjustment

1. Repeatability

| Nominal Value (g) | Standard Deviation (g) |
|---------------------|--------------------------|
| 200 | 0.00000 |

2. Effect of tare

| Nominal Value (g) | Standard Value (g) | Balance Reading (g) | Correction (g) |
|---------------------|----------------------|-----------------------|------------------|
| 20 | 20.0000 | 20.0000 | 0.0000 |
| 40 | 40.0001 | 40.0000 | 0.0001 |
| 60 | 60.0000 | 60.0001 | -0.0001 |
| 80 | 80.0001 | 80.0001 | -0.0001 |
| 100 | 100.0000 | 100.0000 | 0.0000 |

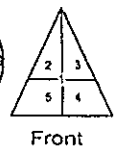
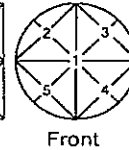
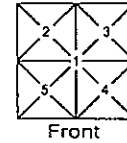
Result of Calibration :.

3. Off-centre loading

A mass approximately 50g was placed on a pan and moved to various position .

The balance reading obtained are given in the table.

| Position | | | | | Maximum Difference (g) |
|----------|---------|---------|---------|---------|-----------------------------|
| 1 | 2 | 3 | 4 | 5 | |
| 50.0000 | 50.0000 | 50.0000 | 50.0000 | 50.0000 | 0.0000 |



4. Departure from nominal value

| Nominal Value (g) | Standard Value (g) | UUC Reading (g) | Correction (g) | Uncertainty (\pm g) | Coverage Factor (k) |
|------------------------|-------------------------|----------------------|---------------------|----------------------------|--------------------------|
| 0.01 | 0.0100 | 0.0100 | 0.0000 | 0.00008 | 2.0 |
| 0.1 | 0.1000 | 0.1000 | 0.0000 | 0.00008 | 2.0 |
| 0.5 | 0.5000 | 0.5000 | 0.0000 | 0.00008 | 2.0 |
| 1 | 1.0000 | 1.0000 | 0.0000 | 0.00008 | 2.0 |
| 2 | 2.0000 | 2.0000 | 0.0000 | 0.00008 | 2.0 |
| 5 | 5.0000 | 5.0000 | 0.0000 | 0.00009 | 2.0 |
| 10 | 10.0000 | 10.0000 | 0.0000 | 0.00009 | 2.0 |
| 20 | 20.0000 | 20.0000 | 0.0000 | 0.00009 | 2.0 |
| 50 | 50.0000 | 50.0000 | 0.0000 | 0.00011 | 2.0 |
| 100 | 100.0000 | 100.0000 | 0.0000 | 0.00016 | 2.0 |
| 120 | 120.0000 | 120.0000 | 0.0000 | 0.00024 | 2.0 |
| 140 | 140.0001 | 140.0000 | 0.0001 | 0.00024 | 2.0 |
| 160 | 160.0000 | 160.0000 | 0.0000 | 0.00026 | 2.0 |
| 180 | 180.0000 | 180.0000 | 0.0000 | 0.00029 | 2.0 |
| 200 | 200.0000 | 200.0000 | 0.0000 | 0.00030 | 2.0 |

- UUC = Unit Under Calibration

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

...End...



CALIBRATION CERTIFICATE

Issued Date : 12-Nov-2021

Certificate No. : 21OV733

CSR No. : A012/00583

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Chemical Laboratory

Instrument Name : Hot Air Oven

Manufacturer : Memmert

Model : UF110

Serial No. : B416.3387

ID No. : SGK_CL0024

Resolution : 0.1 °C

Received Date : 9-Nov-2021

Calibrated Date : 9-Nov-2021

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY Sutthirak O.
APPROVED BY Kanitta H.
NEXT CAL. DATE 10/05/2023

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.012 based on G-20

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Sakeereen Heemhad / Technical Manager

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 Southern Calibration Service Co., Ltd.

Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-------------------------|--------|------------|-----------|------------|
| Data logger With Sensor | 34970A | MY44064411 | QR21-0314 | 9-Feb-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

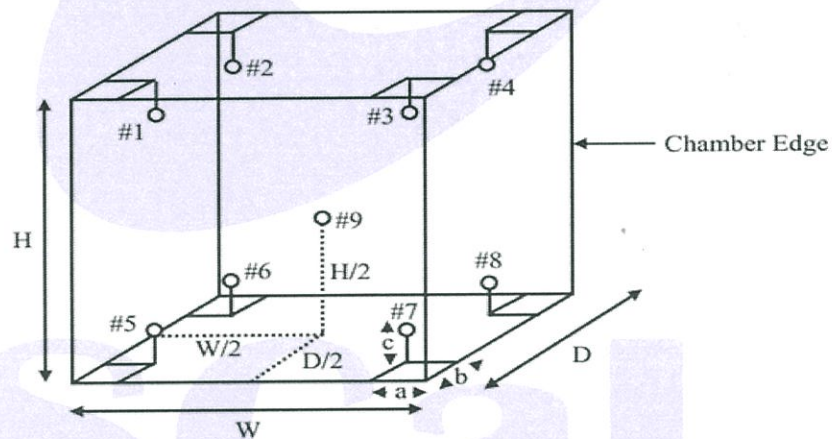
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :.

(✓) Without Adjustment

() After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm

b = 5.0 cm

c = 5.0 cm

Dimension of the chamber

W = 40.0 cm

H = 40.0 cm

D = 33.0 cm

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Hot Air Oven and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | | | | | | | Uncertainty (± °C) |
|---------------------|--|--------|--------|--------|--------|--------|--------|--------|--------|-------------------------|
| | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Ref. 9 | |
| 40 | 39.85 | 39.81 | 39.68 | 39.57 | 39.94 | 39.80 | 39.81 | 39.93 | 39.69 | 0.36 |
| 70 | 70.53 | 70.23 | 70.08 | 69.74 | 70.51 | 70.37 | 70.43 | 69.79 | 70.15 | 0.36 |
| 103 | 103.47 | 102.96 | 102.95 | 102.77 | 103.40 | 103.46 | 103.33 | 102.73 | 102.83 | 0.36 |
| 104 | 104.47 | 103.92 | 103.95 | 103.77 | 104.33 | 104.46 | 104.30 | 103.73 | 103.80 | 0.36 |
| 105 | 105.34 | 104.85 | 104.85 | 104.67 | 105.16 | 105.27 | 105.07 | 104.81 | 105.06 | 0.36 |
| 180 | 180.04 | 180.03 | 179.99 | 179.86 | 180.11 | 180.28 | 180.27 | 180.16 | 180.26 | 0.41 |

3. Performance Result

The performance of the Hot Air Oven are reported as shown below

| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (± °C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|---------------------|-----------------------|-----------------------|-----------------------------------|----------------------------------|-----------------------------|
| 40 | 40.0 | 40.0 | 0.10 | 0.34 | 0.47 |
| 70 | 70.0 | 70.0 | 0.10 | 0.48 | 0.82 |
| 103 | 103.0 | 103.0 | 0.10 | 0.71 | 0.74 |
| 104 | 104.0 | 104.0 | 0.10 | 0.71 | 0.74 |
| 105 | 105.0 | 105.0 | 0.20 | 0.39 | 0.70 |
| 180 | 180.0 | 180.0 | 0.20 | 0.53 | 0.62 |

- UUC = Unit Under Calibration

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

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkhla 90250 Thailand

Tel: 081 599 0417 Fax: 074 805 133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 8-Feb-2022

Certificate No. : 22WB004

CSR No. : A0223/01123

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Chemical Laboratory
Instrument Name : Water Bath
Manufacturer : Memmert
Model : WNE29
Serial No. : L616.0538
ID No. : SGK_CL0035
Resolution : 0.1 °C
Received Date : 5-Feb-2022
Calibrated Date : 5-Feb-2022
Ambient Temperature : (30 ± 10) °C
Relative Humidity : (50 ± 30) %

| | |
|----------------|------------|
| REVIEW BY | Ananta B. |
| APPROVED BY | Kanitta H. |
| NEXT CAL. DATE | 6/07/2023 |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.W1.014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Imron Rattanaylum

Approved by :

Sakeereen Heemhad / Technical Manager

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Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-------------------------|--------|------------|-----------|------------|
| Data logger With Sensor | 34970A | MY44064411 | QR21-0314 | 9-Feb-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

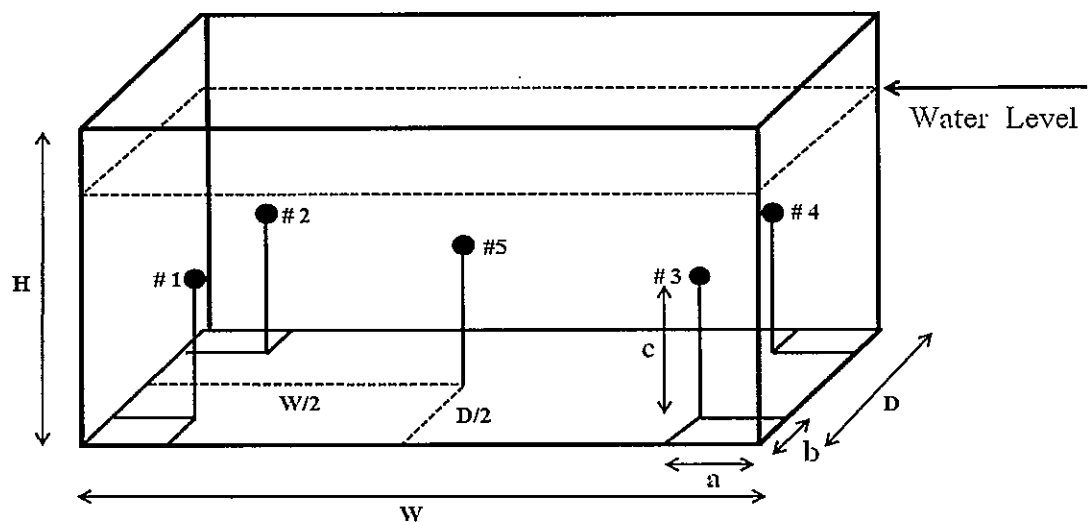
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment

() After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

$a = 5$ cm
 $b = 5$ cm
 $c = 5$ cm

Dimension of the chamber

$W = 45$ cm
 $H = 30$ cm
 $D = 35$ cm

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Water Bath and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | | | Uncertainty (± °C) |
|---------------------|--|-------|-------|-------|-------|-------------------------|
| | #1 | #2 | #3 | #4 | Ref.5 | |
| 80 | 79.95 | 80.07 | 79.95 | 79.99 | 80.03 | 0.14 |

3. Performance Result

The performance of the Water Bath are reported as shown below

| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (± °C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|---------------------|-----------------------|-----------------------|-----------------------------------|----------------------------------|-----------------------------|
| 80 | 81.0 | 81.0 | 0.10 | 0.19 | 0.19 |

- UUC = Unit Under Calibration

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

... End ...



CALIBRATION CERTIFICATE

Issued Date : 19-Aug-2021

Certificate No. : 21OV449

CSR No. : A078/3892

Page : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Chemical Laboratory

Instrument Name : Cold Room Water

Manufacturer : MODULAR

Model : N/A

Serial No. : N/N

ID No. : SGK_CL0065

Resolution : 0.1 °C

Received Date : 16-Aug-2021

Calibrated Date : 16-Aug-2021

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

REVIEW BY Sutthirak T.

APPROVED BY Kanitta H.

NEXT CAL. DATE 14/02/2023

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.012 based on G-20

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Sakeereen Heemhad / Technical Manager

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 Southern Calibration Service Co., Ltd.

Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-------------------------|--------|------------|-----------|------------|
| Data logger With Sensor | 34970A | MY44064411 | QR21-0314 | 9-Feb-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

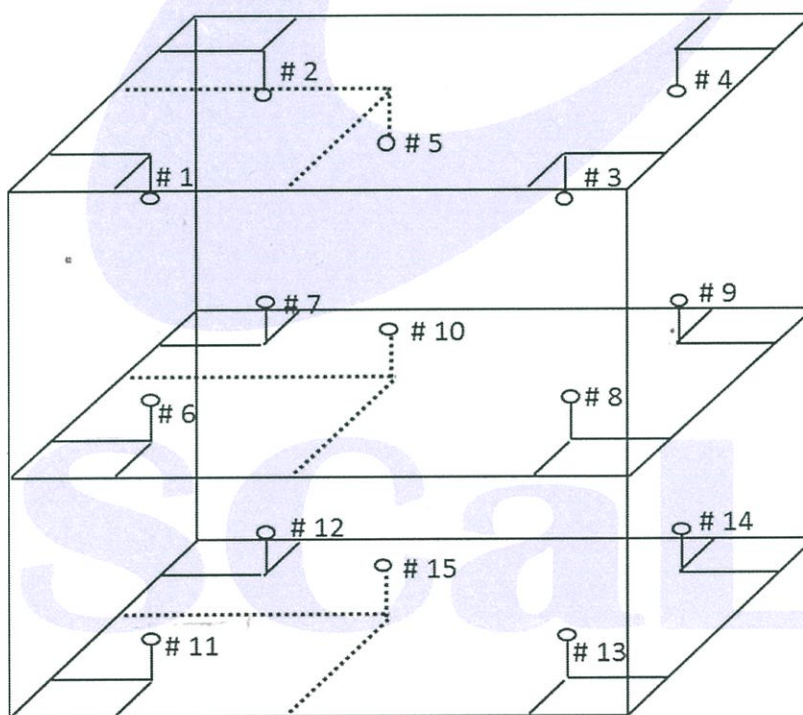
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(✓) Without Adjustment

() After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm

b = 5.0 cm

c = 5.0 cm

Dimension of the chamber

W = 370.0 cm

H = 250.0 cm

D = 540.0 cm

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Cold Room Water and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | | | | | | | | | | | | |
|---------------------|--|------|------|------|------|------|------|------|------|--------|------|------|------|------|------|
| | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | #9 | Ref.10 | #11 | #12 | #13 | #14 | #15 |
| 4 | 3.63 | 3.35 | 3.58 | 3.80 | 4.14 | 3.76 | 3.77 | 3.72 | 3.82 | 3.80 | 3.62 | 3.88 | 3.67 | 3.80 | 3.61 |

The uncertainty of measurement was ± 0.38 °C

3. Performance Result

The performance of the Cold Room Water are reported as shown below

| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (\pm °C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|---------------------|-----------------------|-----------------------|---------------------------------------|----------------------------------|-----------------------------|
| 4 | 4.0 | 4.0 | 1.23 | 0.69 | 3.33 |

* UUC = Unit Under Calibration

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

... End ...

SCaL



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkhla 90250 Thailand

Tel: 081 599 0417 Fax: 074 805 133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 8-Jul-2021

Certificate No. : 21ATC051

CSR No. : A047/2301

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Microbiological Laboratory

Instrument Name : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 52134079

ID No. : SGK_ML0001

Resolution : 1 °C

Received Date : 5-Jul-2021

Calibrated Date : 5-Jul-2021

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

| | |
|----------------|------------------------|
| REVIEW BY | <i>APD Nattawut P.</i> |
| APPROVED BY | <i>Kanitha H.</i> |
| NEXT CAL. DATE | <i>03/07/2023</i> |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.16.013 based on BS 2646 : 1993 (part 5)

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCaL : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Ibrorhim Saleemin

Approved by :

O. W.
Adull Lemsoh / Laboratory Manager

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Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-------------------------|-------|------------|-----------|------------|
| Data logger With Sensor | GL220 | H11119557 | 21SDAT001 | 7-May-2022 |

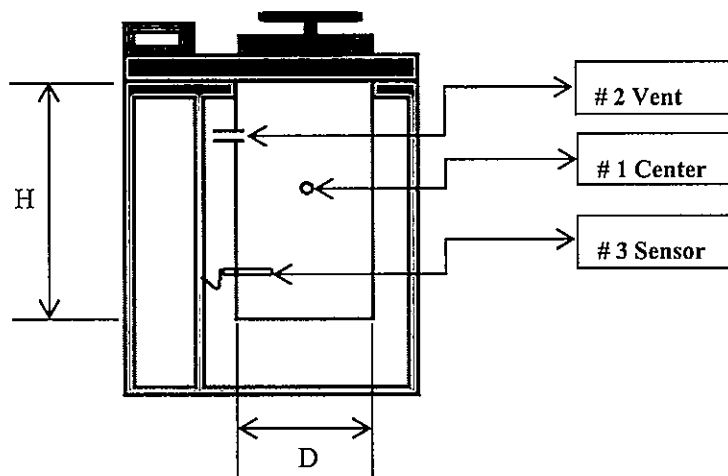
2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration : (✓) Without Adjustment () After Adjustment

1. Sensor Installation Diagram



Chamber Diameter (D) : 30 cm

Chamber Height (H) : 70 cm



Certificate No. : 21ATC051

CSR No. : A047/2301

Page. : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Autoclave and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | Pressure Reading | Operating Time (sec) | Uncertainty (±°C) |
|-------------------|---|---------|-----------|------------------|-------------------------|----------------------|
| | Center #1 | Vent #2 | Sensor #3 | | | |
| 115 | 116.2 | 115.9 | 116.3 | 0.8 MPa | 1800.18 | 0.76 |
| 118 | 119.2 | 118.9 | 119.3 | 0.1 MPa | 1800.26 | 0.76 |
| 121 | 121.5 | 121.2 | 121.6 | 0.12 MPa | 1800.34 | 0.76 |

3. Performance Result

The performance of the Autoclave are reported as shown below

| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (±°C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|-------------------|---------------------|---------------------|--------------------------------|--------------------------------|---------------------------|
| 115 | 115 | 115 | 0.10 | 0.50 | 0.50 |
| 118 | 118 | 118 | 0.10 | 0.50 | 0.50 |
| 121 | 121 | 121 | 0.00 | 0.40 | 0.40 |

* UUC = Unit Under Calibration

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

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkla 90250 Thailand
Tel : 08 1599 0417 Fax : 0 7480 5133 Email : s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 9-Aug-2022

Certificate No. : 22OV529

CSR No. : A037/01847

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8, Karnchanawanich Rd. Tambon, Ban Phru,
Amphoe Hat Yai, Songkhla, 90250

Calibration Place : Microbiological Laboratory

Instrument Name : Incubator

Manufacturer : Memmert

Model : ICP750

Serial No. : F816.0061

ID No. : SGK_ML0013

Resolution : 0.1 °C

Received Date : 6-Aug-2022

Calibrated Date : 6-Aug-2022

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

| | |
|----------------|-------------|
| REVIEW BY | APPROVED BY |
| APPROVED BY | APPROVED BY |
| NEXT CAL. DATE | |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.012 based on G-20

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- SCAL : Sounthern Calibration Service Co., Ltd.,

Calibrated by : Ibrorhim Saleemin

Approved by :

Kanyarat Chaipet / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|------------------------------|--------|------------|-----------|-------------|
| Data Acquisition/Switch Unit | 34970A | MY58009813 | 22SDAT004 | 24-May-2023 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

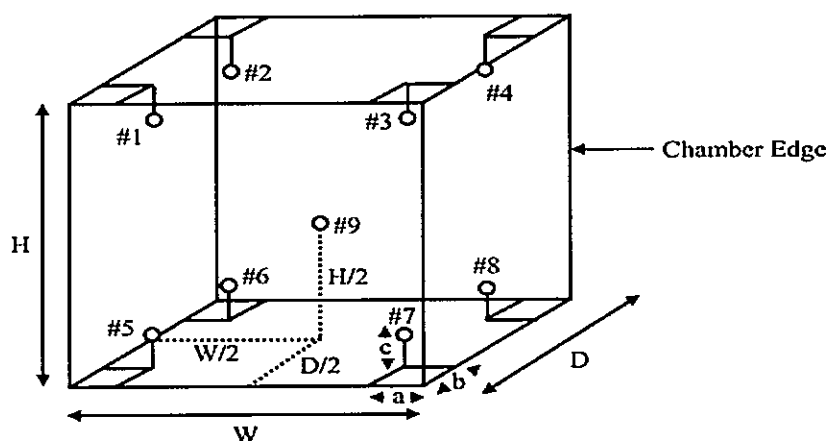
4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :

(☒) Without Adjustment

(☐) After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

a = 5.0 cm

b = 5.0 cm

c = 5.0 cm

Dimension of the chamber

W = 104.0 cm

H = 120.0 cm

D = 60.0 cm



Certificate No. : 22OV529

CSR No. : A037/01847

Page. : 3 of 3

Result of Calibration :

2. Temperature Measurement Accuracy Test

The measurement results of the Incubator and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | | | | | | | Uncertainty (± °C) |
|---------------------|--|-------|-------|-------|-------|-------|-------|-------|--------|-------------------------|
| | #1 | #2 | #3 | #4 | #5 | #6 | #7 | #8 | Ref. 9 | |
| 35 | 34.99 | 34.92 | 34.95 | 34.88 | 34.96 | 35.00 | 34.94 | 34.94 | 34.94 | 0.38 |

3. Performance Result

The performance of the Incubator are reported as shown below

| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (± °C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|---------------------|-----------------------|-----------------------|-----------------------------------|----------------------------------|-----------------------------|
| 35 | 35.0 | 35.0 | 0.10 | 0.12 | 0.19 |

- UUC = Unit Under Calibration

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

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkhla 90250 Thailand

Tel: 081 599 0417 Fax: 074 805 133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 8-Jul-2021

Certificate No. : 21PH098

CSR No. : A047/2301

Page. : 1 of 2

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Microbiological Laboratory

Instrument Name : pH meter

Manufacturer : Sartorius

Model : Basic pH Meter PB-10

Serial No. : C07160695

ID No. : SGK_ML0016

Electrode No. : N/A

Received Date : 5-Jul-2021

Calibrated Date : 5-Jul-2021

Ambient Temperature : $(25 \pm 3) ^\circ\text{C}$

Relative Humidity : $(55 \pm 15) \%$

| | |
|----------------|-------------|
| REVIEW BY | Nattawat P. |
| APPROVED BY | Kanpha H. |
| NEXT CAL. DATE | 03/07/2023 |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.008 based on direct measurement by using certified reference Material (CRM)

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- HACH : LANGE United For Water Quality

- WK : WK Electric Co., Ltd.

Calibrated by : Jessadagon Lemhud

Approved by :

Adull Lemsoh / Laboratory Manager

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Certificate No. : 21PH098

CSR No. : A047/2301

Page. : 2 of 2

Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-----------------------------------|--------|------------|----------------|-------------|
| Standard Solution | 4.005 | C02730 | 1503 | 22-May-2022 |
| Standard Solution | 7.000 | C02775 | 1551 | 20-Oct-2022 |
| Standard Solution | 10.012 | C02770 | 1545 | 17-Sep-2022 |
| Temperature/Electrical Calibrator | MC2-MF | 23642 | WK2102-006-229 | 21-Feb-2022 |

2. The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.

3. This certificate is not certified any commercial transaction

4. Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :: (✓) Without Adjustment () After Adjustment

1. Electrical Measurement

| Applied Voltage (mV) | pH meter Reading (mV) | Correction (mV) | Uncertainty (± mV) |
|---------------------------|----------------------------|----------------------|-------------------------|
| 177.48 | 177.4 | 0.08 | 0.17 |
| 0.00 | 0.0 | 0.00 | 0.13 |
| -177.48 | -177.4 | -0.08 | 0.17 |

2. Sample Test Measurement

| Standard Buffer Solutions (pH) | pH meter Reading (pH) | Correction (pH) | Uncertainty (± pH) |
|-------------------------------------|----------------------------|----------------------|-------------------------|
| 4.006 | 3.99 | 0.016 | 0.012 |
| 6.997 | 7.01 | -0.013 | 0.015 |
| 10.012 | 9.98 | 0.032 | 0.036 |

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

... End ...



Southern Calibration Service Co., Ltd.

669/35 Karnjanavanit Rd., Banpru, Hatyai, Songkhla 90250 Thailand

Tel: 081 599 0417 Fax: 074 805 133 Email: s.calibration@gmail.com www.scal-lab.com



CALIBRATION CERTIFICATE

Issued Date : 9-Aug-2021

Certificate No. : 21WB064

CSR No. : A047/2346

Page. : 1 of 3

Customer : ALS Laboratory Group (Thailand) Co., Ltd
114/1 Moo 8 Karnchanawanich Rd. T.Ban Phru,
A. Hat Yai, Songkhla 90250 TH

Calibration Place : Microbiological Laboratory

Instrument Name : Water Bath

Manufacturer : Memmert

Model : WPE45

Serial No. : L716.0558

ID No. : SGK_ML0021

Resolution : 0.1 °C

Received Date : 6-Aug-2021

Calibrated Date : 6-Aug-2021

Ambient Temperature : (30 ± 10) °C

Relative Humidity : (50 ± 30) %

| | |
|----------------|-------------|
| REVIEW BY | Nattawat P. |
| APPROVED BY | Kanitta H. |
| NEXT CAL. DATE | 4/02/2023 |

Calibration Method Used :

This instrument was calibrated using the Calibration In - house method : SCAL.WI.014 based on ASTM E 715 : 1980 (reapproved 2001)

The Southern Calibration Service Co.,Ltd.calibration control system complies with requirement of ISO/IEC 17025:2017

Traceability of measurement :

This Certificate is traceable to the International and /or national standards which realize the units of measurement according to the International System of Unit (SI) through :

- Q Reborn : Quality Reborn Co.,Ltd.

Calibrated by : Ibrorhim Saleemin

Approved by :

Sakeereen Heemhad / Technical Manager

The uncertainties are for a confidence probability of approximately 95%

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Details of Calibration

1. Reference Standard Equipment Used:

| Equipment | Model | Serial No. | Cert. no. | Due Date |
|-------------------------|--------|------------|-----------|------------|
| Data logger With Sensor | 34970A | MY44064411 | QR21-0314 | 9-Feb-2022 |

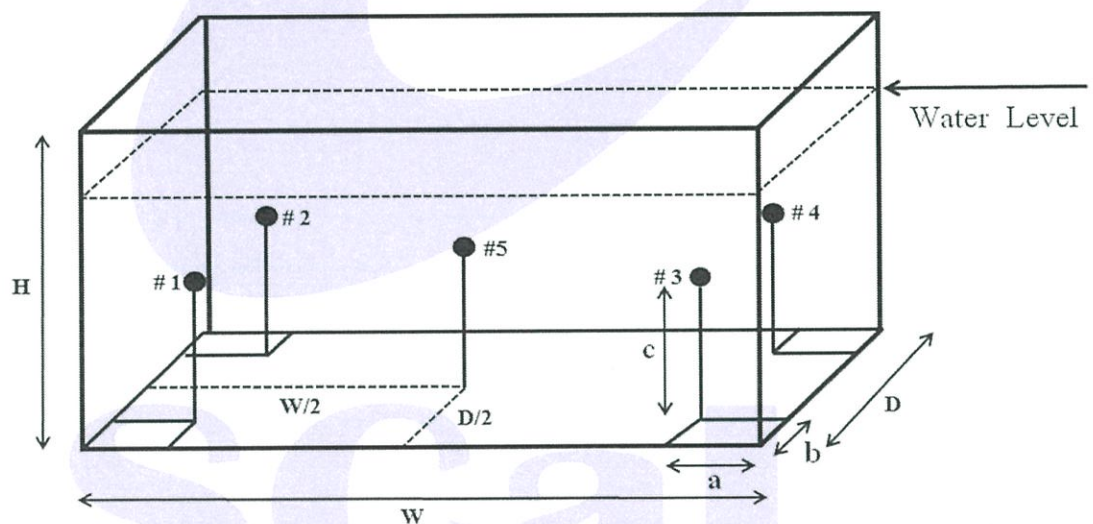
- The results reported in this certificate refer to the condition of the instrument on the date of calibration and carry no implication regarding the longterm stability of instrument.
- This certificate is not certified any commercial transaction
- Condition of Item : normal condition , no indication for any damage or malfunction

Result of Calibration :.

(✓) Without Adjustment

() After Adjustment

1. Sensor Installation Diagram



Sensor Installation Details

$a = 5$ cm
 $b = 5$ cm
 $c = 5$ cm

Dimension of the chamber

$W = 45$ cm
 $H = 30$ cm
 $D = 35$ cm

Result of Calibration .:

2. Temperature Measurement Accuracy Test

The measurement results of the Water Bath and associates are reported in the manner as shown below

| Cal point (°C) | Measured Standard Temperature At Spread Locations (°C) | | | | | Uncertainty (± °C) |
|---------------------|--|-------|-------|-------|-------|-------------------------|
| | #1 | #2 | #3 | #4 | Ref.5 | |
| 44.5 | 44.49 | 44.55 | 44.48 | 44.51 | 44.47 | 0.14 |

3. Performance Result

The performance of the Water Bath are reported as shown below

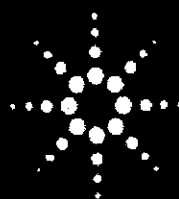
| Cal point (°C) | UUC Setting (°C) | UUC Reading (°C) | Temperature Stability (± °C) | Temperature Uniformity (°C) | Overall Variation (°C) |
|---------------------|-----------------------|-----------------------|-----------------------------------|----------------------------------|-----------------------------|
| 44.5 | 44.6 | 44.6 | 0.20 | 0.24 | 0.24 |

- UUC = Unit Under Calibration

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

... End ...

SCaL



Agilent CrossLab Compliance Services

Agilent
CrossLab

From Insight to Outcome

EQUIPMENT QUALIFICATION REPORT (EQR)

Agilent CrossLab Compliance

Qualification Type: ICPMS-OQ

System ID: JP16511669

EQP Name: AgilentRecommended

EQP Revision: ICPMS.02.50

EQP Publish Date: March 2020

Date: February 8, 2022 11:47:17 AM

Report Type: Report

Org. Name: ALS laboratory Group (Thailand) Co.,Ltd.

Org. Location: 114/1 Moo8, Kanchanawanich Rd., T.Ban Phru,
A.Hatyai, Songkhla 90250

REVIEW BYAnanta B.

APPROVED BYKanitta H.

NEXT CAL. DATE8/2/2023

Date: February 8, 2022 11:47:17 AM
System ID: JP16511669

Certificate of System Qualification

ICPMS-OQ

System ID: JP16511669

Organization Name: ALS laboratory Group (Thailand) Co.,Ltd.

Organization Location: 114/1 Moo8, Kanchanawanich Rd., T.Ban Phru, A.Hatyai, Songkhla 90250

Date: February 8, 2022 11:39:47 AM

EQP Name: AgilentRecommended

EQP Revision: ICPMS.02.50

Overall Qualification Status: Pass

Autosampler Check

Overall Autosampler Check Test Status

Pass

Integrated Sample Introduction System (ISIS) Check

Overall Integrated Sample Introduction System (ISIS) Check Test Status

Pass

Autotune

| | |
|-------------------------------------|------|
| Peakwidth Mass 7 | Pass |
| Peakwidth Mass 89 | Pass |
| Peakwidth Mass 205 | Pass |
| Mass Axis 7 | Pass |
| Mass Axis 89 | Pass |
| Mass Axis 205 | Pass |
| Mass 7 Sensitivity No Gas | Pass |
| Mass 89 Sensitivity No Gas | Pass |
| Mass 205 Sensitivity No Gas | Pass |
| Mass 59 Sensitivity He | Pass |
| Mass 89 Sensitivity H2 | Pass |
| Oxide Ratio 156/140 | Pass |
| Doubly Charged Species Ratio 70/140 | Pass |

Date: February 8, 2022 11:39:47 AM

System ID: JP16511669

Overall Autotune Test Status

Pass

Background (No Gas Mode)

Setpoint Status:

Pass

Masses (AMU):

Measured Value:

Agilent Recommended:

Status:

| | | | | | |
|------|-------|-------|-------|------|------|
| | 7 | 89 | 205 | | |
| | 6.400 | 1.800 | 5.700 | cps | |
| <= | 6.9 | <= | 4.6 | <= | 11.5 |
| Pass | | Pass | | Pass | |

Overall Background (No Gas Mode) Test Status

Pass

Background (Gas Mode)

Gas Mode:

Helium

Setpoint Status:

Pass

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:

| | | |
|------|------|-----|
| | 78 | |
| | 4.60 | cps |
| <= | 115 | |
| Pass | | |

Gas Mode:

Hydrogen

Setpoint Status:

Pass

Mass (AMU):

Measured Value:

Agilent Recommended:

Status:

| | | |
|------|------|-----|
| | 78 | |
| | 1.45 | cps |
| <= | 4.6 | |
| Pass | | |

Overall Background (Gas Mode) Test Status

Pass

Date: February 8, 2022 11:39:47 AM

System ID: JP16511669

20-Minute Stability (No Gas Mode)

Masses (AMU):

Stability RSD:

Agilent Recommended:

Status:

| | | | | | | |
|------|------|------|------|------|------|---|
| | 7 | | 89 | | 205 | |
| | 1.26 | | 0.28 | | 0.43 | % |
| <= | 2.3 | <= | 2.3 | <= | 2.3 | |
| Pass | | Pass | | Pass | | |

Overall 20-Minute Stability (No Gas Mode) Test Status

Pass

Instrument Details

Purpose

This section describes the as found system configuration.

Details

ICP-MS 1

| | |
|-------------------|--|
| Manufacturer | Agilent Technologies |
| Name | 7900 |
| Model Number | G8403A |
| Installed Options | #100H: Standard Package with Hydrogen option |
| Detector Type | SQ |
| Nebulizer | Mira Mist (G3161) |
| Spray Chamber | Quartz |
| Torch | Quartz |
| Sampling Cone | Ni |
| Skimmer Cone | Ni |
| Serial Number | JP16511669 |
| Firmware Revision | 4.00.02 |

ISIS 1

| | |
|---------------|-------------------------|
| Manufacturer | Agilent Technologies |
| Name | ISIS3 |
| Model Number | G8411A |
| Type | Peristaltic pump system |
| Serial Number | JP16510376 |

Autosampler 1

| | |
|---------------|----------------------|
| Manufacturer | Agilent Technologies |
| Name | SPS4 |
| Model Number | G8410A |
| Serial Number | AU16351847 |

Chiller 1

| | |
|---------------|----------------------|
| Manufacturer | Agilent Technologies |
| Name | Chiller |
| Model Number | G3292A |
| Serial Number | 701711328 |

Electronic Signature

Purpose

This signature page was created and published because the ACE sign-off action was executed, which is valid for the entire document, including attachments. The ACE sign-off is an electronic signature that requires two distinct identification components: unique username and personal password. The Agilent representative who has delivered this service understands the meaning and legal status of an electronic signature. As a trained official operator, the Agilent representative has a unique password and logon to access ACE and electronically sign this document. (Other e-signatures can be applied to this document using a Document Content Management or other suitable method defined in your data access and control procedures.)

Details

| | |
|--------------------------|---|
| Full Name of Signer: | Burin Ngamvijit |
| Logged On User Name: | Burin_ngamvijit@agilent.com |
| Signature Creation Date: | February 8, 2022 |
| Reason for Signature: | Published this original version of document |

Regulatory Disclaimer

This document provides a protocol to verify and record instrument configuration and evidence of proper operation. It has been prepared from our interpretation of applicable regulations as well as industry best practices. The document is designed to provide an important component of a complete compliance package. Validation depends upon many factors and use of this protocol alone does not assure compliance. Agilent Technologies makes no promises or representations as to its sufficiency for any specific regulatory program.

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User Name: burin_ngamvjljt
 Hostname: ASSGKWX019

System Id: JP16511669
 Print Date: February 8, 2022 11:39:48 AM

OQ HW 7900ICPMS ALS Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---|---|
| February 8, 2022 9:19:05 AM | Audit | SessionCreated | Session | None |
| February 8, 2022 9:19:05 AM | Start | Configuration | Session | None |
| February 8, 2022 9:19:05 AM | Audit | Entitlement | Licensing | User is FieldEngineer and does not require an unlock code |
| February 8, 2022 9:23:56 AM | Audit | EqpLoaded | Session | EQP details for primary technique [lcpMs] - File path: [ProtocolPacks/lcpMs/Configurations/02.50/lcpMs.02.50.eqp], EQP File Name: [lcpMs.02.50.eqp], EQP Name: [AgilentRecommended] |
| February 8, 2022 9:24:02 AM | End | Configuration | Session | None |
| February 8, 2022 9:24:09 AM | Start | Qualification | Session | OQ |
| February 8, 2022 9:24:09 AM | Start | Execution | Autosampler Check : SPS4: Autosampler Check | None |
| February 8, 2022 9:24:54 AM | End | Execution | Autosampler Check : SPS4: Autosampler Check | Run Count : 1 |
| February 8, 2022 9:24:57 AM | Start | Execution | Integrated Sample Introduction System (ISIS) Check : ISIS3: Integrated Sample Introduction System (ISIS) Check | None |
| February 8, 2022 10:52:47 AM | End | Execution | Integrated Sample Introduction System (ISIS) Check : ISIS3: Integrated Sample Introduction System (ISIS) Check | Run Count : 1 |

User Name: burin_ngamvijit
 Hostname: ASSGKWX019

System Id: JP16511669
 Print Date: February 8, 2022 11:39:48 AM

QQ HW 7900iCPMS ALS Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---|----------------------|
| February 8, 2022 10:52:50 AM | Start | Execution | Autotune : G8403A: Autotune 1 | None |
| February 8, 2022 10:55:26 AM | End | Execution | Autotune : G8403A: Autotune 1 | Run Count : 1 |
| February 8, 2022 10:55:34 AM | Start | Execution | Background (No Gas Mode) : G8403A: No Gas Mode Background 1 | None |
| February 8, 2022 10:55:56 AM | End | Execution | Background (No Gas Mode) : G8403A: No Gas Mode Background 1 | Run Count : 1 |
| February 8, 2022 10:56:00 AM | Start | Execution | Background (Gas Modes) : G8403A: Gas Mode Background :Helium | None |
| February 8, 2022 10:56:22 AM | End | Execution | Background (Gas Modes) : G8403A: Gas Mode Background :Helium | Run Count : 1 |
| February 8, 2022 10:56:24 AM | Start | Execution | Background (Gas Modes) : G8403A: Gas Mode Background :Hydrogen | None |
| February 8, 2022 10:56:40 AM | End | Execution | Background (Gas Modes) : G8403A: Gas Mode Background :Hydrogen | Run Count : 1 |
| February 8, 2022 10:56:43 AM | Start | Execution | 20-Minute Stability (No Gas Mode) : G8403A: 20-Minute Stability (No Gas Mode) 1 | None |
| February 8, 2022 11:01:33 AM | End | Execution | 20-Minute Stability (No Gas Mode) : G8403A: 20-Minute Stability (No Gas Mode) 1 | Run Count : 1 |
| February 8, 2022 11:07:37 AM | End | Qualification | Session | OQ |
| February 8, 2022 11:07:37 AM | Start | Reporting | Session | None |

Page 2 / 3

User Name: burln_ngamvijit

System Id: JP16511669

Hostname: ASSGKWX019

Print Date: February 8, 2022 11:39:48 AM

OQ HW 7900ICPMS ALS Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------------|----------------------|-----------------------|---------------------|-----------------------------------|
| February 8, 2022 11:38:19 AM | Audit | Reporting | Session | Report Generated : Certificate |



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert.No.: 22CHO33

Page.: 1 of 4

Certificate of Calibration

Equipment : UV-VIS Spectrophotometer
Manufacturer : Agilent Technologies
Model : Cary 60 UV-Vis
Serial No. : MY16510028
ID No. : SGK_CL0040
Condition As-Received: Used Item
Received Date : 24 January 2022
Calibration Date : 24 January 2022
Reference : 2201-0617OC-2
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
Songkhla Branch
114/1 Moo 8, Kanjanavanij Rd., Banphru, Hatyai,
Songkhla 90250 , Thailand
Calibration Place : Chemistry Room
Ambient Temperature : (24.1 - 24.8) °C (On-Site)
Relative Humidity : (43.9 - 45.9) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-01
Calibrated by : Kunchit Promprat

REVIEW BY Ananta B.
APPROVED BY Kanida H.
NEXT CAL. DATE 24/1/23

Approved by :

Malee

Approved Signatory

- (/) Malee Butkruea
() Saithip Meangmai
() Warakorn Lerngagtrakul

Issue Date :

7 February 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 0037404



Cert. No. : 22CHO33

Page : 2 of 4

Condition of calibration result

1. Reference Standard Material :

| <u>Material</u> | <u>Serial No.</u> | <u>Certificate No.</u> | <u>Due date</u> |
|----------------------------|-------------------|------------------------|-----------------|
| 1. Absorbance Standard set | 32587 | 85662 | 17 July 2022 |
| 2. Absorbance Standard set | 32590 | 86625 | 08 Sep 2022 |
| 3. Absorbance Standard set | 8331 | 86623 | 08 Sep 2022 |
| 4. Wavelength Standard set | 29829 | 94776 | 02 Sep 2023 |
| 5. Wavelength Standard set | 29829 | 94777 | 02 Sep 2023 |

2. This 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 Physical Laboratory (NPL), The United Kingdom of Great Britain and Northern Ireland
- National Institute of Standards and Technology (NIST), The United States of America

4. Spectral BandWidth : 1.5 nm
Scan Speed : 20 nm/min

Calibration Results : without adjustment

Wavelength Accuracy

| Certified Values of Reference Material (nm) | UUC Reading (nm) | Uncertainty of Measurement (± nm) | Coverage Factor k |
|--|-------------------------------|--|----------------------------------|
| 241.72 | 241.1 | 0.13 | 2.00 |
| 334.06 | 333.5 | 0.13 | 2.00 |
| 418.59 | 418.2 | 0.13 | 2.00 |
| 573.17 | 573.4 | 0.18 | 2.11 |
| 879.29 | 878.9 | 0.13 | 2.00 |

Mak.

a 1093313



Cert. No. : 22CHO33

Page : 3 of 4

Calibration Results : without adjustment

Photometric Accuracy

| Wavelength (nm) | Certified Values of Reference Material (Abs) | UUC Reading (Abs) | Uncertainty of Measurement (\pm Abs) | Coverage Factor <i>k</i> |
|--------------------|--|------------------------|--|--------------------------------|
| 235.0 | Zero | 0.0000 | 0.0046 | 2.00 |
| | 0.4970 | 0.4929 | 0.0046 | 2.00 |
| | Zero | 0.0000 | 0.0050 | 2.00 |
| | 0.7418 | 0.7364 | 0.0050 | 2.00 |
| 257.0 | Zero | 0.0000 | 0.0046 | 2.00 |
| | 0.5759 | 0.5710 | 0.0046 | 2.00 |
| | Zero | 0.0000 | 0.0050 | 2.00 |
| | 0.8634 | 0.8558 | 0.0050 | 2.00 |
| 313.0 | Zero | 0.0000 | 0.0046 | 2.00 |
| | 0.1932 | 0.1924 | 0.0046 | 2.00 |
| | Zero | 0.0000 | 0.0050 | 2.00 |
| | 0.2888 | 0.2877 | 0.0050 | 2.00 |
| 350.0 | Zero | 0.0000 | 0.0046 | 2.00 |
| | 0.4281 | 0.4249 | 0.0046 | 2.00 |
| | Zero | 0.0000 | 0.0050 | 2.00 |
| | 0.6406 | 0.6362 | 0.0050 | 2.00 |

Remark

- The Potassium Dichromate filled cells are measured against a Perchloric acid blank.

Malu .



Cert. No. : 22CHO33

Page : 4 of 4

Calibration Results : without adjustment**Photometric Accuracy**

| Wavelength (nm) | Certified Values of Reference Material (Abs) | UUC Reading (Abs) | Uncertainty of Measurement (\pm Abs) | Coverage Factor <i>k</i> |
|--------------------|--|------------------------|--|--------------------------------|
| 420.0 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5723 | 0.5693 | 0.0033 | 2.00 |
| | 0.7522 | 0.7486 | 0.0031 | 2.00 |
| | 1.0907 | 1.0865 | 0.0032 | 2.00 |
| 440.0 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5616 | 0.5593 | 0.0033 | 2.00 |
| | 0.7345 | 0.7319 | 0.0031 | 2.00 |
| | 1.0646 | 1.0619 | 0.0033 | 2.00 |
| 465.0 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5118 | 0.5099 | 0.0034 | 2.00 |
| | 0.6773 | 0.6751 | 0.0030 | 2.00 |
| | 0.9809 | 0.9786 | 0.0033 | 2.00 |
| 546.1 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5228 | 0.5208 | 0.0029 | 2.00 |
| | 0.6861 | 0.6834 | 0.0029 | 2.00 |
| | 0.9941 | 0.9907 | 0.0029 | 2.00 |
| 590.0 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5546 | 0.5525 | 0.0029 | 2.00 |
| | 0.7159 | 0.7130 | 0.0029 | 2.00 |
| | 1.0369 | 1.0330 | 0.0029 | 2.00 |
| 635.0 | Zero | 0.0000 | 0.0028 | 2.00 |
| | 0.5401 | 0.5387 | 0.0028 | 2.00 |
| | 0.6835 | 0.6810 | 0.0029 | 2.00 |

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer

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 %.

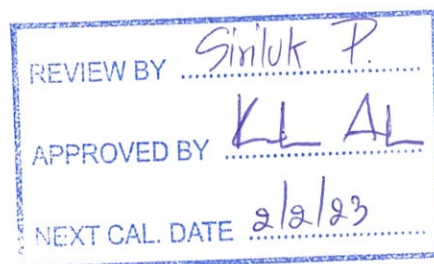
Malu

-o0o-

a 1093311

Certificate No. T211711

Page 1 of 5

Certificate of Calibration**Equipment : Digestion Unit****Manufacturer : Environmental Express****Model : AIM 600 Block****Serial No. : 5146000105****Customer Code : BKK_EN0141****ID No. : T5666A3****Customer : ALS Laboratory Group (Thailand) Co.,Ltd.**104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,
Khet Suan Luang, Bangkok 10250**Customer Location : Environmental Laboratory****Date of Receipt : 30 July 2021****Calibrated By : Sujjar Naknakred (Site Calibration Manager)****Approved By :  / Boonchai Suriyawong (Site Calibration Manager)****Date of Issue : 09 AUG 2021**

The uncertainties are for a confidence probability of approximately 95%.

This Certificate is issued in accordance with the conditions of accreditation granted by the Thai Laboratory Accreditation Scheme which has assessed the measurement capability of the laboratory and its traceability to recognized national standards and to the units of measurement realized at the corresponding national standard laboratory. This certificate may not be reproduced other than in full except with the prior written approval of the Metrological Center.



Metrological Center

SCI ECO Services Company Limited

33/2 Moo 3, T.Banpa, A.Kaengkhoi, Saraburi 18110

Telephone : +66 2 586 5792-4 Fax : +66 2 586 5109

Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th

Certificate No. T211711

Page 2 of 5

Calibration Report

Equipment : Digestion Unit
Date of Calibration : 4-5 August 2021
Environment : Temperature : 21.1 - 21.8 °C
Line Voltage : 221.4 - 225.1 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert four standard thermocouples type S into its chamber , the other one thermocouple type T use for ambient temperature measurement . The calibration was done in according to WI-T10.

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|-------------------|-----------------|-----------------|
| TC | Type S | M20A1-(CH17-CH20) | T210011 | 14 January 2022 |
| DATA LOGGER | 34970A | T149 | T210011 | 14 January 2022 |

3. This certificate is traceable to :

National Institute of Metrology (Thailand) through Metrological Center (NSC-TISI-TIS 17025 CALIBRATION 0244.)

4. Condition of calibrated item : good

Equipment Description :

Time Constant - Hour 51 Minute At 380 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment

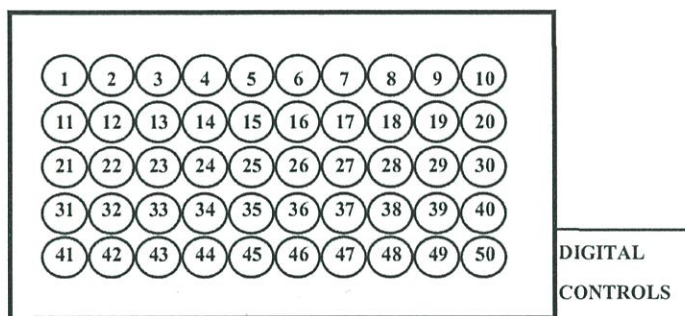
() after adjustment

Approved By.

Certificate No. T211711

Page 3 of 5

Calibration Report



FRONT

Measurement Results

| Cal. Point | Setting | Reading | STD. | Position of Standards at Block | | | | | | | | | |
|------------|---------|---------|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| (°C) | (°C) | (°C) | Reading | Hole1 | Hole2 | Hole3 | Hole4 | Hole5 | Hole6 | Hole7 | Hole8 | Hole9 | Hole10 |
| | | | | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 |
| 380 | 374 | 374 | Max °C | 378.8 | 379.5 | 382.0 | 383.3 | 381.8 | 382.3 | 383.3 | 382.8 | 379.5 | 381.1 |
| | | | Min °C | 378.2 | 378.8 | 381.4 | 382.7 | 381.5 | 382.0 | 382.9 | 382.5 | 379.2 | 380.6 |
| | | | Average °C | 378.5 | 379.2 | 381.7 | 383.0 | 381.7 | 382.1 | 383.1 | 382.6 | 379.3 | 380.8 |
| | | | Stability ± °C | 0.3 | 0.3 | 0.3 | 0.3 | 0.1 | 0.2 | 0.2 | 0.1 | 0.1 | 0.2 |

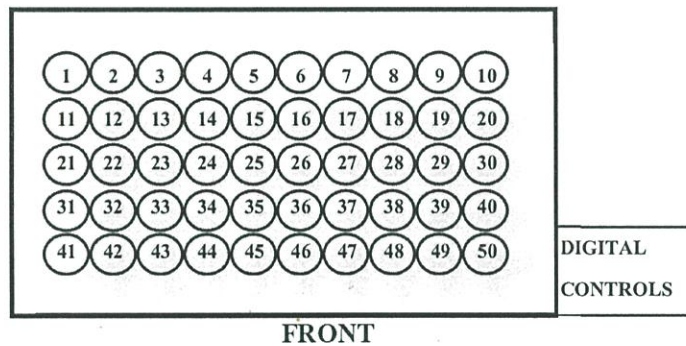
| Cal. Point | Setting | Reading | STD. | Position of Standards at Block | | | | | | | | | |
|------------|---------|---------|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| (°C) | (°C) | (°C) | Reading | Hole11 | Hole12 | Hole13 | Hole14 | Hole15 | Hole16 | Hole17 | Hole18 | Hole19 | Hole20 |
| | | | | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 |
| 380 | 374 | 374 | Max °C | 382.9 | 380.0 | 382.9 | 378.7 | 379.8 | 380.3 | 383.0 | 383.4 | 383.0 | 381.6 |
| | | | Min °C | 382.5 | 379.5 | 382.7 | 378.4 | 379.6 | 380.1 | 382.8 | 383.1 | 382.7 | 381.3 |
| | | | Average °C | 382.7 | 379.7 | 382.8 | 378.5 | 379.7 | 380.2 | 382.9 | 383.3 | 382.9 | 381.4 |
| | | | Stability ± °C | 0.2 | 0.3 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 |

Approved By. 

Certificate No. T211711

Page 4 of 5

Calibration Report



Measurement Results

| Cal. Point | Setting | Reading | STD. | Position of Standards at Block | | | | | | | | | |
|------------|---------|---------|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| °C | °C | °C | Reading | Hole21 | Hole22 | Hole23 | Hole24 | Hole25 | Hole26 | Hole27 | Hole28 | Hole29 | Hole30 |
| | | | | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 |
| 380 | 374 | 374 | Max °C | 379.0 | 380.1 | 383.4 | 383.4 | 380.4 | 380.7 | 381.9 | 382.0 | 380.8 | 379.7 |
| | | | Min °C | 378.7 | 379.7 | 382.6 | 383.1 | 380.1 | 380.5 | 381.7 | 381.7 | 380.5 | 379.2 |
| | | | Average °C | 378.8 | 379.9 | 383.0 | 383.2 | 380.3 | 380.6 | 381.8 | 381.9 | 380.6 | 379.5 |
| | | | Stability ± °C | 0.1 | 0.2 | 0.4 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.3 |

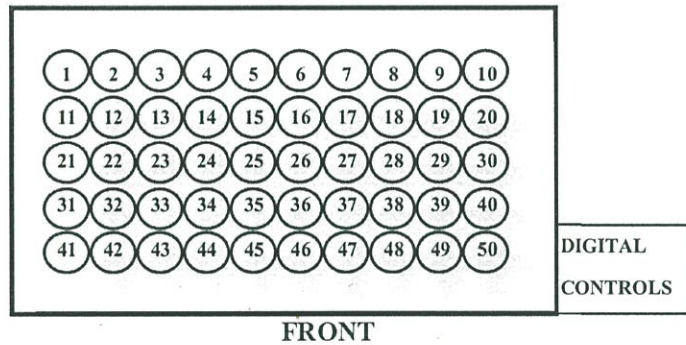
| Cal. Point | Setting | Reading | STD. | Position of Standards at Block | | | | | | | | | |
|------------|---------|---------|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| °C | °C | °C | Reading | Hole31 | Hole32 | Hole33 | Hole34 | Hole35 | Hole36 | Hole37 | Hole38 | Hole39 | Hole40 |
| | | | | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 |
| 380 | 374 | 374 | Max °C | 379.3 | 379.4 | 380.3 | 381.7 | 382.6 | 383.2 | 382.6 | 382.7 | 383.0 | 381.6 |
| | | | Min °C | 378.7 | 378.5 | 380.1 | 381.5 | 382.3 | 382.9 | 382.3 | 382.5 | 382.8 | 381.3 |
| | | | Average °C | 379.0 | 379.0 | 380.2 | 381.6 | 382.4 | 383.1 | 382.5 | 382.6 | 382.9 | 381.4 |
| | | | Stability ± °C | 0.3 | 0.5 | 0.1 | 0.1 | 0.1 | 0.2 | 0.1 | 0.1 | 0.1 | 0.1 |

Approved By. 

Certificate No. T211711

Page 5 of 5

Calibration Report



Measurement Results

| Cal. Point | Setting | Reading | STD. | Position of Standards at Block | | | | | | | | | |
|------------|---------|---------|----------------|--------------------------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|
| (°C) | (°C) | (°C) | Reading | Hole41 | Hole42 | Hole43 | Hole44 | Hole45 | Hole46 | Hole47 | Hole48 | Hole49 | Hole50 |
| | | | | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 | M20A1-CH19 | M20A1-CH20 | M20A1-CH17 | M20A1-CH18 |
| 380 | 374 | 374 | Max °C | 378.9 | 378.6 | 381.0 | 382.3 | 381.8 | 383.2 | 382.4 | 382.2 | 383.0 | 382.4 |
| | | | Min °C | 378.6 | 378.4 | 380.7 | 382.1 | 381.5 | 383.0 | 382.2 | 382.0 | 382.7 | 382.0 |
| | | | Average °C | 378.8 | 378.5 | 380.8 | 382.2 | 381.6 | 383.1 | 382.3 | 382.1 | 382.8 | 382.2 |
| | | | Stability ± °C | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.1 | 0.2 | 0.2 |

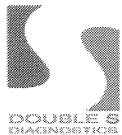
The expanded uncertainty of temperature measurement was $\pm 1.73^{\circ}\text{C}$

The calibration result apply only the above calibrated item.

The result of test was found accurate as shown on date and place of test only.

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

Approved By. 



บริษัท ดับเบิล เอส ไดแอกโนสติกส์ จำกัด
DOUBLE S DIAGNOSTICS CO., LTD.

4 ซอยอุดมสุข 14 แขวงบางนา เขตบางนา กรุงเทพฯ 10260 โทรศัพท์: (02) 747-7009 โทรสาร: (02) 747-7008
4 Soi Udomsuk 14, Bangna, Bangkok 10260 Tel. (02) 747-7009 Fax: (02) 747-7008

Maintenance Plan YEAR : 2022

| เดือน | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| รวม | | | | | | OK | | | | | | |

Periodical maintenance check list for Konelab

| | 6M | 12M | Note! |
|---|-------------------------------------|-------------------------------------|-------|
| 1.Diluent-wash tubing change | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 2.ISE tubing change | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 3.Syringe check/change | | <input checked="" type="checkbox"/> | |
| 4.Dispensing check/ change | | <input checked="" type="checkbox"/> | |
| 5.Waste tubing change when necessary | | <input checked="" type="checkbox"/> | |
| 6.Lamp check/change | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 7.Mixer paddle/paddle change(not Konelab20) | | <input checked="" type="checkbox"/> | |
| 8.ISE needles check/change | | <input checked="" type="checkbox"/> | |
| 9.Pump tubing check/ chance | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 10.Broken/worn out part check /change | | <input checked="" type="checkbox"/> | |
| 11.Peristaltic pump check /cleaning/ lubrication | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 12.Heating check | | <input checked="" type="checkbox"/> | |
| 13.Cooling check | | <input checked="" type="checkbox"/> | |
| 14.Dispenser mechanic check/adjustment | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 15.Cuvette transfer mechanic check/adjustment | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 16.Dispenser movement check/adjustment | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 17.Sample/reagent register check/adjustment | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 18.Dispensing tubing tightness check | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 19.Photometer and optics cleaning/check/adjustment | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 20.Workstation PC cleaning if necessary | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 21.Mechanic cleaning/lubrication | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 22.Instrument cleaning if necessary | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 23.Complete analyzer testing with waterblank/QC or sample | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 24.Test parameters/Adjustment/config. Save to USB key | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |
| 25.UPS Test | <input type="checkbox"/> | <input checked="" type="checkbox"/> | |

Place: ALS LAB Instrument: K20 Aquaken 250

Date/Time: 30-6-65 Serial no: 22781

Service done by: Install date:

Signature of customer: Date/Time: 30/6/22

Certificate of System Qualification

GC-OQ

| | |
|----------------|-----------|
| REVIEW BY | Sarat M. |
| APPROVED BY | KL AL |
| NEXT CAL. DATE | 20 Apr 23 |

System ID: GC-5
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Phattanakan 40, Phattanakan Rd., Suan Luang, Bangkok 10250

Date: October 20, 2021 10:15:57 AM
EQP Name: AgilentRecommended
EQP Revision: GC.02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Decay

Name: 7890

Front SSL

Setpoint Status: Pass

Pressure: 25.0 psi

Pressure Change: 0.3 psi /5 minutes

Agilent Recommended: ≥ -2.0 and ≤ 0.5

Overall Inlet Pressure Decay Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Date: October 20, 2021 10:15:57 AM
System ID: GC-5

Setpoint Status:

Pass

| | Setpoint | Actual |
|----------------------|----------|----------|
| Inlet Pressure: | 25.0 psi | 24.9 psi |
| Accuracy: | | 0.1 psi |
| Agilent Recommended: | <= | 1.2 |

Overall Inlet Pressure Accuracy Test Status

Pass

Detector Flow Accuracy

Name:

7890

Front

FID

Setpoint Status:

Pass

Flow Type:

Fuel

Setpoint:

30.0

mL/min

Measured Flow:

30.0

mL/min

Accuracy:

0.0

mL/min

Agilent Recommended:

<=

10.0

% setpoint

(

3.0

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type:

Oxidizer

Setpoint:

400.0

mL/min

Measured Flow:

390.3

mL/min

Accuracy:

9.7

mL/min

Agilent Recommended:

<=

10.0

% setpoint

(

40.0

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Setpoint Status:

Pass

Flow Type:

Makeup

Setpoint:

25.0

mL/min

Measured Flow:

24.5

mL/min

Accuracy:

0.5

mL/min

Agilent Recommended:

<=

10.0

% setpoint

(

2.5

mL/min

)

Limit is percentage of setpoint or 0.5 mL/minute, whichever is largest.

Date:

October 20, 2021 10:15:57 AM

System ID:

GC-5

Overall Detector Flow Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Setpoint Status: Pass

Zone: Oven

Setpoint/Actual

Temperature: 230.0 231.2 °C

Accuracy: 1.2 °C

Agilent Recommended: \geq -1.0 % setpoint in K (-5.0 °C) \leq 1.0 % setpoint in K (5.0 °C)**Setpoint Status:** Pass

Zone: Oven

Setpoint/Actual

Temperature: 100.0 100.4 °C

Accuracy: 0.4 °C

Agilent Recommended: \geq -1.0 % setpoint in K (-3.7 °C) \leq 1.0 % setpoint in K (3.7 °C)**Overall GC Oven Temperature Accuracy Test Status**

Pass

GC Oven Temperature Stability

Name: 7890

Setpoint Status: Pass

Setpoint/Average

Temperature: 100.0 100.4 °C

Stability: 0.0 °C

Agilent Recommended: \leq 0.5**Overall GC Oven Temperature Stability Test Status**

Pass

Scouting Run

| | | | | |
|-----------------------------|-----------------|-----|---------|-----|
| Tested Combination1 | Front | SSL | / Front | FID |
| | Injection Tower | | | |
| Name: | 7683B | | | |
| Setpoint Status: | Completed | | | |
| Injection Volume on Column: | 1.0 | uL | | |
| Overall Scouting Run Status | | | | |
| Completed | | | | |

Noise and Drift

| | | | | |
|----------------------|------------|------|---------|------|
| Tested Combination1 | Front | SSL | / Front | FID |
| Name: | 7890 | | | |
| Setpoint Status: | Pass | | | |
| Base Signal: | 20.2 | pA | | |
| | ASTM Noise | | Drift | |
| | pA | | pA/Hr | |
| | 0.05 | | 0.50 | |
| Agilent Recommended: | <= | 0.10 | <= | 2.50 |
| Status: | Pass | | Pass | |

| | | | | |
|-------------------------------------|--|--|--|--|
| Overall Noise and Drift Test Status | | | | |
| Pass | | | | |

Injection Precision

| | | | | |
|---------------------|-------|-----|---------|-----|
| Tested Combination1 | Front | SSL | / Front | FID |
| Name: | 7683B | | | |

Setpoint Status:

Pass

Injection Volume on Column:

1.0 uL

Area RSD:

0.52 %

Retention Time RSD:

0.22 %

Agilent Recommended:

<= 3.00

<= 1.00

Overall Injection Precision Test Status

Pass

Signal to Noise

Tested Combination1

Front

SSL

/ Front

FID

Injection Tower

Name:

7890

Setpoint Status:

Pass

Signal to Noise:

1258310

Agilent Recommended:

>= 300000

Overall Signal to Noise Test Status

Pass

Date:

October 20, 2021 10:15:57 AM

System ID:

GC-5

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

| | |
|------------------------|-----------------------------------|
| System ID | GC-5 |
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Flow Data Input | Manual Data |
| Temperature Data Input | Manual Data or Other Data Logging |

Tested Combination1

| | |
|---------------------|-----------------|
| Injection Technique | Injection Tower |
| Inlet | Front |
| Detector | Front |
| LTM Included? | No |

Sampler 1

| | |
|---------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Type | Injection Tower |
| Name | 7683B |
| Model Number | G2913A |
| Serial Number | CN00259643 |
| Firmware Revision | A.11.03 |
| Usage | Sample Injection |
| Location | Front |
| Syringe Volume (µL) | 10 |

Sampler 2

| | |
|-------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Type | Tray |
| Name | 7683A |
| Model Number | G2614A |
| Serial Number | CN81347892 |
| Firmware Revision | A.02.01 |

Mainframe 1

| | |
|------------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Model Number | G3440A |
| Serial Number | US10813027 |
| Firmware Revision | A.01.12.1 |
| Component ID/Asset No. | GC-5 |
| Oven Type | Standard |

Inlet 1

| | |
|--------------|-----------------------------------|
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Type | SSL |
| Location | Front |
| Carrier Gas | Helium |
| Control Type | Electronic Pressure Control (EPC) |
| Purged Inlet | Yes |

Detector 1

| | |
|--------------|-----------------------------------|
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Type | FID |
| Adapter | Capillary |
| Control Type | Electronic Pressure Control (EPC) |
| Location | Front |
| Makeup Gas | Nitrogen |

Electronic Signature

Purpose

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Details

| | |
|--------------------------|---|
| Full Name of Signer: | Suriya Thongkaew |
| Logged On User Name: | suriya.thongkaew@non.agilent.com |
| Signature Creation Date: | October 20, 2021 |
| Reason for Signature: | Executed protocol and published this original version of document |

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User Name: suriya.thongkaew
 Hostname: ASBKkW7029

System Id: GC-5
 Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---|---|
| October 19, 2021 10:37:29 AM | Audit | SessionCreated | Session | None |
| October 19, 2021 10:37:29 AM | Start | Configuration | Session | None |
| October 19, 2021 10:37:30 AM | Audit | Entitlement | Licensing | Session identifier generated: 0800-0002-0000-1YQP-0M4 G |
| October 19, 2021 10:45:44 AM | Audit | Entitlement | Licensing | Successfully unlocked session identified by 0800-0002-0000-1YQP-0M4 G with unlock code CZR6-QXE5-0GQD-6681-68 3G |
| October 19, 2021 10:57:00 AM | Audit | EqpLoaded | Session | EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.51/Gc.02.51.eqp], EQP File Name: [Gc.02.51.eqp], EQP Name: [AgilentRecommended] |
| October 19, 2021 10:58:11 AM | End | Configuration | Session | None |
| October 19, 2021 10:58:14 AM | Start | Qualification | Session | OQ |
| October 19, 2021 10:58:14 AM | Start | Execution | System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated | None |
| October 19, 2021 10:59:07 AM | End | Execution | System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated | Run Count : 1 |

Page 1 / 7

User Name: suriya.thongkaew
 Hostname: ASBKW7029

System Id: GC-5
 Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|--|----------------------|
| October 19, 2021 11:11:55 AM | Start | Execution | Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi | None |
| October 19, 2021 11:28:02 AM | End | Execution | Inlet Pressure Decay - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: >= -2.0 psi and <= 0.5 psi | Run Count : 1 |
| October 19, 2021 11:28:08 AM | Start | Execution | Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi | None |
| October 19, 2021 11:28:15 AM | End | Execution | Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi | Run Count : 1 |
| October 19, 2021 11:28:17 AM | Start | Execution | Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint | None |
| October 19, 2021 11:45:30 AM | Audit | Data | Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint | Manual Data Entry |
| October 19, 2021 11:45:36 AM | End | Execution | Detector Flow Accuracy - Front FID: - Type : Fuel - S: 30.0 mL/min - L: <= 10.0% setpoint | Run Count : 1 |
| October 19, 2021 11:45:38 AM | Start | Execution | Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint | None |
| October 19, 2021 11:52:52 AM | Audit | Data | Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint | Manual Data Entry |
| October 19, 2021 11:52:54 AM | End | Execution | Detector Flow Accuracy - Front FID: - Type : Oxidizer - S: 400.0 mL/min - L: <= 10.0% setpoint | Run Count : 1 |

User Name: suriya.thongkaew

System Id: GC-5

Hostname: ASBKKW7029

Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---|----------------------|
| October 19, 2021 11:52:55 AM | Start | Execution | Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint | None |
| October 19, 2021 12:03:38 PM | Audit | Data | Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint | Manual Data Entry |
| October 19, 2021 12:03:39 PM | End | Execution | Detector Flow Accuracy - Front FID: - Type : Makeup - S: 25.0 mL/min - L: <= 10.0% setpoint | Run Count : 1 |
| October 19, 2021 12:03:42 PM | Start | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | None |
| October 19, 2021 12:23:23 PM | Audit | Data | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Manual Data Entry |
| October 19, 2021 12:23:24 PM | End | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Run Count : 1 |
| October 19, 2021 12:23:28 PM | Start | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | None |
| October 19, 2021 12:33:48 PM | Audit | Data | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Manual Data Entry |
| October 19, 2021 12:33:50 PM | End | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Run Count : 1 |

Page 3 / 7

User Name: suriya.thongkaew

System Id: GC-5

Hostname: ASBKW7029

Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---|---|
| October 19, 2021 12:33:53 PM | Start | Execution | GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C | None |
| October 19, 2021 12:54:48 PM | Audit | Data | GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C | Manual Data Entry |
| October 19, 2021 12:54:49 PM | End | Execution | GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C | Run Count : 1 |
| October 19, 2021 12:54:52 PM | Start | Execution | GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated | None |
| October 19, 2021 4:48:40 PM | Audit | AceClosed | Session | None |
| October 20, 2021 9:34:06 AM | Audit | AceRestarted | Session | None |
| October 20, 2021 9:34:08 AM | Audit | SessionReloaded | Session | None |
| October 20, 2021 9:34:12 AM | Start | Qualification | Session | OQ |
| October 20, 2021 9:34:12 AM | Start | Execution | GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated | None |
| October 20, 2021 9:35:51 AM | Audit | Data | GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated | Data files Path : C:\Chem32\1\DATA\OQPV20 21\OQPV2021 2021-10-19 17-23-14\SCOUTING001.D\F ID1A.ch |

User Name: suriya.thongkaew

System Id: GC-5

Hostname: ASBKkW7029

Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|-----------------------------|-------------------|--------------------|--|---|
| October 20, 2021 9:36:24 AM | End | Execution | GC Scouting Run - Injection Tower, Front SSL, Front FID: - Part of System Preparation - No limits associated | Run Count : 1 |
| October 20, 2021 9:36:27 AM | Start | Execution | Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour | None |
| October 20, 2021 9:37:19 AM | Audit | Data | Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021-10-19-17-23-14\NSDRF001.D\FID1A.ch |
| October 20, 2021 9:37:30 AM | End | Execution | Noise and Drift - Front FID: - Detector FID - L (Noise): <= 0.10 pA - L (Drift): <= 2.50 pA/hour | Run Count : 1 |
| October 20, 2021 9:37:32 AM | Start | Execution | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | None |
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021-10-19-17-23-14\INJPREC002.D\FID1A.ch |
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021-10-19-17-23-14\INJPREC003.D\FID1A.ch |

Page 5 / 7

User Name: suriya.thongkaew

System Id: GC-5

Hostname: ASBKKW7029

Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|-----------------------------|-------------------|--------------------|--|---|
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021 2021-10-19 17-23-14\INJPREC004.D\FID 1A.ch |
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021 2021-10-19 17-23-14\INJPREC005.D\FID 1A.ch |
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021 2021-10-19 17-23-14\INJPREC006.D\FID 1A.ch |
| October 20, 2021 9:37:53 AM | Audit | Data | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021 2021-10-19 17-23-14\INJPREC007.D\FID 1A.ch |
| October 20, 2021 9:38:21 AM | End | Execution | Injection Precision - Injection Tower, Front SSL, Front FID: - GC - L (Area): <= 3.00% - L (Ret. Time): <= 1.00% | Run Count : 1 |
| October 20, 2021 9:38:28 AM | Start | Execution | Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000 | None |
| October 20, 2021 9:38:42 AM | Audit | Data | Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000 | Data files Path : C:\Chem32\1\DATA\OQPV2021\OQPV2021 2021-10-19 17-23-14\SIGTONS001.D\FID 1A.ch |
| October 20, 2021 9:38:50 AM | End | Execution | Signal to Noise - Injection Tower, Front SSL, Front FID: - Detector FID - L: >= 300000 | Run Count : 1 |

Page 6 / 7

User Name: suriya.thongkaew

System Id: GC-5

Hostname: ASBKkW7029

Print Date: October 20, 2021 10:16:00 AM

OQ GC ALS US10813027 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|------------------------------|-------------------|--------------------|---------------------|-----------------------------------|
| October 20, 2021 9:38:54 AM | End | Qualification | Session | OQ |
| October 20, 2021 9:38:54 AM | Start | Reporting | Session | None |
| October 20, 2021 10:15:14 AM | Audit | Reporting | Session | Report Generated : Certificate |

REVIEW BY

Mont Somb

APPROVED BY

KL AL

NEXT CAL. DATE

21/12/23

Agilent CrossLab Compliance Services

Certificate of System Qualification

GC-OQ + GCMS-OQ

System ID: GM-7
Organization Name: ALS Laboratory Group (Thailand) Co., Ltd.
Organization Location: 104 Patthanakarn 40, Patthanakarn rd., Khwang Suan Luang, Khet Suan Luang, Bangkok 10250
Date: June 21, 2022 2:04:12 PM
EQP Name: AgilentRecommended , AgilentRecommended
EQP Revision: GC.02.50, GCMS.02.50
Overall Qualification Status: Pass

System Inspection and Basic Safety and Operation

Name: 7890

Setpoint Status: Pass

Overall System Inspection and Basic Safety and Operation Test Status

Pass

Inlet Pressure Accuracy

Name: 7890

Front SSL

Setpoint Status: Pass

| | Setpoint | Actual |
|----------------------|----------|----------|
| Inlet Pressure: | 25.0 psi | 25.0 psi |
| Accuracy: | | 0.0 psi |
| Agilent Recommended: | <= | 1.2 |

Overall Inlet Pressure Accuracy Test Status

Pass

GC Oven Temperature Accuracy

Name: 7890

Date: June 21, 2022 2:04:12 PM
System ID: GM-7

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

230.0

230.0

°C

Accuracy:

0.0

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-5.0

°C

)

<=

1.0

% setpoint in K

(

5.0

°C

)

Setpoint Status:

Pass

Zone:

Oven

Setpoint/Actual

Temperature:

100.0

100.4

°C

Accuracy:

0.4

°C

Agilent Recommended:

>=

-1.0

% setpoint in K

(

-3.7

°C

)

<=

1.0

% setpoint in K

(

3.7

°C

)

Overall GC Oven Temperature Accuracy Test Status

Pass

GC Oven Temperature Stability

Name:

7890

Setpoint Status:

Pass

Setpoint/Average

Temperature:

100.0

100.0333

°C

Stability:

0.1

°C

Agilent Recommended:

<=

0.5

Overall GC Oven Temperature Stability Test Status

Pass

Log Amp

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Date:

June 21, 2022 2:04:12 PM

System ID:

GM-7

Overall Log Amp Test Status

Pass

RFPA

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Amu:

1050

m/z

Drift After Five Minutes:

22

mV

RFPA Voltage:

568

mV

Agilent Recommended:

>=

-100

and

<=

100

<=

1100

Overall RFPA Test Status

Pass

Tune EI

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Setpoint Status:

Pass

Filament:

1

Setpoint Status:

Pass

Filament:

2

Overall Tune EI Test Status

Pass

Signal to Noise EI

Tested Combination1

Front

SSL

/ External

SQ

Name:

5977A

Date:

June 21, 2022 2:04:12 PM

System ID:

GM-7

Source: Filament:

Setpoint Status:

Signal to Noise:

Agilent Recommended:

Source: Filament:

Setpoint Status:

Signal to Noise:

Agilent Recommended:

This test's 0 comment(s) and 1 deviation(s) are available in the Attachments section.

Overall Signal to Noise EI Test Status

Instrument Details

Purpose

This section describes the as found system configuration.

Details

System

| | |
|--------------|----------------------|
| System ID | GM-7 |
| Manufacturer | Agilent Technologies |
| Name | 7890 |

Tested Combination1

| | |
|---------------------|------------------|
| Injection Technique | Manual Injection |
| Inlet | Front |
| Detector | External |
| LTM Included? | No |

Sampler 1

| | |
|---------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Type | Manual Injection |
| Usage | Sample Injection |
| Syringe Volume (µL) | 10 |

Mainframe 1

| | |
|-------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Model Number | G3442B |
| Serial Number | CN14133181 |
| Firmware Revision | B.02.03 |
| Oven Type | Standard |

Inlet 1

| | |
|--------------|-----------------------------------|
| Manufacturer | Agilent Technologies |
| Name | 7890 |
| Type | SSL |
| Location | Front |
| Carrier Gas | Helium |
| Control Type | Electronic Pressure Control (EPC) |
| Purged Inlet | Yes |

Detector 1

| | |
|--------------|----------------------|
| Manufacturer | Agilent Technologies |
| Name | Mass Spectrometer |
| Type | Mass Spectrometer |
| Location | External |

Mass Spectrometer 1

| | |
|-----------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Type | SQ |
| Name | 5977A |
| Serial Number | US1415M209 |
| Firmware Revision | 5977 6.00.21 |
| High Vacuum System | Turbo Pump |
| Scouting Run Standard | OFN Std |

MS EI Source 1

| | |
|---------------------|----------------------|
| Manufacturer | Agilent Technologies |
| Source Type | EI - Extractor |
| Number of filaments | 2 |

Electronic Signature

Purpose

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Details

| | |
|--------------------------|---|
| Full Name of Signer: | Supasak Nimsongtham |
| Logged On User Name: | supasak.nimsongtham@agilent.com |
| Signature Creation Date: | June 21, 2022 |
| Reason for Signature: | Executed protocol and published this original version of document |

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| | |
|------------|--------------------------|
| Date: | June 21, 2022 2:04:12 PM |
| System ID: | GM-7 |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|--|
| June 21, 2022 10:25:05 AM | Audit | SessionCreated | Session | None |
| June 21, 2022 10:25:05 AM | Start | Configuration | Session | None |
| June 21, 2022 10:25:05 AM | Audit | Entitlement | Licensing | User is FieldEngineer and does not require an unlock code |
| June 21, 2022 10:25:26 AM | Audit | EqpLoaded | Session | EQP details for primary technique [Gc] - File path: [ProtocolPacks/Gc/Configurations/02.50/Gc.02.50.eqp], EQP File Name: [Gc.02.50.eqp], EQP Name: [AgilentRecommended] EQP details for hyphenated technique [GcMs] - File path: [ProtocolPacks/GcMs/Configurations/02.50/GcMs.02.50.eqp], EQP File Name: [GcMs.02.50.eqp], EQP Name: [AgilentRecommended] |
| June 21, 2022 10:25:39 AM | End | Configuration | Session | None |
| June 21, 2022 10:25:43 AM | Start | Qualification | Session | OQ |
| June 21, 2022 10:25:43 AM | Start | Execution | System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated | None |
| June 21, 2022 10:25:54 AM | End | Execution | System Inspection and Basic Safety and Operation - 7890: - Qualitative Test - No setpoints associated | Run Count : 1 |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|----------------------|
| June 21, 2022 10:26:00 AM | Start | Execution | Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi | None |
| June 21, 2022 10:26:10 AM | End | Execution | Inlet Pressure Accuracy - Front SSL: - Pressure Controlled Inlet - S: 25.0 psi - L: <= 1.2 psi | Run Count : 1 |
| June 21, 2022 10:26:12 AM | Start | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | None |
| June 21, 2022 10:34:09 AM | Audit | Data | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Manual Data Entry |
| June 21, 2022 10:34:10 AM | End | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 230.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Run Count : 1 |
| June 21, 2022 10:34:11 AM | Start | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | None |
| June 21, 2022 10:38:42 AM | Audit | Data | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Manual Data Entry |
| June 21, 2022 10:38:44 AM | End | Execution | GC Oven Temperature Accuracy - 7890: - Temperature : Oven - S: 100.0°C - L: >= -1.0 AND <= 1.0 % setpoint in K | Run Count : 1 |
| June 21, 2022 10:38:46 AM | Start | Execution | GC Oven Temperature Stability - 7890: - Temperature : Oven - S: 100.0°C - L: <= 0.5°C | None |

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Date: June 21, 2022 2:04:12 PM
 System ID: GM-7

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|--|
| June 21, 2022 11:01:00 AM | Audit | AceClosed | Session | None |
| June 21, 2022 11:01:47 AM | Audit | AceRestarted | Session | None |
| June 21, 2022 11:01:48 AM | Audit | SessionReloaded | Session | None |
| June 21, 2022 11:01:51 AM | Start | Qualification | Session | OQ |
| June 21, 2022 11:01:51 AM | Start | Execution | GC Oven Temperature Stability | None |
| | | | - 7890: - Temperature : Oven - | |
| | | | S: 100.0°C - L: <= 0.5°C | |
| June 21, 2022 11:03:14 AM | Audit | Data | DataManager | DataManager was in a data verification state but the user chose to start over. |
| June 21, 2022 11:04:19 AM | Audit | Data | GC Oven Temperature Stability | Manual Data Entry |
| | | | - 7890: - Temperature : Oven - | |
| | | | S: 100.0°C - L: <= 0.5°C | |
| June 21, 2022 11:04:22 AM | End | Execution | GC Oven Temperature Stability | Run Count : 1 |
| | | | - 7890: - Temperature : Oven - | |
| | | | S: 100.0°C - L: <= 0.5°C | |
| June 21, 2022 11:04:24 AM | Start | Execution | Log Amp - 5977A SQ: - Source: EI - Extractor | None |
| June 21, 2022 11:04:34 AM | End | Execution | Log Amp - 5977A SQ: - Source: EI - Extractor | Run Count : 1 |
| June 21, 2022 11:04:37 AM | Start | Execution | RFPA - 5977A SQ: - Source: EI - Extractor | None |
| June 21, 2022 11:07:49 AM | End | Execution | RFPA - 5977A SQ: - Source: EI - Extractor | Run Count : 1 |
| June 21, 2022 11:07:52 AM | Start | Execution | Tune EI - 5977A SQ: - Source: EI - Extractor Filament 1 (Qualitative - No setpoints associated) | None |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|----------------------|
| June 21, 2022 11:08:35 AM | End | Execution | Tune EI - 5977A SQ: - Source: - Run Count : 1 EI - Extractor Filament 1 (Qualitative - No setpoints associated) | |
| June 21, 2022 11:14:59 AM | Start | Execution | Tune EI - 5977A SQ: - Source: - None EI - Extractor Filament 2 (Qualitative - No setpoints associated) | |
| June 21, 2022 11:16:48 AM | End | Execution | Tune EI - 5977A SQ: - Source: - Run Count : 1 EI - Extractor Filament 2 (Qualitative - No setpoints associated) | |
| June 21, 2022 11:16:49 AM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | None |
| June 21, 2022 11:17:05 AM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | None |
| June 21, 2022 11:17:10 AM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | None |
| June 21, 2022 11:26:09 AM | Audit | AceClosed | Session | None |
| June 21, 2022 12:36:20 PM | Audit | AceRestarted | Session | None |
| June 21, 2022 12:36:22 PM | Audit | SessionReloaded | Session | None |
| June 21, 2022 12:36:26 PM | Start | Qualification | Session | OQ |
| June 21, 2022 12:36:26 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | None |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|--|
| June 21, 2022 12:37:07 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | None |
| June 21, 2022 12:37:08 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | None |
| June 21, 2022 12:38:54 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Data files Path : H:\ALSGM7_2022\SNF1_001.D |
| June 21, 2022 12:39:24 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Data files Path : H:\ALSGM7_2022\SNF1_001.D |
| June 21, 2022 12:40:09 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Data files Path : H:\ALSGM7_2022\SNF1_001.D |
| June 21, 2022 12:42:04 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Data files Path : H:\ALSGM7_2022\SNF1_001.D |
| June 21, 2022 12:42:17 PM | Audit | AceClosed | Session | None |
| June 21, 2022 12:33:31 PM | Audit | AceRestarted | Session | None |
| June 21, 2022 12:33:33 PM | Audit | SessionReloaded | Session | None |
| June 21, 2022 12:33:37 PM | Start | Qualification | Session | OQ |
| June 21, 2022 12:33:37 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | None |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|--|
| June 21, 2022 12:34:44 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF1_001.D |
| June 21, 2022 12:36:26 PM | End | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 1 - L: >= 1200 | Run Count : 1 |
| June 21, 2022 12:37:11 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | None |
| June 21, 2022 12:38:15 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:38:30 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:38:45 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:39:00 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:39:14 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |

User Name: supasak.nimsongtham
 Hostname: 5CG1115HKC

System Id: GM-7
 Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|---|--|
| June 21, 2022 12:39:45 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:40:16 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:40:40 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:41:09 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |
| June 21, 2022 12:41:29 PM | End | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Run Count : 1 |
| June 21, 2022 12:42:30 PM | Audit | TestUnlocked | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Deviation filed for Run Count : 1 |
| June 21, 2022 12:42:30 PM | Start | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | None |
| June 21, 2022 12:42:35 PM | Audit | Data | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Data files Path : E:\ALSGM7_2022\SNF2_001.D |

User Name: supasak.nimsongtham
Hostname: 5CG1115HKC

System Id: GM-7
Print Date: June 21, 2022 2:04:17 PM

ALS-GM7-2022 Transaction log :

| Time | Transaction State | Activity Performed | Type of Transaction | Optional Information |
|---------------------------|-------------------|--------------------|--|--------------------------------|
| June 21, 2022 12:42:45 PM | End | Execution | Signal to Noise EI - Liquid Injection, Front SSL, SQ: - Source: EI - Extractor using Filament 2 - L: >= 1200 | Run Count : 2 |
| June 21, 2022 12:42:50 PM | End | Qualification | Session | QQ |
| June 21, 2022 12:42:50 PM | Start | Reporting | Session | None |
| June 21, 2022 12:45:17 PM | Audit | AceClosed | Session | None |
| June 21, 2022 1:57:47 PM | Audit | AceRestarted | Session | None |
| June 21, 2022 1:57:50 PM | Audit | SessionReloaded | Session | None |
| June 21, 2022 1:57:56 PM | Start | Qualification | Session | QQ |
| June 21, 2022 2:02:42 PM | Audit | Reporting | Session | Report Generated : Certificate |

ภาคผนวก จ

สำเนาหนังสือใบอนุญาตขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๕๐๐

๒๘ มกราคม ๒๕๖๕

เรื่อง ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๓๐ กรกฎาคม ๒๕๖๓

- สิ่งที่ส่งมาด้วย ๑. รายชื่อผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๑ แผ่น
๒. รายชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ แผ่น
๓. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๑ แผ่น

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ขอต่ออายุ
หนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔
ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร
ต่อกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย)
จำกัด ต่ออายุหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน โดยมีองค์ประกอบดังนี้

- ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย ตามสิ่งที่ส่งมาด้วย ๑
ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย ตามสิ่งที่ส่งมาด้วย ๒
ค. ขอบข่ายสารมลพิษที่ได้รับขึ้นทะเบียนให้วิเคราะห์ในน้ำเสีย จำนวน ๕๙ รายการ น้ำใต้ดิน
จำนวน ๑๒๖ รายการ อากาศเสีย ๑๖ รายการ สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน ๓๕ รายการ และดิน
จำนวน ๑๒๕ รายการ รวมทั้งสิ้นจำนวน ๓๖๑ รายการ ตามสิ่งที่ส่งมาด้วย ๓

หนังสือฉบับนี้จะหมดอายุในวันที่ ๒ กันยายน ๒๕๖๖ หากประสงค์จะต่ออายุหนังสือ
รับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอ
ต่อกรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นอายุของหนังสือรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์
เอกชน ซึ่งคำขอต่ออายุดังกล่าวขอรับได้ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

(นายศิริระ จันทรเจต)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน
ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๒๐๒ ๔๑๔๖ ๐ ๒๒๐๒ ๔๐๐๒

โทรสาร ๐ ๒๓๕๔ ๓๒๐๘ ๐ ๒๓๕๔ ๓๔๑๕

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ก. ผู้ควบคุมดูแลห้องปฏิบัติการวิเคราะห์ จำนวน ๖ ราย

๑) นางสาวยุพาพร จันทร์เปล่ง

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๐

๒) นางสาวชัชชัย โกมารกุล ณ นคร

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๑

๓) นายศรายุทธ จิตรานนท์

ทะเบียนเลขที่ ว-๒๐๔-ค-๔๗๐๒

๔) นางสาวกนกกร เอนก

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๑

๕) นายสุริยา สอนแก้ว

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๒

๖) นายวิชาญ ชูณหะวัณ

ทะเบียนเลขที่ ว-๒๐๔-ค-๖๑๑๓



(นายศิริระ จันทร์เจิด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ ออก ๐๓๑๐(๑)/ ๑๐๖๙

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ข. เจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๖๒ ราย

| | |
|--|----------------------------|
| ๑) นางสาวจินดา ไชจุลธรรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๘ |
| ๒) นางสาวสาวิตรี น้อยเสงี่ยม | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๐๙ |
| ๓) นางสาวชนัญฎาญจน์ อัมขม | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๐ |
| ๔) นางสาวนรินทร์ สายเส็ง | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๕ |
| ๕) นางสาวนันทวดี สมบูรณ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๖ |
| ๖) นางสาวศรัณยา เฉลิมธำรงค์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๗ |
| ๗) นางสาวสรารัศมี มงคลจิรวุฒิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙ |
| ๘) นางสาวศิริลักษณ์ พึ่งแพง | ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๒๐ |
| ๙) นายณพพงศ์ จันทรพันธุ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๐๘ |
| ๑๐) นายนรเศรษฐ์ โกมลาลัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๑ |
| ๑๑) นายธันวา จริยา | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๔ |
| ๑๒) นางสาวเกศรินทร์ แก้วมัน | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๖ |
| ๑๓) นางสาวสุวิมล ชัยเรืองวุฒิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๑๗ |
| ๑๔) นางสาวสุชาดา ธรรมถาวร | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๑ |
| ๑๕) นางสาวเบมิกา ชัยเดชธนกุล | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๓ |
| ๑๖) นางสาวศศิธร หมูสวัสดิ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๔ |
| ๑๗) นางสาวเสาวลักษณ์ ภู่นภาอำพร | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๕ |
| ๑๘) นายอภิสิทธิ์ สิงหา | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๖ |
| ๑๙) นายศักดิ์สิทธิ์ ไพศาลพิสุทธิ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๗ |
| ๒๐) ว่าที่ร้อยตรีหญิง พรรณีภา ขำเจริญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๘ |
| ๒๑) นางจิตดา คำภูแก้ว | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๓๑ |
| ๒๒) นางสาวอรรวรรณ รักยง | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๕ |
| ๒๓) นางสาวนพรัตน์ แยมกรานต์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๑๙ |
| ๒๔) นายจุลเดช วารินทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๐ |
| ๒๕) นางสาวดาญรัตน์ ร้องคำ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๑ |
| ๒๖) นายนคร สุขเจริญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒ |
| ๒๗) นายบัญชา นามเขตต์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓ |
| ๒๘) นายพรมมี ศรีปัดเนตร | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๕ |
| ๒๙) นายอุทิศ อุ่นสมิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๖ |
| ๓๐) ว่าที่ร้อยตรี เฉลิมเกียรติ อมรศรีเสริม | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๘ |
| ๓๑) นางสาววริยา สร้างนา | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๙ |
| ๓๒) นายอนุพงศ์ รัตนศรีประเสริฐ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๓๐ |
| ๓๓) นางสาวจุฑารัตน์ โอนสันเทียะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๔๒ |
| ๓๔) นางสาวจรรวรรณ พิมพ์อริกฤติยา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๖ |

(นายศิระ จันทรเจ็ด)

๓๕) นางสาวปรารถทิพย์...

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

สำนักงานสิ่งแวดล้อมและเฝ้าระวังมลพิษ

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| ๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๙ |
| ๓๖) นางสาวเตือนใจ ทางกลาง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๐ |
| ๓๗) นางสาวจิราพร ศิริเวช | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๑ |
| ๓๘) นายวรกร ผูกרך | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๓ |
| ๓๙) นายทอง วิริยะสทกิจ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๔ |
| ๔๐) นายธนิศ เจนจบ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๕ |
| ๔๑) นายคณิศร ขำเพชร | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๖ |
| ๔๒) นายอรรคพล นิยมวิทยาพันธ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗ |
| ๔๓) นายภูวิช พรหมสะอาด | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๘ |
| ๔๔) นายธนเดช โภคาพิพัฒน์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๙ |
| ๔๕) นายชวฤทธิ์ วงษ์จันทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๐ |
| ๔๖) นายอาทิตย์ ศรีแสน | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๑ |
| ๔๗) นายเจษฎินทร คงศักดิ์ไทย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๒ |
| ๔๘) นายจรัส บุญยั้ง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๕ |
| ๔๙) นายธนาณัติ เอนก | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๖ |
| ๕๐) นายอภิวัฒน์ ทุมหนู | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๗ |
| ๕๑) นางสาวสุภาขวัญ มาก | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๘ |
| ๕๒) นางสาวหัตพร ขวาลสมบูรณ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๐ |
| ๕๓) นางสาวธิดิมา บุญเพ็ง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๑ |
| ๕๔) นางสาวกนกอร เข้มเพ็ชร | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๒ |
| ๕๕) นางสาวพัชรียา หงษ์สมดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓ |
| ๕๖) นางสาวภาวนิดา สุรวงศ์ตระกูล | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔ |
| ๕๗) นางสาวภาณุมาศ นามวัฒน์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๕ |
| ๕๘) นางสาวอุไรรัตน์ ทิงสร้างแป้น | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๖ |
| ๕๙) นายธีรวัฒน์ ปวงสุข | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๗ |
| ๖๐) นายอิทธิพล ยะโส | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๘ |
| ๖๑) นายประพจน์ วรรณชูชัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๙ |
| ๖๒) นายชยธร พวงทิพย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๐ |
| ๖๓) นางสาวกนกวรรณ จันทบาล | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๑ |
| ๖๔) นางสาวเกษร หลักบุญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๒ |
| ๖๕) นายสิทธิโชค ธงเงิน | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๑๓ |
| ๖๖) นางศิวารณ ใจบุญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๕ |
| ๖๗) นางสาวพรรณธิดา พุ่มคง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๘ |
| ๖๘) นางสาวศรณีย์ ยิ่งดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙ |
| ๖๙) นายนวกัทร ศรีวิริยะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๐ |
| ๗๐) นายสุวิชา ทองอ่อน | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๑ |
| ๗๑) นายวิญญู บุญตะนัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๓ |

(นายศิระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

บริษัท ปูนซิเมนต์ไทย จำกัด (มหาชน)

๗๒) นายสมบูรณ์...

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| ๗๒) นายสมบุรณ์ บุตรจันทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๔ |
| ๗๓) นายวิรัตน์ ไชยชนะรา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๕ |
| ๗๔) นายนฤเบศน์ เพิ่มพูน | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๖ |
| ๗๕) นายจิรณัฐ ขาวละออ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๗ |
| ๗๖) นายสมโภช วันสา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๘ |
| ๗๗) นายอัสรี นามบุรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๙ |
| ๗๘) นายณัฐนันท์ ปานประเสริฐ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๐ |
| ๗๙) นายอัครเวศ จ่อสาว | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๑ |
| ๘๐) นายประเสริฐ สุระพันธ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๒ |
| ๘๑) นายอนุกุล จันทรเนียม | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๓ |
| ๘๒) นายพิรพงษ์ ทองคุณปรีดา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๔ |
| ๘๓) นายนฤพล ทองนุช | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๕ |
| ๘๔) นายอนุวัฒน์ ม่วงแพร่ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๖ |
| ๘๕) นายเจตศราวุฒิ ปัตตะมะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๗ |
| ๘๖) นายกฤษณะ สายวรรณ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๘ |
| ๘๗) นายพิชัย บุญยงค์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๒๙ |
| ๘๘) นายภานุพงศ์ โหมวงศ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๐ |
| ๘๙) นายสามารถ คุ่มปลี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๑ |
| ๙๐) นายสัญญาชัย โกศรีนาม | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๒ |
| ๙๑) นายณัฐวุฒิ ศรีประเสริฐ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๓ |
| ๙๒) นายชวัลรัช นาคพนม | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๔ |
| ๙๓) นายพงศธร ชัยทิพย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๕ |
| ๙๔) ว่าที่ร้อยตรี ภาณุพงศ์ แสนศรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๖ |
| ๙๕) นายสิทธิโชค ทาสีดา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๗ |
| ๙๖) นายธนากร อินสุตา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๘ |
| ๙๗) นางสาววรรณิษา ขาติวันชัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๓๙ |
| ๙๘) นางสาวพิมพ์ตะวัน มินากุล | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๐ |
| ๙๙) นางสาวเพชรรัตน์ สิงห์สมบุญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๑ |
| ๑๐๐) นางสาวชยานิน พรหมจันทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๒ |
| ๑๐๑) นายกীরติ ทวีราช | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๓ |
| ๑๐๒) นายจักริน หมั่นวิชา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๔ |
| ๑๐๓) นายฉัตรชัย สุขเปี้ย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๕ |
| ๑๐๔) นายณรนนท์ ต๊ะทองคำ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๖ |
| ๑๐๕) นายดุลยพล สนนอก | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๗ |
| ๑๐๖) นายทักษ์ดนัย อุบลศรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๘ |
| ๑๐๗) นายธนศร นามะกฤษณา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๔๙ |
| ๑๐๘) นายธิตีพงศ์ บัวแดง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๕๐ |
| | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๕๑ |
| | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๕๒ |
| | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๕๓ |

(นายศิระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปภ.โครงการเทคโนโลยีการป้องกันและบรรเทาผลกระทบ

๑๐๙) นายนนทชัย...

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| ๑๐๙) นายพนนพชัย อุปถัมภ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๔ |
| ๑๑๐) นายนิรุฬพล คุณสุทธิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๕ |
| ๑๑๑) นายนิพนธ์วัฒน์ สาริน | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๖ |
| ๑๑๒) นายปิยะนัฐ พลมะศรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๗ |
| ๑๑๓) นายพงศ์สิริ โสมเขียว | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๘ |
| ๑๑๔) นายพีรพัฒน์ กำคำ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๙ |
| ๑๑๕) นายภาณุพงศ์ มานิตย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๐ |
| ๑๑๖) นายมงคล ผลาทิพย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๑ |
| ๑๑๗) นายมนุรินทร์ พูลศิริ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๒ |
| ๑๑๘) นายสิรินันท์ ทองอ้น | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๓ |
| ๑๑๙) นายอเนชา ทันสมัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๔ |
| ๑๒๐) นายอดิศักดิ์ ผมไผ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๕ |
| ๑๒๑) นายอนันตชัย วิสม | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๖ |
| ๑๒๒) นายณัฐดนัย เจือละออง | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗ |
| ๑๒๓) นายวรวิธ คีนิก | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๘ |
| ๑๒๔) นายแสงตะวัน นະตะສັດ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๙ |
| ๑๒๕) นายยุทธพงศ์ รัตนะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๐ |
| ๑๒๖) นายชัยวัฒน์ ไซยะนิจ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๑ |
| ๑๒๗) นายวิศรุต ศรีธรรมมา | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๒ |
| ๑๒๘) นายพนนทกร เผือกผ่อง | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๓ |
| ๑๒๙) นายกำชัย สุทธะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๔ |
| ๑๓๐) นางสาวณัฐภรณ์ รักทะเล | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๑๙ |
| ๑๓๑) นางสาวประภาภรณ์ บุตรพรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๐ |
| ๑๓๒) นางสาวนิลาวัลย์ นามพรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๑ |
| ๑๓๓) นางสาวพัชรินทร์ แสนสร้อย | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๒ |
| ๑๓๔) นายไพโรจน์ เปี่ยมพิมาย | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๓ |
| ๑๓๕) นางสาวศุภมาศ ทองมาก | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๔ |
| ๑๓๖) นางสาวลลิตา จิตรสว่าง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๕ |
| ๑๓๗) นางสาวชไมพร เสิกภูเขียว | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๖ |
| ๑๓๘) นางสาวกฤติมาพร คำมีแก่น | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๗ |
| ๑๓๙) นางสาวสกลรัตน์ ภาควุฒิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๘ |
| ๑๔๐) นางสาวกาญจนา คงคุณ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๙ |
| ๑๔๑) นางสาวไพรินทร์ ศรีรูปี | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๐ |
| ๑๔๒) นางสาวทิพนันดา ฝอยปัญญา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๑ |
| ๑๔๓) นางสาวสาธิตา ปานทอง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๒ |
| ๑๔๔) นางสาวอริสา ทองนวล | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๓ |
| ๑๔๕) นางสาวอรรษา คำคลอง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๔ |

(นายศิริ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

๑๔๖) นางสาวบุษดาภรณ์...

| | |
|---------------------------------|----------------------------|
| ๑๔๖) นางสาวชุตานภรณ์ สุนทรสนาน | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๕ |
| ๑๔๗) นางสาวสุภารัตน์ นนท์ประสาท | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๖ |
| ๑๔๘) นางสาวรัชนิกร เนียมกลาง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๗ |
| ๑๔๙) นางสาวกัญญารัตน์ ศรีนิลทา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๘ |
| ๑๕๐) นางสาวอัญชลี คำจันทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๙ |
| ๑๕๑) นายบุญฤทธิ์ เอี่ยมเทศ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๐ |
| ๑๕๒) นายศิริวัฒน์ พานิชย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๑ |
| ๑๕๓) นางสาวศุภรดา ปันมยุรา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๒ |
| ๑๕๔) นางสาวพาฤดี คุณน่าน | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๓ |
| ๑๕๕) นางสาวจิราเจต พองดา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๔ |
| ๑๕๖) นางสาวกนกภรณ์ อุระ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๕ |
| ๑๕๗) นางสาวอารยา มีชัย | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๖ |
| ๑๕๘) นางสาวจิตสุภา ประเทืองสุข | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๗ |
| ๑๕๙) นางสาวอริสา วิริยขันติธรรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๘ |
| ๑๖๐) นางสาววิษุตา นาคผจญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๙ |
| ๑๖๑) นางสาวพนิดา ยอดอินทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๐ |
| ๑๖๒) นางสาวนันทิยา จันทะสุน | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๑ |



(นายศิริระ จันทรเจต)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

เอกสารแนบท้ายหนังสือรับต่ออายุขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน

บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

เลขทะเบียน ว-๒๐๔

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๕

ลงวันที่ ๒๘ มกราคม ๒๕๖๕

ขอขยายสารมลพิษที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๖๑ รายการ

น้ำเสีย จำนวน 59 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|------------------------------|---|
| 1 | Aldicarb | High-Performance Liquid Chromatographic Method ^[4] |
| 2 | Aldicarb Sulfone | High-Performance Liquid Chromatographic Method ^[4] |
| 3 | Aldicarb Sulfoxide | High-Performance Liquid Chromatographic Method ^[4] |
| 4 | Aldrin | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 5 | Arsenic | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 6 | Barium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 7 | α -BHC | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 8 | β -BHC | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 9 | δ -BHC | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 10 | γ -BHC | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 11 | Biochemical Oxygen Demand | 1) 5-Day BOD Test, Azide Modification Method ^[4] 2) 5-Day BOD Test, Membrane Electrode Method ^[4] |
| 12 | Carbaryl | High-Performance Liquid Chromatographic Method ^[4] |
| 13 | Carbofuran | High-Performance Liquid Chromatographic Method ^[4] |
| 14 | Cadmium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 15 | Chemical Oxygen Demand | 1) Closed Reflux, Colorimetric Method ^[4] 2) Closed Reflux, Titrimetric Method ^[4] |
| 16 | Chlordane | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 17 | Chromium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[4] |
| 18 | Color | ADMI Weighted-Ordinate Spectrophotometric Method |

(นางริกาญจน์ จันทรกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

19 Copper...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|---------------------|---|
| 19 | Copper | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 20 | Cyanide | Distillation, Colorimetric Method ^[4] |
| 21 | 2,4'-DDD | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 22 | 4,4'-DDD | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 23 | 2,4'-DDE | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 24 | 4,4'-DDE | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 25 | 2,4'-DDT | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 26 | 4,4'-DDT | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 27 | Dieldrin | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 28 | Endosulfan Sulfate | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 29 | Endosulfan I | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 30 | Endosulfan II | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 31 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 32 | Endrin Aldehyde | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 33 | Formaldehyde | Distillation, Colorimetric Method ^[3] |
| 34 | Free Chlorine | 1) DPD Ferrous Titrimetric Method ^[4] 2) Iodometric Method ^[4] |
| 35 | Heptachlor | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 36 | Heptachlor epoxide | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 37 | Hexavalent Chromium | Filtration, Colorimetric Method ^[4] |
| 38 | 3-Hydroxycarbofuran | High-Performance Liquid Chromatographic Method ^[4] |
| 39 | Lead | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 40 | Manganese | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 41 | Mercury | 1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass spectrometric Method ^[4] |
| 42 | Methiocarb | High-Performance Liquid Chromatographic Method ^[4] |
| 43 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |

วิมล

44 Methomyl...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

กรมส่งเสริมการค้าระหว่างประเทศ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|-------------------------|---|
| 44 | Methomyl | High-Performance Liquid Chromatographic Method ^[4] |
| 45 | Nickel | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 46 | Oil & Grease | 1) Liquid-Liquid, Partition-Gravimetric Method ^[4] 2) Soxhlet Extraction Method ^[4] |
| 47 | Oxamyl | High-Performance Liquid Chromatographic Method ^[4] |
| 48 | Propoxur | High-Performance Liquid Chromatographic Method ^[4] |
| 49 | pH | Electrometric Method ^[4] |
| 50 | Phenols | 1) Distillation, Chloroform Extraction Method ^[4] 2) Distillation, Direct Photometric Method ^[4] |
| 51 | Selenium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 52 | Sulfide | Iodometric Method ^[4] |
| 53 | Temperature | Laboratory and Field Methods ^[4] |
| 54 | Total Dissolved Solids | Dried at 180 °C ^[4] |
| 55 | Total Kjeldahl Nitrogen | Semi-Micro Kjeldahl Method ^[4] |
| 56 | Total Suspended Solids | Dried at 103-105 °C ^[4] |
| 57 | Toxaphene | Liquid-Liquid Extraction, Gas Chromatographic Method ^[4] |
| 58 | Trivalent Chromium | 1) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Colorimetric Method; Calculation ^[4] |
| 59 | Zinc | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[4] |

น้ำใต้ดิน จำนวน 126 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--------------|--|
| 1 | Acenaphthene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |

วิภา

3 Aldrin...

(นางริภาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|-------------------------|---|
| 3 | Aldrin | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 4 | Anthracene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 5 | Antimony | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 6 | Arsenic | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 7 | Atrazine | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 8 | Barium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 9 | Benz(a)anthracene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 10 | Benzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 11 | Benzo(b)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 12 | Benzo(k)fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 13 | Benzoic Acid | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 14 | Benzo(a)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 15 | Benzo[g,h,i]perylene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 16 | Beryllium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 17 | Bis(2-chloroethyl)ether | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |

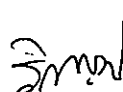
วิธีทาง

18 Bis(2-ethylhexyl)phthalate...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------------|---|
| 18 | Bis(2-ethylhexyl)phthalate | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 19 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 20 | Bromoform | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 21 | Butanol | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 22 | Butyl Benzyl Phthalate | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 23 | Cadmium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 24 | Carbazole | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 25 | Carbon Disulfide | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 26 | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 27 | Chlordane | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 28 | p-Chloroaniline | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 29 | Chlorobenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 30 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 31 | Chloroform | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 32 | 2-Chlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 33 | Chromium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |

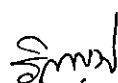


34 Chromium (III)...

(นางริกาญจน์ จิตรสกุลไธ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------------|--|
| 51 | cis-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 52 | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 53 | 2,4-Dichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 54 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 55 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 56 | 1,3-Dichloropropene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 57 | Dieldrin | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 58 | Diethyl Phthalate | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 59 | 2,4-Dimethylphenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 60 | 2,4-Dinitrophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 61 | 2,4-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 62 | 2,6-Dinitrotoluene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 63 | Di-n-Octyl Phthalate | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 64 | Endosulfan | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 65 | Endrin | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 66 | Ethylbenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 67 | Fluoranthene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |



(นางริกาญจน์ ฉัตรสกุลวิไล)

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และทะเบียนห้องปฏิบัติการ

68 Fluorene...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|---------------------------|---|
| 68 | Fluorene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 69 | Heptachlor | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 70 | Heptachlor epoxide | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 71 | Hexachlorobenzene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 72 | Hexachloro-1,3-butadiene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 73 | n-Hexane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 74 | α -HCH | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 75 | β -HCH | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 76 | γ -HCH | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 77 | Hexachlorocyclopentadiene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 78 | Hexachloroethane | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 79 | Indeno(1,2,3-cd)pyrene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 80 | Isophorone | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 81 | Lead | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 82 | Manganese | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 83 | Mercury | 1) Cold Vapor Atomic Absorption Spectrometric Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |

วิมล

84 Methanol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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และคณะเจ้าหน้าที่ปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|---|---|
| 84 | Methanol | 1) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] 2) Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 85 | Methoxychlor | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 86 | Methyl Bromide | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 87 | Methylene Chloride | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 88 | 2-Methylphenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 89 | 2-Methylnaphthalene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 90 | Methyl tert-Butyl Ether | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 91 | Naphthalene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 92 | Nickel | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 93 | Nitrobenzene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 94 | N-Nitrosodiphenylamine | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 95 | N-Nitrosodi-n-Propylamine | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 96 | Polychlorinated Biphenyls - PCB 1016 - PCB 1221 - PCB 1232 - PCB 1242 - PCB 1248 - PCB 1254 - PCB 1260 | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |

วิมล

97 Pentachlorophenol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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และทะเบียนห้องปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|---|--|
| 97 | Pentachlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 98 | pH | Electrometric Method ^[4] |
| 99 | Phenanthrene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 100 | Phenol | 1) Distillation, Direct Photometric Method ^[4] 2) Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 101 | Pyrene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 102 | Selenium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 103 | Silver | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 104 | Styrene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 105 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 106 | Tetrachloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 107 | Toluene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 108 | Toxaphene | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 109 | TPH (C ₅ -C ₈) | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[13,24] |
| 110 | TPH (C _{>8} -C ₁₆) | Solvent Extraction, Gas Chromatographic Method ^[9,21] |
| 111 | TPH (C _{>16} -C ₃₅) | Solvent Extraction, Gas Chromatographic Method ^[9,21] |
| 112 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 113 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |

วิมล

114 1,1,2-Trichloroethane...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|------------------------|---|
| 114 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 115 | Trichloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 116 | 2,4,5-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 117 | 2,4,6-Trichlorophenol | Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 118 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 119 | Vanadium | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |
| 120 | Vinyl Acetate | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 121 | Vinyl Chloride | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 122 | m-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 123 | o-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 124 | p-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 125 | Xylene (Total) | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[4] |
| 126 | Zinc | 1) Digestion, Inductively Coupled Plasma Method ^[4] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[4] |

อากาศเสีย (ปล่อยระบาย) จำนวน 16 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------|--|
| 1 | Antimony | Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5] |
| 2 | Arsenic | Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5] |

วิทย์

3 Carbon Monoxide...

(นางริกาญจน์ ฉัตรสกุลวิไล)

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และหน่วยงานที่เกี่ยวข้อง

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|-----------------------------|--|
| 3 | Carbon Monoxide | 1) Sampling Bag Non-Dispersive Infrared Method ^[5] 2) Non-Dispersive Infrared Method ^[5] 3) Instrumental Analyzer Method ^[5] |
| 4 | Chlorine | 1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5] |
| 5 | Copper | Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5] |
| 6 | Dioxins | Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ^[5] |
| 7 | Hydrogen Chloride | 1) Absorption Sampling, Ion Chromatographic Method ^[5] 2) Isokinetic Sampling, Ion Chromatographic Method ^[5] |
| 8 | Hydrogen Sulfide | Absorption Sampling, Iodometric Method ^[5] |
| 9 | Lead | Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5] |
| 10 | Mercury | 1) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[5] 2) Isokinetic, Digestion, Inductively Coupled Plasma Method ^[5] |
| 11 | Opacity | Ringelmann's Method ^[2] |
| 12 | Oxides of Nitrogen | 1) Absorption Sampling, Phenoldisulfonic Acid Method ^[5] 2) Chemiluminescence Method ^[5] 3) Instrumental Analyzer Method ^[5] |
| 13 | Sulfur Dioxide | 1) Absorption Sampling, Barium-Thorin Titrimetric Method ^[5] 2) UV Fluorescence Method ^[5] 3) Instrumental Analyzer Method ^[5] |
| 14 | Sulfuric Acid | Isokinetic Sampling, Barium-Thorin Titrimetric Method ^[5] |
| 15 | Total Suspended Particulate | Isokinetic Sampling, Gravimetric Method ^[5] |
| 16 | Xylene | Adsorption Sampling, Gas Chromatographic Method ^[5] |

วิมล

สิ่งปลูก...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

สิ่งปฏิกูลหรือวัสดุที่ไม่ใช้แล้ว จำนวน 35 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|-----------|--|
| 1 | Aldrin | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] |
| 2 | Antimony | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 3 | Arsenic | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 4 | Barium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 5 | Beryllium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |



6 Cadmium...

(นางริกาญจน์ ฉัตรสกุลจิไล)

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และทะเบียนห้องปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------|---|
| 6 | Cadmium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 7 | Chlordane | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,19,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] |
| 8 | Chromium | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 9 | Chromium (III) | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,15,17] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation Method ^[1,6,16,17] 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,15,17] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8, 16,17] |
| 10 | Chromium (VI) | 1) Waste Extraction, Colorimetric Method ^[1,6,17] 2) Alkaline Digestion, Colorimetric Method ^[8,17] |



(นางริกาญจน์ ฉัตรสกุลวิไล)

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.....เรียน...../...../.....

11 Cobalt...