

ภาคผนวก จ

ใบรับรองการสอบเทียบเครื่องมือ

รายการเครื่องมือที่ใช้ในการวิเคราะห์ / ทดสอบ

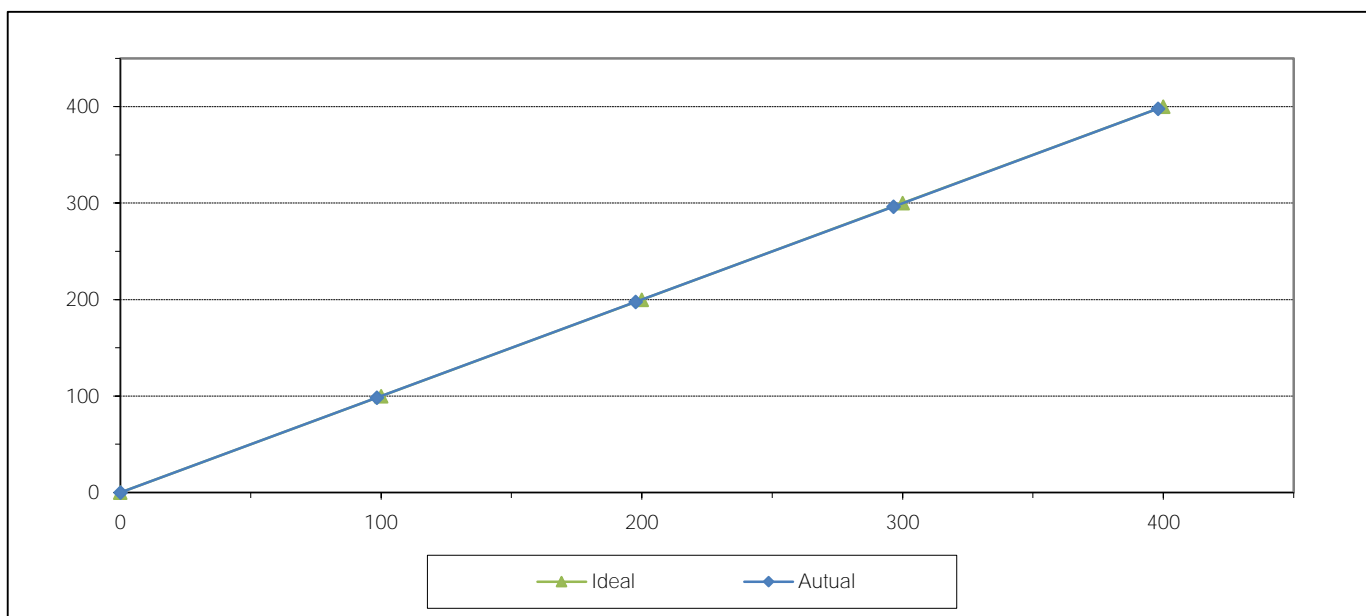
| Sample Name | Parameter | Equipment Name | ID No. | Calibrated Date | Next Cal | Freq. Calibrate (Months) |
|-------------|----------------------------------|---------------------------|------------|-----------------|-----------|--------------------------|
| Ambient | Sulfur Dioxide | SO ₂ Analyzer | BKK_FS0772 | 4-Jan-23 | 4-Jul-23 | 6 |
| Ambient | Nitrogen Dioxide | NO ₂ Analyzer | BKK_FS1072 | 5-Jan-23 | 5-Jul-23 | 6 |
| Ambient | Particulate Matter (PM-10) | High Volume | BKK_FS0383 | - | - | On site Calibration |
| Ambient | Particulate Matter (PM-10) | Digital Balance | BKK_EN0004 | 8-Feb-23 | 8-Feb-24 | 12 |
| Ambient | Total Suspended Particulate | High Volume | BKK_FS0358 | - | - | On site Calibration |
| Ambient | Total Suspended Particulate | Digital Balance | BKK_EN0004 | 8-Feb-23 | 8-Feb-24 | 12 |
| Ambient | Total Hydrocarbon | Total Hydrocarbon Analyz | BKK_EN0057 | 9-Aug-22 | 9-Feb-24 | 18 |
| Ambient | Carbon Monoxide | CO Analyzer | BKK_EN0073 | 7-Apr-22 | 7-Oct-23 | 18 |
| Water Lab | pH at 25 °C | pH meter | BKK_EN0072 | 12-Sep-22 | 12-Mar-24 | 18 |
| Water Lab | Sulfide | Burette | BKK_EN0171 | 30-Aug-22 | 1-Mar-24 | 18 |
| Water Lab | Sulfide | Chamber (Cold Room) | BKK_EN0167 | 30-Jun-22 | 30-Dec-23 | 18 |
| Water Lab | Oil & Grease | Electronic Top-Loading Ba | BKK_EN0002 | 8-Feb-23 | 8-Feb-24 | 12 |
| Water Lab | Oil & Grease | Water Bath | BKK_EN0148 | 31-Jan-23 | 1-Aug-23 | 18 |
| Water Lab | Total Dissolved Solids 103-105°C | Electronic Top-Loading Ba | BKK_EN0002 | 8-Feb-23 | 8-Feb-24 | 12 |
| Water Lab | Total Dissolved Solids 103-105°C | Oven | BKK_EN0273 | 29-Nov-22 | 29-May-24 | 18 |
| Water Lab | BOD | Incubator | BKK_EN0305 | 5-Apr-23 | 5-Apr-24 | 18 |
| Water Lab | BOD | Burette | BKK_EN0171 | 30-Aug-22 | 1-Mar-24 | 18 |
| Water Lab | COD | Hot Block | BKK_EN0222 | 1-Mar-23 | 1-Mar-24 | 12 |
| Water Lab | COD | Spectrophotometer | BKK_EN0018 | 16-Sep-22 | 16-Sep-23 | 12 |
| Water Lab | Total Suspended Solids | Electronic Top-Loading Ba | BKK_EN0002 | 8-Feb-23 | 8-Feb-24 | 12 |
| Water Lab | Total Suspended Solids | Oven | BKK_EN0273 | 29-Nov-22 | 29-May-24 | 18 |
| Water Lab | Total Coliform | Autoclave | BKK_ML0041 | 20-May-22 | 20-Nov-23 | 18 |
| Water Lab | Total Coliform | Incubator | BKK_ML0010 | 21-Jan-22 | 22-Jul-23 | 18 |
| Water Lab | Total Coliform | Hot Air Oven | BKK_ML0013 | 21-Nov-22 | 21-May-24 | 18 |
| Water Lab | Fecal Coliform | Autoclave | BKK_ML0041 | 20-May-22 | 20-Nov-23 | 18 |
| Water Lab | Fecal Coliform | Incubator | BKK_ML0010 | 21-Jan-22 | 22-Jul-23 | 18 |
| Water Lab | Fecal Coliform | Hot Air Oven | BKK_ML0013 | 21-Nov-22 | 21-May-24 | 18 |
| Water Lab | Fecal Coliform | Water Bath | BKK_ML0056 | 20-Apr-23 | 20-Apr-24 | 12 |
| Water Lab | Residual Free Chlorine | Chlorine Meter | BKK_LG0042 | 28-Jan-22 | 28-Jan-23 | 12 |
| Water Lab | Residual Chlorine | Chlorine Meter | BKK_LG0042 | 28-Jan-22 | 28-Jan-23 | 12 |
| Water Lab | Ammonia Nitrogen | Discrete analyzer | BKK_EN0037 | 30-Jun-22 | 30-Jun-23 | 12 |
| Water Lab | Total Alkalinity | Burette | BKK_EN0171 | 30-Aug-22 | 1-Mar-24 | 18 |
| Water Lab | Calcium Hardness | Burette | BKK_EN0171 | 30-Aug-22 | 1-Mar-24 | 18 |
| Water Lab | Nitrate | Ion Chromatography | BKK_EN0069 | 12-Jan-22 | 12-Jan-23 | 12 |
| Water Lab | Chloride | Ion Chromatography | BKK_EN0069 | 12-Jan-22 | 12-Jan-23 | 12 |
| Water Lab | <i>Staphylococcus aureus</i> | Autoclave | BKK_ML0041 | 20-May-22 | 20-Nov-23 | 18 |
| Water Lab | <i>Staphylococcus aureus</i> | Incubator | BKK_ML0010 | 21-Jan-22 | 22-Jul-23 | 18 |
| Water Lab | <i>Staphylococcus aureus</i> | Hot Air Oven | BKK_ML0013 | 7-Jun-21 | 6-Dec-22 | 18 |
| Water Lab | <i>Pseudomonas aeruginosa</i> | Autoclave | BKK_ML0041 | 20-May-22 | 20-Nov-23 | 18 |
| Water Lab | <i>Pseudomonas aeruginosa</i> | Incubator | BKK_ML0010 | 21-Jan-22 | 22-Jul-23 | 18 |
| Water Lab | <i>Pseudomonas aeruginosa</i> | Water Bath | BKK_ML0049 | 21-Feb-22 | 21-Feb-23 | 12 |
| Water Lab | <i>Pseudomonas aeruginosa</i> | Hot Air Oven | BKK_ML0013 | 7-Jun-21 | 6-Dec-22 | 18 |
| Water Lab | <i>Escherichia coli</i> | Autoclave | BKK_ML0041 | 20-May-22 | 20-Nov-23 | 18 |
| Water Lab | <i>Escherichia coli</i> | Incubator | BKK_ML0010 | 21-Jan-22 | 22-Jul-23 | 18 |
| Water Lab | <i>Escherichia coli</i> | Hot Air Oven | BKK_ML0013 | 7-Jun-21 | 6-Dec-22 | 18 |
| Water Lab | <i>Escherichia coli</i> | Water Bath | BKK_ML0056 | 20-May-22 | 20-May-23 | 12 |



MULTIPOINT CALIBRATION REPORT

| | | | |
|------------------------------|--------------|----------------|--------------|
| Calibration Date | 4-Jan-23 | Equipment Name | SO2 Analyzer |
| Manufacturer | Teledyne API | Model | 100E |
| Serial No. | 3468 | Equipment ID | BKK_FS0772 |
| Calibrator Manufacturer | Teledyne API | Model | 700 |
| Serial No. | 947 | | |
| Std. Gas Concentration (PPM) | 56.3 | Cylinder No. | GN0027222 |
| Cylinder Pressure (psi) | 1800 | Certified By | Airgas Inc. |
| Certified Date | 9-Feb-22 | Expired Date | 9-Feb-30 |

| Point | CALIBRATION RESULTS | | | |
|-------------|---------------------|--------|-------|--------|
| | Ideal | Autual | Error | %Error |
| ZERO | 0.00 | 0.10 | 0.10 | 0.10 |
| 1 | 100.00 | 98.40 | -1.60 | -1.60 |
| 2 | 200.00 | 197.70 | -2.30 | -1.15 |
| 3 | 300.00 | 296.50 | -3.50 | -1.17 |
| 4 | 400.00 | 398.00 | -2.00 | -0.50 |
| AVERAGE (%) | | | | -0.86 |



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

(Mr.Sarayuth Jittranont)
Assistant General Manager

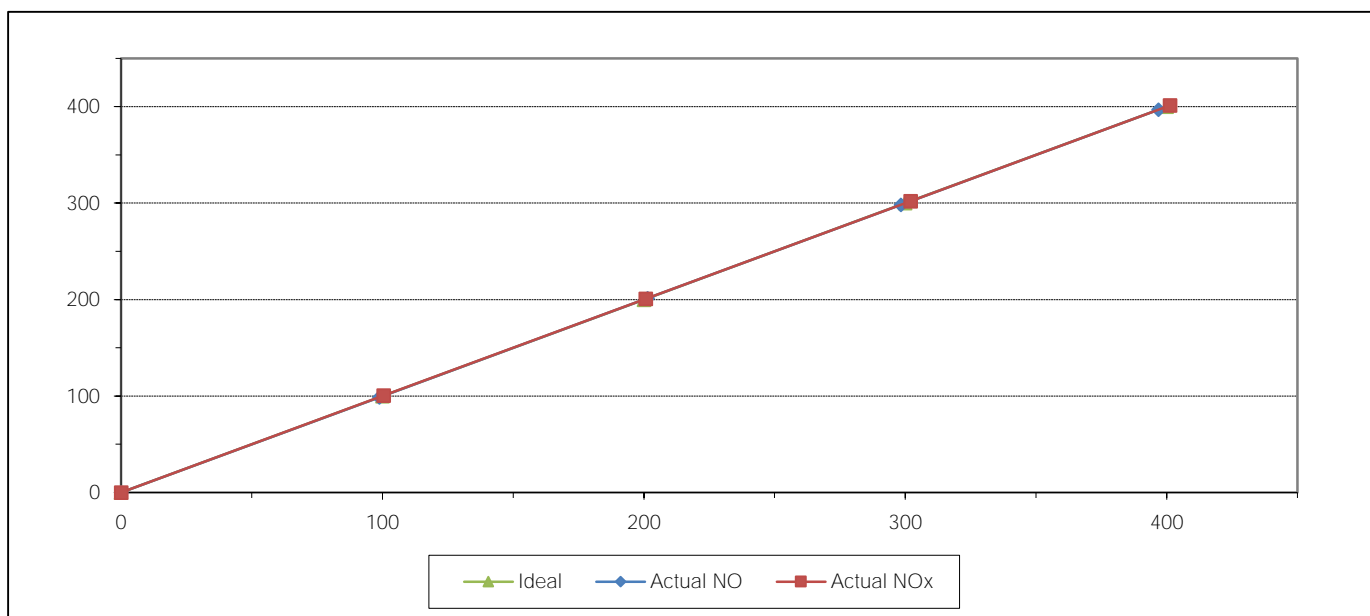


MULTIPOINT CALIBRATION REPORT

Calibration Date 5-Jan-23
Manufacturer HORIBA
Serial No. PHD13MC7
Calibrator Manufacturer Teledyne API
Serial No. 947
Std. Gas Concentration (PPM) 55.88
Cylinder Pressure (psi) 1800
Certified Date 9-Feb-22

Equipment Name NOx Analyzer
Model APNA-370
Equipment ID BKK_FS1072
Model 700
Cylinder No. GN0027222
Certified By Airgas Inc.
Expired Date 9-Feb-30

| Point | CALIBRATION RESULTS | | | | | | |
|-------------|---------------------|-----------|----------|-----------|------------|-----------|------------|
| | Ideal | Actual NO | Error NO | %Error NO | Actual NOx | Error NOx | %Error NOx |
| ZERO | 0.00 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 | 0.10 |
| 1 | 100.00 | 98.80 | -1.20 | -1.20 | 100.50 | 0.50 | 0.50 |
| 2 | 200.00 | 201.40 | 1.40 | 0.70 | 200.70 | 0.70 | 0.35 |
| 3 | 300.00 | 298.30 | -1.70 | -0.57 | 302.10 | 2.10 | 0.70 |
| 4 | 400.00 | 396.90 | -3.10 | -0.78 | 401.30 | 1.30 | 0.33 |
| AVERAGE (%) | | | | -0.35 | | | 0.40 |



Calibrated By

(Mr.Jirawut Sakarn)
Field Environmental Scientist (3)

Approved By

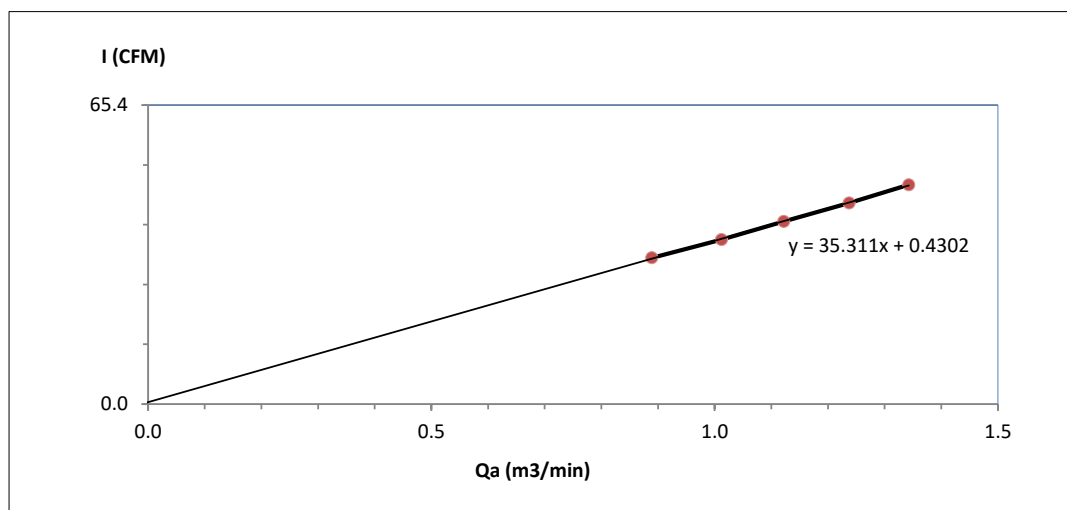
(Mr.Sarayuth Jittranont)
Assistant General Manager





High Volume Air Sampler Calibration Worksheet

| | | | |
|-----------------------|--|-------------------------------|------------|
| Project Site : | Dcondo Rin Juristic Person Condominium | Barometric Pressure (mm Hg) : | 753 |
| Calibrate Location : | บริเวณภายในโครงการ Dcondo Rin (หลังป้อม รปภ.) | Temperature (°C) : | 33 |
| Calibrate Date : | 26-Apr-23 | High Volume ID : | BKK_FS0383 |
| CalibrationSheet No.: | C-260423-BKK_FS0383 | High Volume Model : | TE-5009X |
| Calibrator ID: | BKK_FS0624 | High Volume S/N : | 4787 |
| Calibrator Model : | TE-5028A | Calibrator Slope : | 1.0268 |
| Calibrator S/N : | 2584 | Calibrator Intercept : | -0.01116 |

| Test No. | Delta H ₂ O (inch) | Qa (m ³ /min) | I : Chart (CFM) | Linear Regression |
|----------|----------------------------------|-----------------------------|--------------------|---|
| 1 | 2.0 | 0.889 | 32 | Slope : 35.3109 Intercept : 0.4302 Correlation Coefficient : 0.9997 |
| 2 | 2.6 | 1.012 | 36 | |
| 3 | 3.2 | 1.122 | 40 | |
| 4 | 3.9 | 1.237 | 44 | |
| 5 | 4.6 | 1.343 | 48 | |



Calibrated by 
(Mr.Pattarapong Meesuk)
Field Scientist(1)

Approved by : 
(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6, e-mail: service.thailand@sartorius.com

**SARTORIUS**

Certificate

of Calibration

| | |
|----------------|-------------------|
| REVIEW BY | <u>Siriruk P.</u> |
| APPROVED BY | <u>KL AL</u> |
| NEXT CAL. DATE | <u>8/2/24</u> |

Model Number : XP105DU
Description : Semi-micro Balance
Serial Number : 1123091884
ID No. : BKK_EN0004
Manufacturer : Mettler Toledo

Certificate No. : 23BC10071
Issued Date : Monday, February 13, 2023
Reference No. : 203245
Page No. : 1 of 3

Customer Name : ALS Laboratory Group (Thailand)Co., Ltd.
104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.

Calibrated Place : Balance Room.

Calibrated By : Mr. Chonchai Inthana
Calibration Date : Wednesday, February 08, 2023

Calibration
Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (WI-003)
Based on UKAS LAB 14 : 2019

Metrological data :

Capacity : 31/120 g Readability : 0.0001 g

Ambients Conditions:

Temperature : 21.0 °C ± 3.0 °C

Humidity : 65.0 % RH ± 5.0 % RH

Pressure : — ± —

Reasons for calibration

☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ Maintenance

Equipment Condition: ☒ Good Operate ☐ Fair

Measurement Method UKAS Publication Ref :Lab 14

The measurement uncertainty stated is the expended uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came form list of Sartorius Metrological Specifications.

Traceability:

| Model Number | Description | Traceability | Certificate No. | Due Date |
|---------------|--|--------------|-----------------|-------------|
| YCS011-522-00 | Sartorius weight set 1mg - 1kg E2 s/n 37929119 | SPC-RT | C02212565 | 14-Sep-2023 |
| MHB-382SD | Humidity/Barometer/Temp Lutron MHB-382SD | DKSH | C19220444 | 5-Sep-2023 |
| | | | | |

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division
Sartorius (Thailand) Co., Ltd.

Mr.Chonchai Inthana(Technical Manager)

S
T
A
M
P



Certificate of Calibration

Model Number : XP105DU

Description : Semi-micro Balance

Serial Number : 1123091884

ID No. BKK_EN0004

Manufacturer : Mettler Toledo

Certificate No. : 23BCI0071

Issued Date : Monday, February 13, 2023

Reference No. : 203245

Page No. : 2 of 3

Calibration Results : Without Adjustment

Repeatability

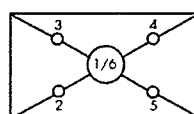
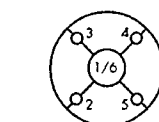
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

| | | |
|-----------------------------|----------|----------|
| Nominal Value : (Low Load) | 2.00002 | 20.00002 |
| 2 g | 2.00001 | 20.00001 |
| Tolerance | 2.00002 | 20.00001 |
| N/A g | 2.00002 | 20.00001 |
| Nominal Value : (High Load) | 2.00002 | 20.00000 |
| 20 g | 2.00002 | 20.00001 |
| Tolerance | 2.00002 | 20.00000 |
| N/A g | 2.00001 | 20.00000 |
| | 2.00001 | 20.00001 |
| Standard Deviation | 0.000005 | 0.000007 |

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 20 g
Tolerance N/A g



| | Difference |
|---|------------|
| 1 | — |
| 2 | -0.00002 |
| 3 | -0.00004 |
| 4 | 0.00002 |
| 5 | 0.00003 |
| 6 | — |

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance N/A g

| Nominal Value (g) | Conventional Mass Value (g) | Displayed Value (g) | Deviation (g) | Uncertainty (g) |
|----------------------|--------------------------------|------------------------|------------------|--------------------|
| 0.1 | 0.10000 | 0.10000 | 0.00000 | 0.000022 |
| 0.5 | 0.50001 | 0.50000 | -0.00001 | 0.000023 |
| 1 | 1.00000 | 1.00000 | 0.00000 | 0.000024 |
| 2 | 2.00002 | 2.00001 | -0.00001 | 0.000026 |
| 5 | 5.00002 | 5.00002 | 0.00000 | 0.000030 |
| 10 | 10.00002 | 10.00002 | 0.00000 | 0.000035 |
| 15 | 15.00004 | 15.00004 | 0.00000 | 0.000053 |
| 20 | 20.00000 | 20.00000 | 0.00000 | 0.000053 |
| 25 | 25.00002 | 25.00002 | 0.00000 | 0.000089 |
| 30 | 30.00002 | 30.00004 | 0.00002 | 0.000089 |

Certificate of Calibration

Model Number : XS105DU
 Description : Semi-micro Balance
 Serial Number : 1123091884
 ID No. : BKK_EN0004
 Manufacturer : Mettler Toledo

Certificate No. : 23BCI0071
 Issued Date : Monday, February 13, 2023
 Reference No. : 203245
 Page No. : 3 of 3

Calibration Results : Without Adjustment

Repeatability

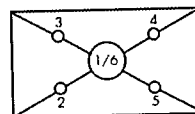
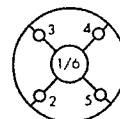
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

| | | |
|-----------------------------|--|----------|
| Nominal Value : (Low Load) | | 100.0000 |
| g | | 100.0000 |
| Tolerance | | 100.0000 |
| N/A g | | 100.0000 |
| | | 100.0000 |
| Nominal Value : (High Load) | | 100.0000 |
| 100 g | | 100.0000 |
| Tolerance | | 99.9999 |
| N/A g | | 100.0000 |
| | | 100.0000 |
| Standard Deviation | | 0.00003 |

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : g
 Tolerance N/A g



Difference

| | |
|---|---|
| 1 | — |
| 2 | — |
| 3 | — |
| 4 | — |
| 5 | — |
| 6 | — |

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

| Nominal Value (g) | Conventional Mass Value (g) | Displayed Value (g) | Deviation (g) | Uncertainty (g) |
|----------------------|--------------------------------|------------------------|------------------|--------------------|
| 50 | 50.0000 | 50.0000 | 0.0000 | 0.00012 |
| 55 | 55.0000 | 55.0000 | 0.0000 | 0.00015 |
| 60 | 60.0000 | 60.0000 | 0.0000 | 0.00015 |
| 65 | 65.0001 | 65.0001 | 0.0000 | 0.00015 |
| 70 | 70.0000 | 70.0000 | 0.0000 | 0.00015 |
| 80 | 80.0000 | 80.0000 | 0.0000 | 0.00017 |
| 90 | 90.0001 | 90.0001 | 0.0000 | 0.00018 |
| 100 | 100.0000 | 100.0000 | 0.0000 | 0.00018 |
| 110 | 110.0000 | 110.0000 | 0.0000 | 0.00026 |
| 120 | 120.0000 | 120.0000 | 0.0000 | 0.00026 |

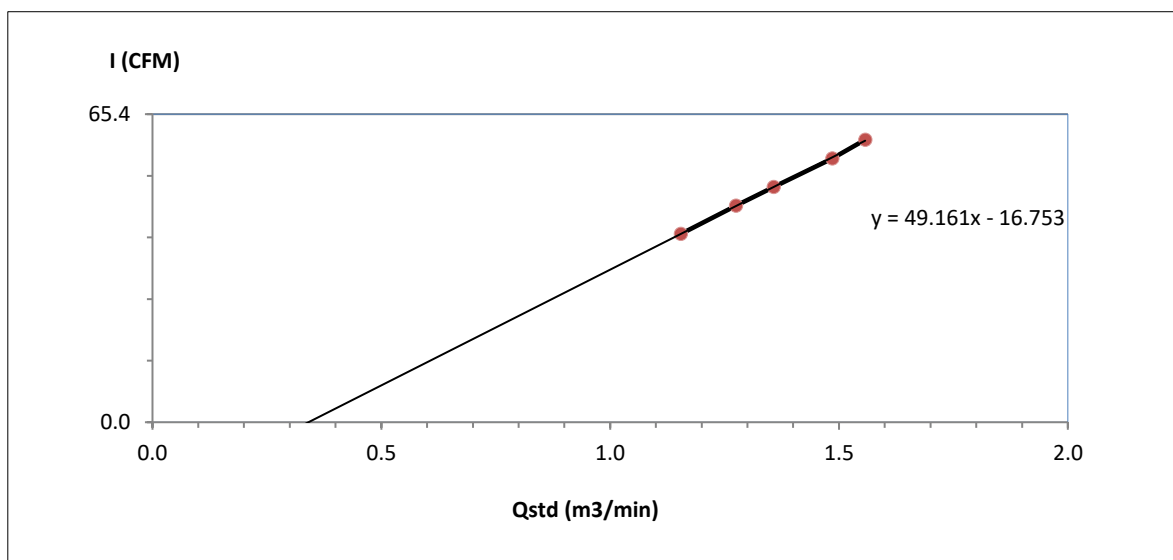
End of Report.



High Volume Air Sampler Calibration Worksheet

| | | | |
|-----------------------|--|-------------------------------|------------|
| Project Site : | Dcondo Rin Juristic Person Condominium | Barometric Pressure (mm Hg) : | 753 |
| Calibrate Location : | บริเวณภายในโครงการ Dcondo Rin (หลังป้อม รปภ.) | Temperature (°C) : | 33 |
| Calibrate Date : | 26-Apr-23 | High Volume ID : | BKK_FS0358 |
| CalibrationSheet No.: | C-260423-BKK_FS0358 | High Volume Model : | TE-5009X |
| Calibrator ID: | BKK_FS0624 | High Volume S/N : | 5193 |
| Calibrator Model : | TE-5028A | Calibrator Slope : | 1.63932 |
| Calibrator S/N : | 2584 | Calibrator Intercept : | -0.01785 |

| Test No. | Delta H ₂ O (inch) | Q _{std} (m ³ /min) | I : Chart (CFM) | Linear Regression |
|----------|----------------------------------|---|--------------------|---|
| 1 | 3.6 | 1.1548 | 40 | Slope : 49.1606 Intercept : -16.7534 Correlation Coefficient : 0.9998 |
| 2 | 4.4 | 1.2747 | 46 | |
| 3 | 5.0 | 1.3577 | 50 | |
| 4 | 6.0 | 1.4856 | 56 | |
| 5 | 6.6 | 1.5572 | 60 | |



Calibrated by _____

(Mr.Pattarapong Meesuk)
Field Scientist(1)

Approved by : _____

(Mr. Noppong Juntarupan)
Enviro Field Coordinator Scientist (3)



JIRANATEE ASSOCIATES CO., LTD.

CALIBRATION REPORT

REVIEW BY Vichuta N.

APPROVED BY Sararat M.

NEXT CAL. DATE 9/2/67

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd.

EQUIPMENT NAME : Total Hydrocarbon Analyzer

MANUFACTURER : Baseline

MODEL : 9000 NMHC

SERIAL NO : 0314DR0170

STANDARD GAS CONCENTRATION (PPM) : 100 PPM (Methane)

CYLINDER NO : ND55981

CYLINDER PRESSURE (psig) : 900 PSI

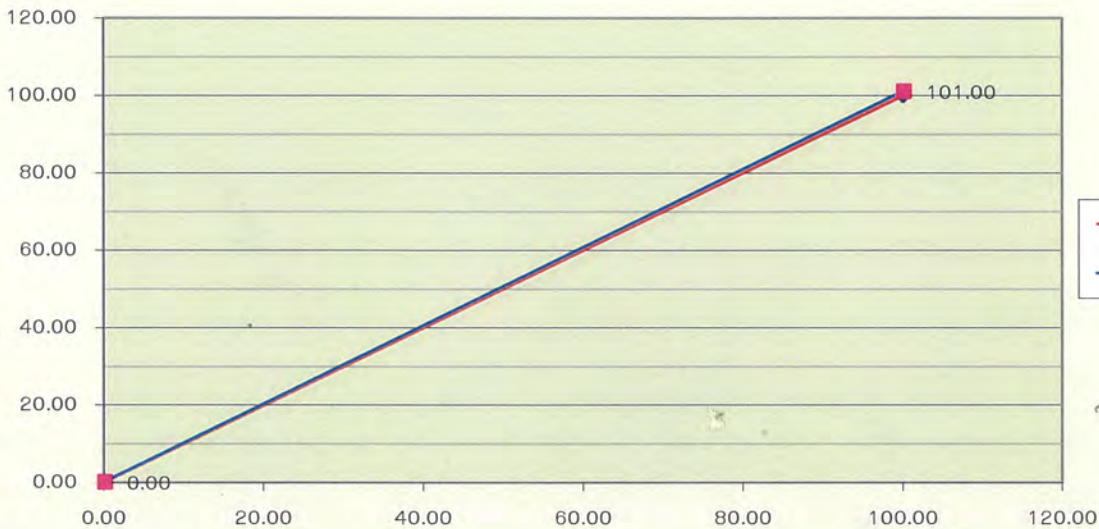
CERTIFIED DATE : 12/02/2022

CERTIFIED BY : AIRGAS

EXPIRED DATE : 12/02/2025

CALIBRATION RESULTS

| POINT NO | CALIBRATION RESULTS | | | |
|-------------|---------------------|--------|-------|--------|
| | IDEAL | ACTUAL | ERROR | %ERROR |
| ZERO | 0.00 | 0.00 | 0.00 | - |
| 1 | 100.00 | 101.00 | 1.0 | -1.00 |
| AVERAGE (%) | | | | 0.25 |



CALIBRATED BY : วรพอล ดุสิตาเจริณ

DATE : 9/8/65

CHECKED BY : ศศิวิทย์ อังคาร

DATE : 9/8/65



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 31 , E-Mail : Engineer@Jiranatee.com

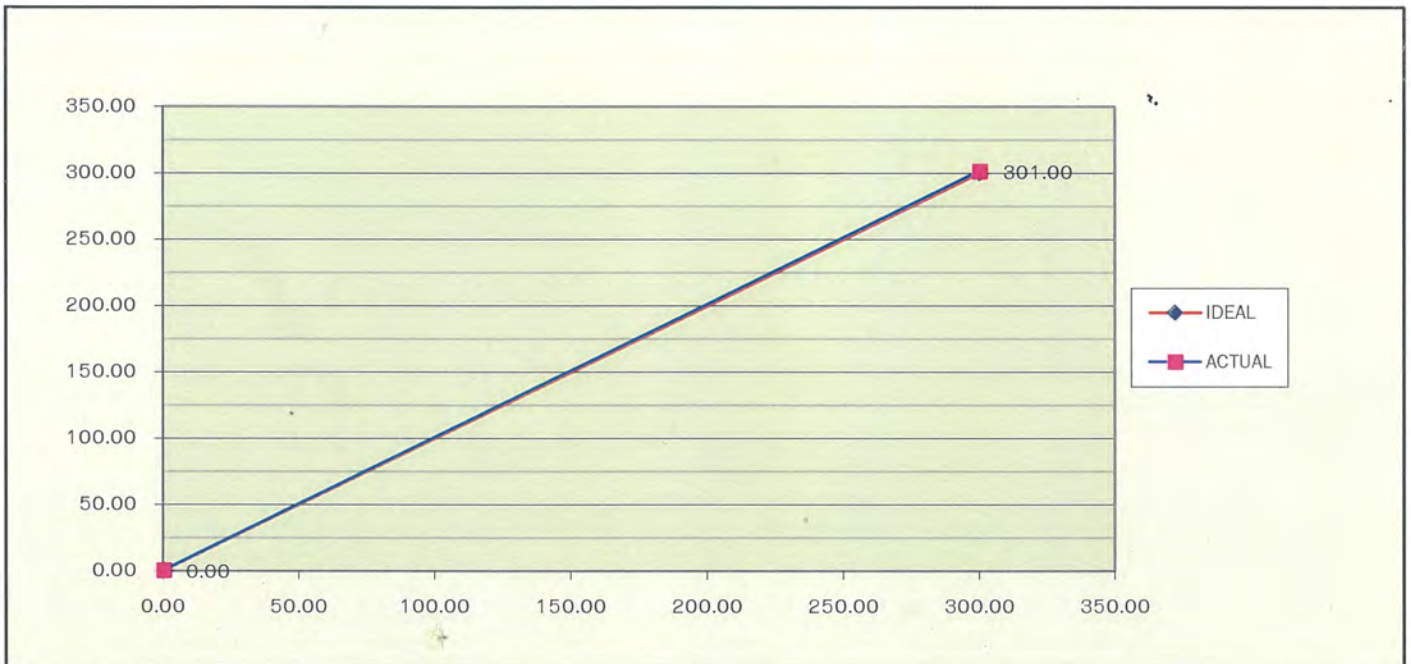
เลขที่ 63/14-15, 67/35-36 ถนน เพชรเกษม 7, 7/1 แขวง วัดท่าพระ เขต บางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02868-1889

CALIBRATION REPORT

| | |
|---|-----------------------------|
| CUSTOMER NAME : ALS Laboratory Group (Thailand) Co., Ltd. | |
| EQUIPMENT NAME : Total Hydrocarbon Analyzer | |
| MANUFACTURER : Baseline | MODEL : 9000 NMHC |
| SERIAL NO : 0314DR0170 | |
| STANDARD GAS CONCENTRATION (PPM) : 100 PPM (Propane) | |
| CYLINDER NO : ND55981 | |
| CYLINDER PRESSURE (psig) : 900 PSI | CERTIFIED DATE : 12/02/2022 |
| CERTIFIED BY : AIRGAS | EXPIRED DATE : 12/02/2025 |

CALIBRATION RESULTS

| POINT NO | CALIBRATION RESULTS | | | |
|-------------|---------------------|--------|-------|--------|
| | IDEAL | ACTUAL | ERROR | %ERROR |
| ZERO | 0.00 | 0.00 | 0.00 | - |
| 1 | 300.00 | 301.00 | 1.0 | 0.33 |
| AVERAGE (%) | | | | 0.08 |



CALIBRATED BY : วรณล ศักดิ์เจริญ DATE : 9/18/65

CHECKED BY : ศิษฐ์ ด้วง DATE : 9/18/65



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 31 , E-Mail : Engineer@jiranatee.com

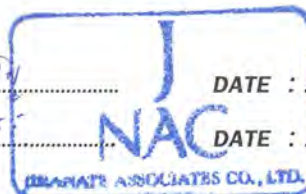
เลขที่ 63/14-15,67/35-36 ถนนเพชรเกษม 7,7/1 แขวง วัดท่าพระ เขต บางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02868-1889

FLOW CALIBRATE

| | | | | |
|----------------|---|---|---------------|--------------------|
| CUSTOMER NAME | : | ALS Laboratory Group (Thailand) Co., Ltd. | | |
| EQRIPMENT NAME | : | Flow Calibrator | | |
| MANUFACTURER | : | Bios | MODEL : 510 L | SERIAL NO : 129549 |

| Flow Parameter | Step | Set | Display | Flow Meter |
|----------------|--------|-----|---------|-------------|
| Sample | Before | 40 | 38 | 15 cc/min |
| | After | 40 | 40 | 39.7 cc/min |
| Air | Before | 175 | 175 | 190 cc/min |
| | After | 175 | 175 | 176 cc/min |
| Fuel | Before | 35 | 32 | 36 cc/min |
| | After | 35 | 35 | 35 cc/min |

CALIBRATED BY : วราพล ดวกิ่งเจริญ **DATE :** 9/8/65
CHECKED BY : สันติ วัฒนะ **DATE :** 9/8/65



ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : เจ้าหน้าที่ฝ่ายบริการหลังการขาย , โทร 02-868-0812 # 15-16 , E-Mail : Engineer@jiranatee.com
 เลขที่ 63/14-15,67/35-36 ถนน เพชรเกษม 7,7/1 แขวง วัดท่าพระ เขต บางกอกใหญ่ กรุงเทพฯ 10600 โทร 02-868-0812-13 โทรสาร 02868-1889

MULTI POINT CALIBRATION REPORT

REVIEW BY Vichuta N.APPROVED BY Sararat M.NEXT CAL. DATE 7 Oct 23

CUSTOMER NAME : ALS Laboratory Group (Thailand) Co.Ltd.

EQUIPMENT NAME : CO Analyzer

MANUFACTURER : Teledyne - API

MODEL : T300

SERIAL NO : 1756

STANDARD GAS CONCENTRATION (PPM) : 4512

CYLINDER NO : CC745169

CYLINDER PRESSURE (psig) : 1900

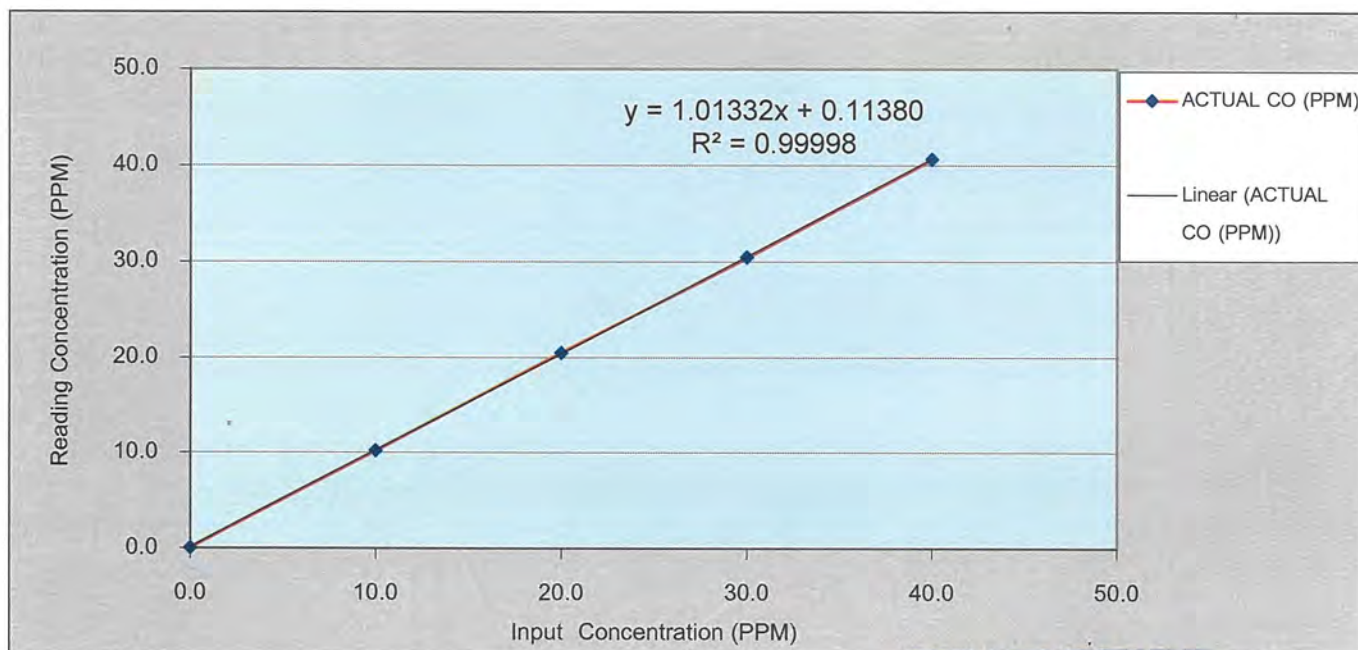
CERTIFIED DATE : Mar 10, 2021

CERTIFIED BY : AIRGAS SPECIALTY GASES

EXPIRED DATE : Mar 10, 2029

CALIBRATION RESULTS

| POINT NO | CALIBRATION RESULTS | | | |
|-------------|---------------------|-----------------|----------------|------------|
| | IDEAL (PPM) | ACTUAL CO (PPM) | ERROR CO (PPM) | % ERROR CO |
| ZERO | 0.0 | 0.065 | 0.065 | - |
| 1 | 10.0 | 10.238 | 0.238 | 2.380 |
| 2 | 20.0 | 20.514 | 0.514 | 2.570 |
| 3 | 30.0 | 30.468 | 0.468 | 1.560 |
| 4 | 40.0 | 40.616 | 0.616 | 1.540 |
| AVERAGE (%) | | | | 2.012 |

**KINETICS**
บริษัท ไคเนติกส์ คอร์ปอเรชั่น จำกัด

CALIBRATED BY : คุณพรชัย ผาติวนารักษ์

DATE : 7 เมษายน 2565

ต้องการข้อมูลทางด้านเทคนิคเพิ่มเติม : คุณพรชัย ผาติวนารักษ์ โทรศัพท์ : 02-515-8987



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.: 22CH1222

Page.: 1 of 2

Certificate of Calibration

| | |
|-------------------------|---|
| Equipment : | pH Meter |
| Manufacturer : | Mettler Toledo |
| Model : | Seven Compact S220 |
| Serial No. : | B520948426 |
| ID No. : | BKK_EN0072 |
| Condition As-Received: | Used Item |
| Received Date : | 09 September 2022 |
| Calibration Date : | 12 September 2022 |
| Reference : | 2209-0312DSC-1 |
| Submitted by : | ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250 Thailand |
| Ambient Temperature : | (25 ± 2.5) °C |
| Relative Humidity : | (50 ± 15) % |
| Calibration Procedure : | In - house method : - CP-CH5 by direct measurement with standard voltage calibrator and direct measurement with certified reference material (CRM) |

| | |
|----------------|------------------|
| REVIEW BY | <u>Sinluk P.</u> |
| APPROVED BY | <u>KL AL</u> |
| NEXT CAL. DATE | <u>12/03/24</u> |

Calibrated by : Warakorn Lerngagtrakul

Approved by :

Malee

Approved Signatory

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

Issue Date : 15 September 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.



Cert. No.: 22CH1222

Page.: 2 of 2

Condition of this calibration result

1. Reference Standard Instrument : -

| <u>Instrument</u> | <u>Serial No.</u> | <u>ID No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|--------------------------------|-------------------|---------------|------------------|-----------------|
| 1) Document Process Calibrator | 54030049 | 130RC116 | 22E2769 | 24 Aug 2023 |

This certification is traceable to the International System of Unit maintained at:-

- Traceable to National Institute of Metrology (Thailand), NIMT

2. Certified Reference Materials : The measurement results are traceable to SI through CPA chem Ltd.,
ANSI-ASQ National Accreditation Board, Accredited No. AR-1835

| <u>Buffer Solution</u> | <u>Manufacturer</u> | <u>Lot No.</u> | <u>Exp. date</u> |
|------------------------|---------------------|----------------|------------------|
| pH 4.008 | CPA chem | 823320 | 20 June 2024 |
| pH 6.985 | CPA chem | 794122 | 14 Feb 2023 |
| pH 10.008 | CPA chem | 823323 | 20 June 2023 |

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

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

| Unit Under Calibration | Nominal Value | Standard Voltage Input | Actual Reading | | Uncertainty of Measurement (\pm mV) | Coverage factor <i>k</i> |
|------------------------------|---------------|------------------------|----------------|--------|---|-----------------------------|
| | pH | mV | mV | pH | | |
| pH Meter S/N.: B520948426 | 4.000 | 177.48 | 177.4 | 4.000 | 0.058 | 2.00 |
| | 7.000 | 0.00 | 0.0 | 7.000 | 0.058 | 2.00 |
| | 10.000 | -177.48 | -177.5 | 10.000 | 0.058 | 2.00 |

Function : pH Measurement**Performing three buffers standard curve by using buffer nominal pH (4,7,10)**

| Unit Under Calibration | Standard pH Buffer Solution | Actual pH Reading | Actual mV Reading (mV) | Uncertainty of pH measurement (\pm) | Coverage factor <i>k</i> |
|-------------------------------------|-----------------------------|-------------------|---------------------------|--|-----------------------------|
| pH Electrode S/N.: PCE-86-EX1001 | 4.008 | 3.999 | 153.9 | 0.0055 | 2.09 |
| | 6.985 | 7.017 | -13.7 | 0.0084 | 2.00 |
| | 10.008 | 9.996 | -179.0 | 0.0078 | 2.06 |

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 %.

-oOo-

Malu.

a 1126274



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.: 22CG3154

Page.: 1 of 2

Certificate of Calibration

| | |
|-------------------------|--|
| Equipment : | Burette |
| Capacity : | 50 mL |
| Serial No. : | - |
| ID. No. : | BKK_EN0171 |
| Manufacturer : | Witeg |
| Made in : | Germany |
| Submitted by : | ALS Laboratory Group (Thailand) Co.,Ltd. 104 Phatthanakan 40, Phatthanakan Rd. Khwaeng Phatthanakan, Khet Suan Luang Bangkok 10250 Thailand |
| Ambient Temperature : | (20 ± 2.5) °C |
| Relative Humidity : | (50 ± 10) % |
| Barometric Pressure : | 759 mmHg |
| Calibration Procedure : | ASTM E 542 - 01 |
| Calibrated by : | Panward Pramklam |

| | |
|----------------|-------------------|
| REVIEW BY | <i>Sin'luk P.</i> |
| APPROVED BY | <i>KLAL</i> |
| NEXT CAL. DATE | <i>29/03/2024</i> |

Approved by :

Approved Signatory

- () Pornthippa Tameyakul
() Malee Butkruea
(☒) Ponpan Paipim
() Srisuda Khamtha

Issue Date :

31 August 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 0044607



Equipment : Burette
Received Date : 26 August 2022
Condition As-Received : Used Item
Calibration Date : 30 August 2022
Reference : 2208-0918DSC-2

Cert.No.: 22CG3154

Page.: 2 of 2

Condition of this result of calibration

1. Reference Standard Instruments :

| <u>Instruments</u> | <u>Model</u> | <u>Serial No.</u> | <u>ID. No.</u> | <u>Certificate No.</u> | <u>Traceability</u> | <u>Due date</u> |
|----------------------|--------------|-------------------|----------------|------------------------|---------------------|-----------------|
| 1) Balance | AE200S | N03679 | 140RC001 | 21MM429 | NIMT | 22 Sep 2022 |
| 2) Thermo-Hygrograph | THDX-CE | 00016540 | 140EC001 | 22H1243 | NIST,NIMT | 09 June 2023 |
| 3) Thermometer | - | 1594592 | 140EC010 | 22I181 | NIMT | 10 Feb 2023 |

This certification is traceable to SI Unit

2. The certificate is valid only to the item calibrated on date and place of calibration.
3. True value is converted to true volume at the standard temperature of 20 °C

Calibration result :

| Nominal capacity (mL) | Reading (mL) | Uncertainty (\pm mL) | k Factor |
|------------------------------------|---------------------------|--|---------------------|
| 50 | 49.9959 | 0.010 | 2.00 |

Remark mL = cm³

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 %.

-o0o-

a 1123908



Metrological Center

SCI ECO Services Company Limited

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

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th



Certificate No. T221644

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Cold Room)

Manufacturer : KOLDTECH

Model : KM 320

Serial No. : TBN-1012061/05

Customer Code : BKK_EN0167

ID No. : T2463A3

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

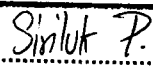
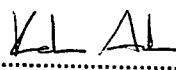
Customer Location : Environmental Laboratory

Date of Receipt : 27 June 2022

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 04 JUL 2022

| | |
|----------------|---|
| REVIEW BY |  |
| APPROVED BY |  |
| NEXT CAL. DATE | 30/12/23 |

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.

Certificate No. T221644

Page 2 of 4

Calibration Report

Equipment : Chamber (Cold Room)
Date of Calibration : 30 June - 1 July 2022
Environment : Temperature : 18.9-23.7 °C
Line Voltage : 222.9-226.5 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|----------------|-----------------|--------------|
| TC | TYPE T | TN161-TN170 | T210009 | 30 July 2022 |
| TC | TYPE T | TN171-TN180 | T210009 | 30 July 2022 |
| DATA LOGGER | 34970A | T149 | T210009 | 30 July 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 3 Hour - Minute At 3 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

() without adjustment

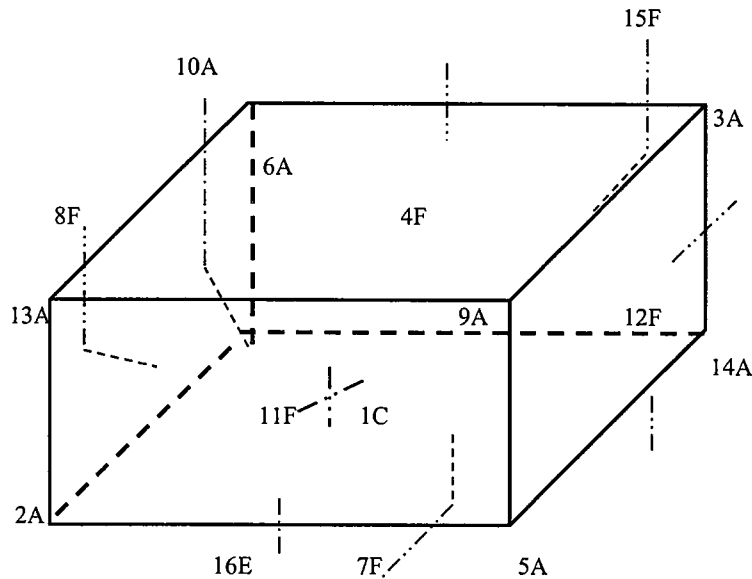
(X) after adjustment

Approved By. 

Certificate No. T221644

Page 3 of 4

Calibration Report



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

| | | |
|-----|---|-------|
| 1C | = | TN161 |
| 2A | = | TN162 |
| 3A | = | TN163 |
| 4F | = | TN164 |
| 5A | = | TN165 |
| 6A | = | TN166 |
| 7F | = | TN167 |
| 8F | = | TN168 |
| 9A | = | TN169 |
| 10A | = | TN170 |

| | | |
|-----|---|-------|
| 11F | = | TN171 |
| 12F | = | TN172 |
| 13A | = | TN173 |
| 14A | = | TN174 |
| 15F | = | TN175 |
| 16E | = | TN176 |

Approved By. 

Certificate No. T221644

Page 4 of 4

Calibration Report

Measurement Results:

| Average Standard Reading at each position (°C) | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Calibration Point | TN161 | TN162 | TN163 | TN164 | TN165 | TN166 | TN167 | TN168 | TN169 | TN170 |
| 3 | 2.71 | 2.82 | 2.75 | 2.89 | 2.95 | 3.68 | 3.02 | 2.96 | 3.03 | 2.85 |
| | TN171 | TN172 | TN173 | TN174 | TN175 | TN176 | | | | |
| | 2.97 | 3.02 | 2.89 | 3.04 | 2.97 | 3.33 | | | | |

| Chamber (Cold Room) | | | Temperature Distribution | | | | |
|-----------------------|--------------|---------|--------------------------|------------------|-----------------|--------------------|-----------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage |
| | Min , Max | Average | | | | | Factor <i>k</i> |
| 3.0 | 2.9 , 4.0 | 3.2 | 2.99 | 1.05 | 1.30 | 1.66 | 2.00 |

* The quoted uncertainty exclude " uniformity "

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* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6, e-mail: service.thailand@sartorius.com



NSC-TISI-TIS 17025

CALIBRATION 0426

SARTORIUS

Certificate

of Calibration

| | |
|----------------|------------|
| REVIEW BY | Sirilut P. |
| APPROVED BY | LL ΔL |
| NEXT CAL. DATE | 8/2/24 |

Model Number : MSE224S-100-DUDescription : Analytical BalanceSerial Number : 26207042ID No. : BKK_EN0002Manufacturer : SartoriusCertificate No. : 23BCI0072Issued Date : Monday, February 13, 2023Reference No. : 203245Page No. : 1 of 2Customer Name : ALS Laboratory Group (Thailand)Co., Ltd.104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan, Khet Suan Luang, Bangkok 10250.Calibrated Place : Balance RoomCalibrated By : Mr. Chonchai InthanaCalibration Date : Wednesday, February 08, 2023

Calibration

Procedure No. : This calibration was conducted by
Using in-house calibration procedure number (WI-003)

Based on UKAS LAB 14 : 2019

Metrological data :Capacity : 220 g Readability : 0.0001 g**Ambients Conditions:**Temperature : 23.2 °C ± 5.0 °CHumidity : 60.0 % RH ± 10.0 % RHPressure : ± **Reasons for calibration**☐ New Installation ☐ Service / Repaired ☒ Re-calibration/ MaintenanceEquipment Condition: ☒ Good Operate ☐ Fair**Measurement Method****UKAS Publication Ref :Lab 14**

The measurement uncertainty stated is the expended uncertainty which is obtained from the standard uncertainty multiplied by the coverage factor (k=2) to provide a level of confidence of approximately 95%. It is determined in accordance with the Guide to Expression of Uncertainty in Measurement (GUM). The calibration certificate documents the traceability to National Standards, which realise the unit of measurement according to the International Standard System of Units (SI). Report of Tolerance came from list of Sartorius Metrological Specifications.

Traceability:

| Model Number | Description | Traceability | Certificate No. | Due Date |
|---------------|--|--------------|-----------------|-------------|
| YCS011-522-00 | Sartorius weight set 1mg - 5000g E2, YCS011-522-00 | SPC-RT | C02212565 | 14-Sep-2023 |
| MHB-382SD | Humidity/Barometer/Temp Lutron MHB-382SD | DKSH | C19220444 | 5-Sep-2023 |

This certificate relate and apply this equipment only.

This certificate may not be reproduced other than in full except with the prior written approval of the Verification Operation Division Sartorius (Thailand) Co., Ltd.

SOP FM 33 03 February 2022

Mr. Chonchai Inthana (Technical Manager)

S
T
A
M
P

Sartorius (Thailand) Co., Ltd.

129 Rama 9 Road, Huaykwang, Huaykwang, Bangkok 10310

Tel: +66 2643 8361-6 Fax: +66 2643-8367, e-mail: service.thailand@sartorius.com

SARTORIUS

Certificate of Calibration

Model Number : MSE224S-100-DUCertificate No. : 23BCI0072Description : Analytical BalanceIssued Date : Monday, February 13, 2023Serial Number : 26207042Reference No. : 203245ID No. : BKK_EN0002Manufacturer : SartoriusPage No. : 2 of 2

Calibration Results : Without Adjustment

Repeatability

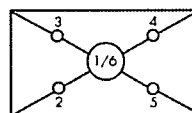
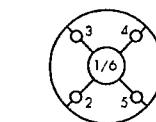
The reproducibility is the ability of a weighing instrument to display nearly identical readouts under constant test conditions when the same load within a measurement series is placed repeatedly on the weighing pan in the same manner. The standard deviation is used to express reproducibility quantitatively.

| | | |
|-----------------------------|---------|----------|
| Nominal Value : (Low Load) | 20.0000 | 200.0000 |
| 20 g | 20.0000 | 199.9999 |
| Tolerance | 20.0000 | 200.0000 |
| 0.0001 g | 20.0000 | 199.9999 |
| | 20.0001 | 200.0000 |
| Nominal Value : (High Load) | 20.0000 | 200.0000 |
| 200 g | 20.0000 | 199.9999 |
| Tolerance | 20.0000 | 199.9999 |
| 0.0001 g | 20.0000 | 200.0000 |
| | 20.0001 | 199.9999 |
| Standard Deviation | 0.00004 | 0.00005 |

Eccentricity (Off-center loading error)

The off-center loading error is yielded by the difference between the readout of the load, i.e. 1/3 or 1/4 of maximum capacity, placed in the middle of the weighing pan and between each of four additional measurement points (positions defined according to OIML R76).

Nominal value : 50 g
Tolerance 0.0004 g



| | Difference |
|---|------------|
| 1 | — |
| 2 | -0.0001 |
| 3 | 0.0000 |
| 4 | 0.0001 |
| 5 | 0.0000 |
| 6 | — |

Linearity

The linearity, also called linearity error. Describes the deviation of the characteristic curve of a weighing instrument from the linear slope.

Tolerance 0.0002 g

| Nominal Value (g) | Conventional Mass Value (g) | Displayed Value (g) | Deviation (g) | Uncertainty (g) |
|----------------------|--------------------------------|------------------------|------------------|--------------------|
| 0.01 | 0.0100 | 0.0100 | 0.0000 | 0.00014 |
| 0.1 | 0.1000 | 0.1000 | 0.0000 | 0.00014 |
| 1 | 1.0000 | 1.0000 | 0.0000 | 0.00014 |
| 2 | 2.0000 | 2.0000 | 0.0000 | 0.00014 |
| 5 | 5.0000 | 5.0000 | 0.0000 | 0.00014 |
| 10 | 10.0000 | 10.0000 | 0.0000 | 0.00014 |
| 20 | 20.0000 | 20.0000 | 0.0000 | 0.00014 |
| 50 | 50.0000 | 50.0000 | 0.0000 | 0.00015 |
| 100 | 100.0000 | 100.0000 | 0.0000 | 0.00019 |
| 200 | 200.0000 | 199.9999 | -0.0001 | 0.00030 |

End of Report.



Metrological Center

SCI ECO Services Company Limited

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

Saraburi Tel : +66 3627 3096 Fax : +66 3627 3100

Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.scieco.co.th

E-Mail : calibrate@scg.co.th



Certificate No. T220139

Page 1 of 3

Certificate of Calibration

Equipment : Liquid Bath (Water)

Manufacturer : MEMMERT

Model : WNB29

Serial No. : L611.0135

Customer Code : BKK_EN0148

ID No. : T6455A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

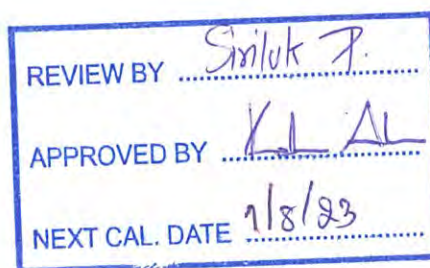
Customer Location : ORGANIC PREPARATION LAB

Date of Receipt : 26 January 2022

Calibrated By : Watcharapon Sangtong (Technician)

Approved By :  / Sujjar Naknakred (Site Calibration Manager)

Date of Issue : 08 FEB 2022



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.

Certificate No. T220139

Page 2 of 3

Calibration Report

Equipment : Liquid Bath (Water)
Date of Calibration : 31 January 2022
Environment : Temperature : 22.4-23.9 °C
Line Voltage : 221.4-225.4 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert five resistance thermometer detectors into its water bath , the other one thermocouple type T use for ambient temperature measurement . The calibration was done in according to WI-T36 (based on ASTM E715-80 (Reapproved 2001)).

All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|-----------------|
| RTD | 100 OHM | M34 (CH1-CH5) | T210115 | 2 February 2022 |
| DATA LOGGER | 34970A | T47 | T210115 | 2 February 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 1 Hour - Minute At 60 °C

5. Adjustment :

(X) without adjustment

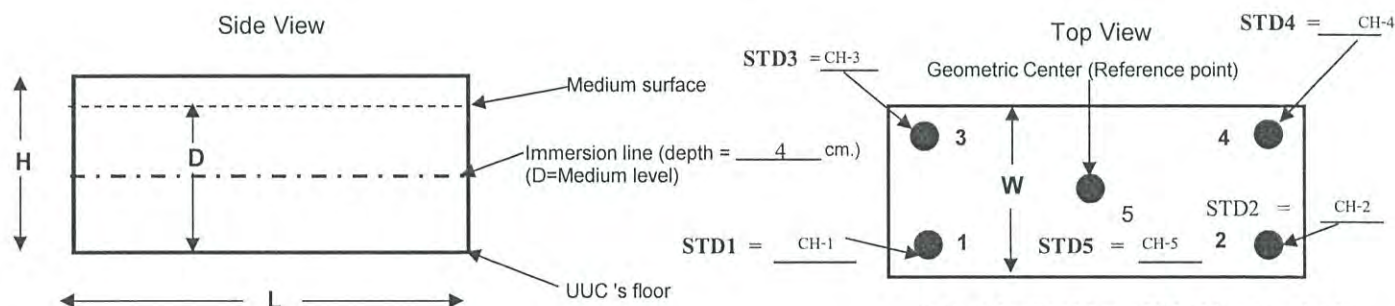
() after adjustment

Approved By. 

Certificate No. T220139

Page 3 of 3

Calibration Report



- D = Medium level : 8 cm.
 - UUC's medium : Water
 - Working standards are located at 2.5 cm. away from each corner and walls.
- Working space dimension : 62 × 41 × 14 (W×L×H)

Measurement Results:

| Calibration Point | Average Standard Reading at each position (°C) | | | | |
|-------------------|--|-------|-------|-------|-------|
| | CH-1 | CH-2 | CH-3 | CH-4 | CH-5 |
| 60 | 59.95 | 60.04 | 60.12 | 60.01 | 59.89 |
| 85 | 85.17 | 84.89 | 85.34 | 84.78 | 84.93 |
| 95 | 93.46 | 93.14 | 93.81 | 93.05 | 93.28 |

| Liquid Bath (Water) | | | Temperature Distribution | | | |
|-----------------------|--------------|---------|--------------------------|----------------------|-----------------------|-----------------------------|
| Setting (°C) | Reading (°C) | | Stability (± °C) | Uniformity (± °C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | |
| 61.0 | 60.9 , 61 | 61.0 | 0.10 | 0.19 | 0.25 | 2.00 |
| 86.0 | 85.9 , 86.1 | 86.0 | 0.12 | 0.39 | 0.32 | 2.06 |
| 95.0 | 94.8 , 95.1 | 94.9 | 0.14 | 0.51 | 0.38 | 2.11 |

* The quoted uncertainty exclude "uniformity"

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* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 



Metrological Center

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Certificate No. T222502

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Oven)

Manufacturer : Memmert

Model : UF 450

Serial No. : B7170531

Customer Code : BKK_EN0273

ID No. : T8042A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Oven Room

Date of Receipt : 23 November 2022

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By :  /Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 09 DEC 2022

| | |
|----------------|-----------|
| REVIEW BY | Sinluk P. |
| APPROVED BY | KL AL |
| NEXT CAL. DATE | 29/05/24 |

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.

Certificate No. T222502

Page 2 of 4

Calibration Report

Equipment : Chamber (Oven)
Date of Calibration : 29 November 2022
Environment : Temperature : 29.1-29.6 °C
Line Voltage : 221.3-223.2 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert nine resistance thermometer detectors and nine standard thermocouples type T into its chamber , the other one resistance thermometer detector use for ambient temperature measurement .
The calibration was done in according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986).
All data show below were final values and the initial data from customer request . The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|------------------|
| RTD | 100 ohm | 27-(CH1-10) | T210004 | 30 December 2022 |
| TC | TYPE T | TN261-TN270 | T210010 | 30 December 2022 |
| DATA LOGGER | 34970A | T149 | T210004 | 30 December 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 1 Hour 49 Minute At 104 °C
Fresh Air Damper ☒ Open ☐ Min ☐ Medium ☒ Max
☐ Close
☐ Not Available

5. Adjustment :

() without adjustment

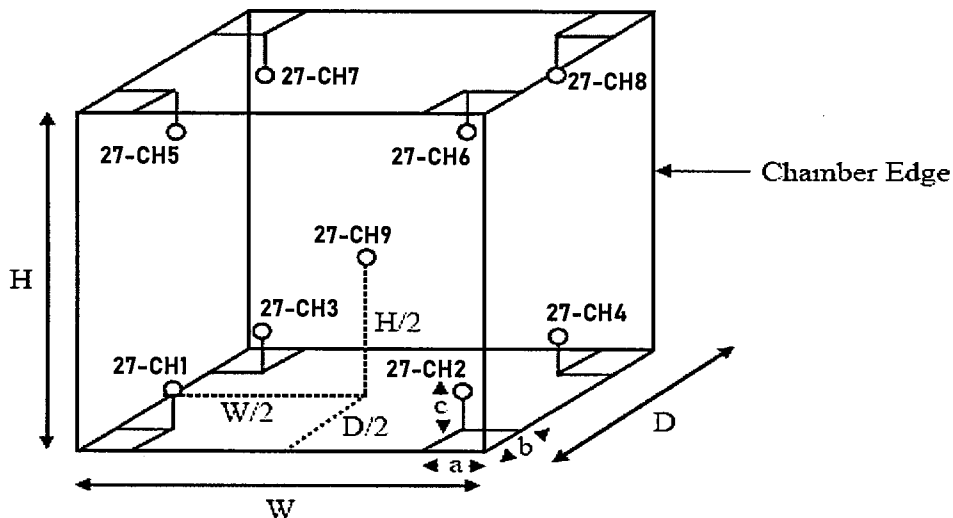
(X) after adjustment

Approved By. Bm Loi

Certificate No. T222502

Page 3 of 4

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 104 cm. , H (Height) = 72 cm. and D (Depth) = 60 cm.

Size of Installed Standard sensor number 27-CH1 to number 27-CH8 : a = 5 cm. ,b = 5 cm. and c = 5 cm.

Size of Installed Standard sensor number 27-CH9 : W/2 = 104 cm./2 , H/2 = 72 cm./2 and D/2 = 60cm./2

Measurement Results

| Average Standard Reading at each position (°C) | | | | | | | | | |
|--|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Calibration Point | 27-CH1 | 27-CH2 | 27-CH3 | 27-CH4 | 27-CH5 | 27-CH6 | 27-CH7 | 27-CH8 | 27-CH9 |
| 104 | 104.07 | 103.60 | 103.45 | 104.02 | 104.47 | 103.57 | 104.59 | 103.78 | 104.18 |


| Chamber (Oven) | | | Temperature Distribution | | | | |
|------------------|----------------|---------|--------------------------|--------------------|-------------------|----------------------|-----------------------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | | |
| 104.0 | - | 104.0 | 103.97 | 0.07 | 0.70 | 0.42 | 2.00 |

* The quoted uncertainty exclude "uniformity"

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.

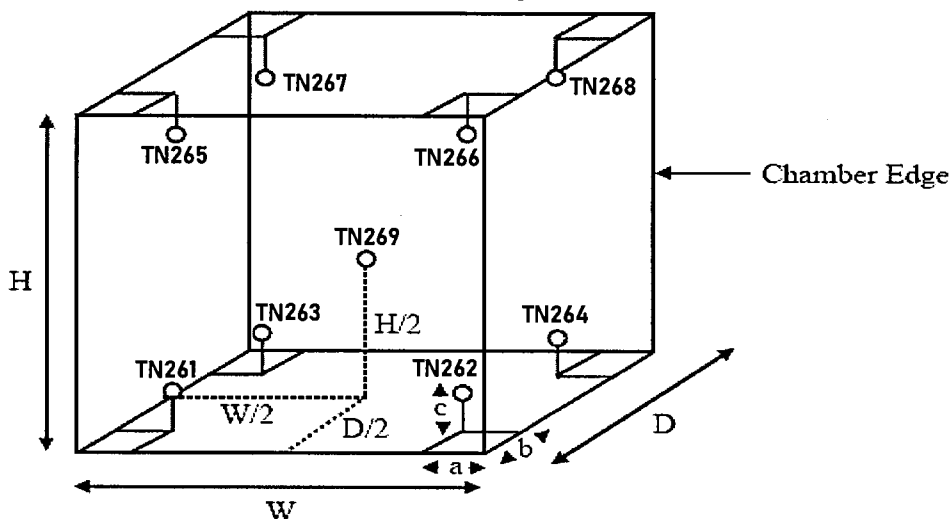
The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor *k* which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 

Certificate No. T222502

Page 4 of 4

Calibration Report



Remark :

Internal Dimensions of Chamber : W (Width) = 104 cm. , H (Height) = 72 cm. and D (Depth) = 60 cm.

Size of Installed Standard sensor number TN261 to number TN268 : a = 5 cm. ,b = 5 cm. and c = 5 cm.

Size of Installed Standard sensor number TN269 : W/2 = 104 cm./2 , H/2 = 72 cm./2 and D/2 = 60cm./2

Measurement Results

| Calibration Point | Average Standard Reading at each position (° C) | | | | | | | | |
|-------------------|---|--------|--------|--------|--------|--------|--------|--------|--------|
| | TN261 | TN262 | TN263 | TN264 | TN265 | TN266 | TN267 | TN268 | TN269 |
| 180 | 179.14 | 179.17 | 179.65 | 179.26 | 180.41 | 179.64 | 181.18 | 180.99 | 180.36 |

| Chamber (Oven) | | | Temperature Distribution | | | | |
|------------------|-----------------|---------|--------------------------|---------------------|--------------------|-----------------------|--------------------------|
| Setting (° C) | Reading (° C) | | Average (° C) | Stability (± ° C) | Uniformity (° C) | Uncertainty (± ° C) | Coverage Factor <i>k</i> |
| | Min , Max | Average | | | | | |
| 180.0 | - | 180.0 | 179.98 | 0.38 | 1.78 | 1.10 | 2.00 |


* The quoted uncertainty exclude "uniformity"

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* which for a t-distribution, providing

a level of confidence of approximately 95 % .

Approved By. 



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Bangkok Tel : +668 9205 6851 , +669 8247 2360

Website : www.scieco.co.th E-Mail : calibrate@scg.com



Certificate No. T230683

Page 1 of 4

Certificate of Calibration

Equipment : Chamber (Incubator)

Manufacturer : MEMMERT

Model : ICP 750

Serial No. : F818.0075

Customer Code : BKK_EN0305

ID No. : T9571A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab 2

Date of Receipt : 30 March 2023

Calibrated By : Sujjar Naknakred (Site Calibration Manager)

Approved By :  / Boonchai Suriyawong (Assistant Calibration Manager)

Date of Issue : 10 APR 2023

| | |
|----------------|-----------|
| REVIEW BY | Sinluk P. |
| APPROVED BY | KL AL |
| NEXT CAL. DATE | 05/04/24 |

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.

Certificate No. T230683

Page 2 of 4

Calibration Report

Equipment : Chamber (Incubator)
Date of Calibration : 5 April 2023 (Finished Time 4:30 PM)
Environment : Temperature 22.9-28.6 °C
Line Voltage 221.7-225.5 V

Condition of this results of test. :

1. This instrument was calibrated by insert 12 standard resistance thermometer into its chamber and test according to WI-T20 (based on ASTM E145-94 (Reapproved 2001) and AS2853-1986.)

All data show below were final values and the initial data may be obtained upon request.

The temperature scale used was based on ITS - 90.

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|---------|----------------|-----------------|------------------|
| RTD | 100 ohm | 37-(CH1-10) | T222493 | 28 November 2023 |
| RTD | 100 ohm | 36-(CH1-10) | T222493 | 28 November 2023 |
| DATA LOGGER | 34970A | T193 | T222493 | 28 November 2023 |

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

UUC Description :

Time Constant 2 Hour 24 Minute At 20 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Result of test :

() without adjustment

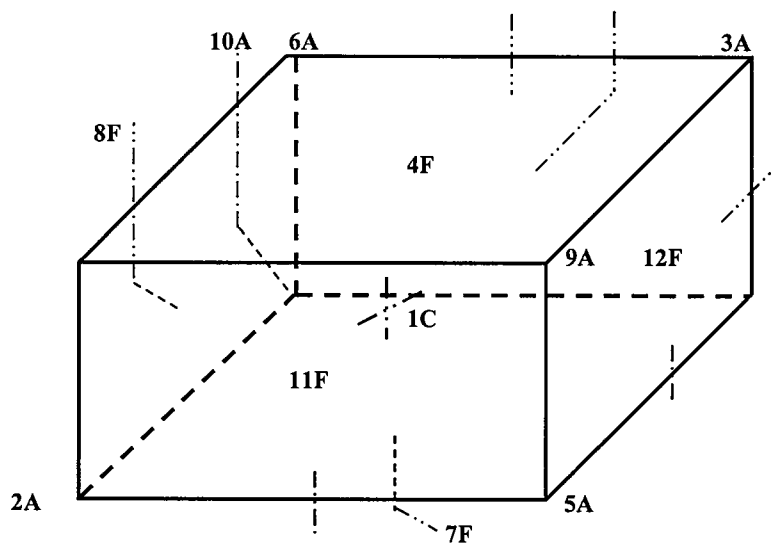
(X) after adjustment

Approved By. 

Certificate No T230683

Calibration Report

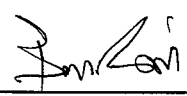
Page 3 of 4



C = Centre , F = Centre of Face , A = Corner , E = Centre of Edge

| | | |
|-----|---|--------|
| 1C | = | 37CH1 |
| 2A | = | 37CH2 |
| 3A | = | 37CH3 |
| 4F | = | 37CH4 |
| 5A | = | 37CH5 |
| 6A | = | 37CH6 |
| 7F | = | 37CH7 |
| 8F | = | 37CH8 |
| 9A | = | 37CH9 |
| 10A | = | 37CH10 |

| | | |
|-----|---|-------|
| 11F | = | 36CH1 |
| 12F | = | 36CH2 |

Approved By. 

Certificate No. T230683

Calibration Report

Page 4 of 4

Measurement Results

| Average Standard Reading at each position (°C) | | | | | | | | | | |
|--|-------|-------|-------|-------|-------|-------|-------|-------|-------|--------|
| Calibration Point | 37CH1 | 37CH2 | 37CH3 | 37CH4 | 37CH5 | 37CH6 | 37CH7 | 37CH8 | 37CH9 | 37CH10 |
| 20.0 | 20.32 | 20.28 | 20.17 | 20.22 | 20.22 | 20.04 | 20.17 | 19.74 | 20.31 | 19.93 |
| | 36CH1 | 36CH2 | | | | | | | | |
| | 20.14 | 20.20 | | | | | | | | |
| Calibration Point | 37CH1 | 37CH2 | 37CH3 | 37CH4 | 37CH5 | 37CH6 | 37CH7 | 37CH8 | 37CH9 | 37CH10 |
| 25 | 25.28 | 25.15 | 25.13 | 25.13 | 25.20 | 25.02 | 25.11 | 24.79 | 25.20 | 25.26 |
| | 36CH1 | 36CH2 | | | | | | | | |
| | 25.13 | 24.94 | | | | | | | | |

| Chamber (Incubator) | | | Temperature Distribution | | | | |
|-----------------------|--------------|---------|--------------------------|------------------|-----------------|--------------------|----------------------|
| Setting (°C) | Reading (°C) | | Average (°C) | Stability (± °C) | Uniformity (°C) | Uncertainty (± °C) | Coverage Factor k |
| | Min , Max | Average | | | | | |
| 20.0 | 19.9 , 20.1 | 20.0 | 20.02 | 0.09 | 0.54 | 0.38 | 2.00 |
| 25.0 | 24.9 , 25.1 | 25.0 | 25.03 | 0.03 | 0.51 | 0.38 | 2.00 |

* The quoted uncertainty exclude "uniformity"

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 which for a t-distribution, providing a level of confidence of approximately 95 % .

Approved By. 



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Certificate No. T230352

Page 1 of 5

Certificate of Calibration

Equipment : HOT BLOCK

Manufacturer : Environmental Express

Model : B3000- 240

Serial No. : 2017CODW116

Customer Code : BKK_EN0222

ID No. : T6769A4

Customer : ALS Laboratory Group (Thailand) Co.,Ltd.

104 Phatthanakan 40, Phatthanakan Rd., Khwaeng Phatthanakan,

Khet Suan Luang, Bangkok 10250

Customer Location : Wet Chemistry Lab2

Date of Receipt : 21 February 2023

Calibrated By : Watcharasak Puttarat (Technician)

Approved By :  / Boonchai Suriyawong (Site Calibration Manager)

Date of Issue : 20 MAR 2023

| | |
|----------------|-----------|
| REVIEW BY | Simlut P. |
| APPROVED BY | KL AL |
| NEXT CAL. DATE | 01/03/24 |

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.



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Certificate No. T230352

Page 2 of 5

Calibration Report

Equipment : HOT BLOCK
Date of Calibration : 1 March 2023
Environment : Temperature : 22.9-24.4 °C
Line Voltage : 222.7-227.8 V
Relative Humidity : 55 - 65 %RH

Condition of this results of calibration :

1. This equipment was calibrated by insert 20 standard thermocouples type T into its chamber , the other one standard thermocouples type T use for ambient temperature measurement . The calibration was done in according to WI-T20. All data show below were final values and the initial data from customer request .
The temperature scale used was based on ITS - 90 .

2. Reference Standard Instrument :

| Instrument | Model | Instrument No. | Certificate No. | Due Date |
|-------------|--------|----------------|-----------------|----------------|
| TC | TYPE T | TN121-TN130 | T222122 | 5 October 2023 |
| TC | TYPE T | TN131-TN140 | T222122 | 5 October 2023 |
| DATA LOGGER | 34970A | T150 | T222122 | 5 October 2023 |

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 2 Hour 22 Minute At 150 °C
Fresh Air Damper ☐ Open ☐ Min ☐ Medium ☐ Max
☐ Close
☒ Not Available

5. Adjustment :

(X) without adjustment

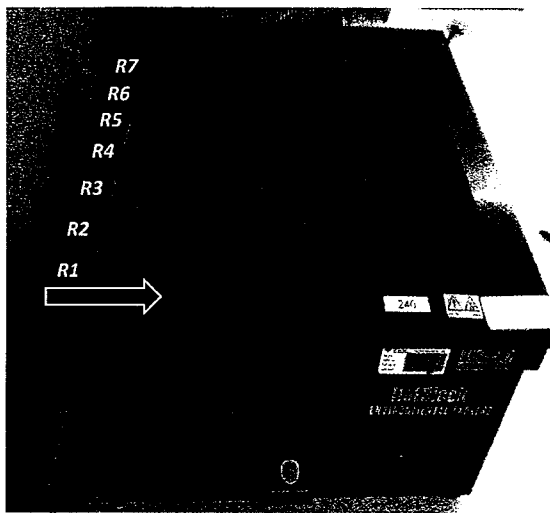
() after adjustment

Approved By

Certificate No T230352

Page 3 of 5

Calibration Report



| Row | Hole | | | | | | | |
|-----|------|-----|-----|-----|-----|-----|-----|-----|
| R7 | H49 | H50 | H51 | H52 | H53 | H54 | H55 | H56 |
| R6 | H41 | H42 | H43 | H44 | H45 | H46 | H47 | H48 |
| R5 | H33 | H34 | H35 | H36 | H37 | H38 | H39 | H40 |
| R4 | H25 | H26 | H27 | H28 | H29 | H30 | H31 | H32 |
| R3 | H17 | H18 | H19 | H20 | H21 | H22 | H23 | H24 |
| R2 | H9 | H10 | H11 | H12 | H13 | H14 | H15 | H16 |
| R1 | H1 | H2 | H3 | H4 | H5 | H6 | H7 | H8 |

H: STANDARD THERMOCOUPLE TYPE T

| | | | | | | | | | | | | | | | | | | | | |
|----|---|-------|-----|---|-------|-----|---|-------|-----|---|-------|-----|---|-------|-----|---|-------|-----|---|-------|
| H1 | = | TN121 | H9 | = | TN129 | H17 | = | TN137 | H25 | = | TN125 | H33 | = | TN133 | H41 | = | TN121 | H49 | = | TN129 |
| H2 | = | TN122 | H10 | = | TN130 | H18 | = | TN138 | H26 | = | TN126 | H34 | = | TN134 | H42 | = | TN122 | H50 | = | TN130 |
| H3 | = | TN123 | H11 | = | TN131 | H19 | = | TN139 | H27 | = | TN127 | H35 | = | TN135 | H43 | = | TN123 | H51 | = | TN131 |
| H4 | = | TN124 | H12 | = | TN132 | H20 | = | TN140 | H28 | = | TN128 | H36 | = | TN136 | H44 | = | TN124 | H52 | = | TN132 |
| H5 | = | TN125 | H13 | = | TN133 | H21 | = | TN121 | H29 | = | TN129 | H37 | = | TN137 | H45 | = | TN125 | H53 | = | TN133 |
| H6 | = | TN126 | H14 | = | TN134 | H22 | = | TN122 | H30 | = | TN130 | H38 | = | TN138 | H46 | = | TN126 | H54 | = | TN134 |
| H7 | = | TN127 | H15 | = | TN135 | H23 | = | TN123 | H31 | = | TN131 | H39 | = | TN139 | H47 | = | TN127 | H55 | = | TN135 |
| H8 | = | TN128 | H16 | = | TN136 | H24 | = | TN124 | H32 | = | TN132 | H40 | = | TN140 | H48 | = | TN128 | H56 | = | TN136 |

Approved By.





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Certificate No. T230352

Page 4 of 5

Calibration Report

Measurement Results

| | | | Average Standard Reading at each position (° C) | | | | | | | | | |
|-------------------|-------|---------|---|--------|--------|--------|--------|--------|--------|--------|--------|--------|
| Calibration Point | | | TN121 | TN122 | TN123 | TN124 | TN125 | TN126 | TN127 | TN128 | TN129 | TN130 |
| 150 | 150.0 | Max | 152.61 | 150.49 | 150.10 | 148.27 | 149.85 | 151.19 | 149.99 | 149.29 | 149.97 | 150.03 |
| | | Min | 152.15 | 149.87 | 149.73 | 147.75 | 149.26 | 150.78 | 149.49 | 148.56 | 149.15 | 149.15 |
| | | Average | 152.41 | 150.22 | 149.90 | 147.99 | 149.48 | 150.92 | 149.71 | 148.92 | 149.51 | 149.67 |
| | | | TN131 | TN132 | TN133 | TN134 | TN135 | TN136 | TN137 | TN138 | TN139 | TN140 |
| | | Max | 149.84 | 148.34 | 148.34 | 149.88 | 152.39 | 149.73 | 149.66 | 149.16 | 149.76 | 151.18 |
| | | Min | 149.35 | 147.85 | 148.40 | 148.94 | 152.39 | 149.19 | 148.83 | 148.68 | 149.51 | 150.92 |
| | | Average | 149.67 | 148.10 | 148.59 | 149.55 | 152.39 | 149.36 | 149.25 | 148.96 | 149.64 | 151.05 |
| | | | TN121 | TN122 | TN123 | TN124 | TN125 | TN136 | TN127 | TN128 | TN129 | TN130 |
| | | Max | 152.91 | 150.56 | 149.20 | 148.63 | 149.78 | 151.28 | 150.09 | 148.83 | 148.16 | 148.33 |
| | | Min | 152.72 | 150.04 | 148.59 | 147.96 | 149.42 | 150.96 | 149.83 | 148.20 | 147.62 | 147.29 |
| | | Average | 152.80 | 150.29 | 148.89 | 148.30 | 149.60 | 151.08 | 149.97 | 148.52 | 147.90 | 147.80 |
| | | | TN131 | TN132 | TN133 | TN134 | TN135 | TN136 | TN137 | TN138 | TN139 | TN140 |
| | | Max | 148.81 | 148.04 | 148.56 | 148.11 | 149.07 | 149.06 | 148.58 | 149.85 | 149.07 | 150.89 |
| | | Min | 148.08 | 147.63 | 148.07 | 147.63 | 148.81 | 148.62 | 148.18 | 149.60 | 148.86 | 150.63 |
| | | Average | 148.45 | 147.84 | 148.36 | 147.81 | 148.94 | 148.84 | 148.37 | 149.74 | 148.96 | 150.78 |
| | | | TN121 | TN122 | TN123 | TN124 | TN125 | TN126 | TN127 | TN128 | TN129 | TN130 |
| | | Max | 150.76 | 152.63 | 151.14 | 150.47 | 151.07 | 150.93 | 149.35 | 150.31 | 149.28 | 149.81 |
| | | Min | 150.59 | 152.40 | 150.69 | 150.17 | 150.77 | 150.54 | 148.80 | 149.93 | 148.84 | 149.23 |
| | | Average | 150.69 | 152.52 | 150.95 | 150.33 | 150.94 | 150.73 | 149.18 | 150.10 | 149.04 | 149.56 |
| | | | TN131 | TN132 | TN133 | TN134 | TN135 | TN136 | | | | |
| | | Max | 150.97 | 150.34 | 151.70 | 149.10 | 153.13 | 150.74 | | | | |
| | | Min | 150.77 | 149.94 | 151.36 | 148.83 | 152.91 | 150.61 | | | | |
| | | Average | 150.87 | 150.13 | 151.53 | 148.97 | 153.05 | 150.66 | | | | |

Approved By.



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Certificate No. T230352

Page 5 of 5

Calibration Report

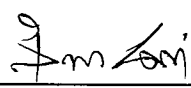
Measurement Results

| HOT BLOCK | | | Temperature Distribution | |
|--------------|--------------|---------|--------------------------|-------------------------|
| Setting (°C) | Reading (°C) | | Stability (\pm °C) | Uncertainty (\pm °C) |
| | Min , Max | Average | | |
| 150.0 | 150 , 150.1 | 150.0 | 0.60 | 1.01 |

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. 

Certificate of Calibration

Number of Page(s) 1 of 3

Certificate No. BSCC-UV-307/22
Equipment UV/Vis Spectrophotometer
Model UV-1800
Manufacturer Shimadzu
Serial No. A11454908533CD
ID No. BKK_EN0018
Date of receipt 16 September 2022
Date of calibration 16 September 2022
Date of issue 23 September 2022

REVIEW BY *Siriluk P.*
APPROVED BY *Kw An*
16/9/23
NEXT CAL. DATE *23/9/22*

Customer name ALS Laboratory Group (Thailand) Co., Ltd.

Address 104 Soi Phatthanakan 40, Phatthanakan Road, Phatthanakan, Suan Luang, Bangkok 10250

Temperature (22.1-23.3) °C (On site)

Humidity (58.8-63.2) %RH (On site)

Equipment condition Good Operation

Calibration Location Organic Prep

Calibration Procedure In-house method WI-UV-702-01 based on ASTM E275-01

Traceability Wavelength Accuracy is traceable to certificate No. 95917 and 95918
Photometric Accuracy is traceable to certificate No. 95924 and 95937
Stray Light is traceable to certificate No. 95908
The above certificate are traceable to SI unit through Starna Scientific Ltd.
(UKAS accredited calibration laboratory NO. 0659)

Calibrated by Mr.Waruth Janphung

Approved by



Mr.Kanchit Choothep
Technical Manager

The above results are valid exclusively for the calibrated item(s) as mention in this report / certificate.
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except in full, without written approval of the Bara Scientific Co., Ltd.

Certificate of Calibration

Certificate No.

BSCC-UV-307/22

Number of Page(s)

2 of 3

Calibration Results:

1.Wavelength Accuracy

| Certified Wavelength (nm) | UUC (nm) | Error (nm) | Uncertainty (\pm nm) |
|---------------------------|----------|------------|-------------------------|
| 241.70 | 241.65 | -0.05 | 0.18 |
| 334.02 | 333.92 | -0.10 | 0.18 |
| 418.53 | 418.46 | -0.07 | 0.18 |
| 572.99 | 572.96 | -0.03 | 0.18 |
| 879.41 | 879.17 | -0.24 | 0.18 |

2.Photometric Accuracy (UV)

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty (\pm A) |
|-----------------|--------------------------|---------|-----------|------------------------|
| 235 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| | 0.7467 | 0.7461 | -0.0006 | 0.0075 |
| 257 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| | 0.8662 | 0.8647 | -0.0015 | 0.0075 |
| 313 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| | 0.2904 | 0.2911 | 0.0007 | 0.0075 |
| 350 | 0.0000 | 0.0000 | 0.0000 | 0.0075 |
| | 0.6429 | 0.6426 | -0.0003 | 0.0075 |

*CNR = Customer not request

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Certificate of Calibration

Certificate No. **BSCC-UV-307/22**

Number of Page(s)

3 of 3

Calibration Results:

3. Photometric Accuracy (Visible)

| Wavelength (nm) | Certified Absorbance (A) | UUC (A) | Error (A) | Uncertainty ($\pm A$) |
|-----------------|--------------------------|---------|-----------|-------------------------|
| 420.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5783 | 0.5777 | -0.0006 | 0.0042 |
| | 0.7628 | 0.7635 | 0.0007 | 0.0046 |
| | 1.0206 | 1.0230 | 0.0024 | 0.0042 |
| 440.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5621 | 0.5618 | -0.0003 | 0.0042 |
| | 0.7455 | 0.7460 | 0.0005 | 0.0048 |
| | 0.9985 | 1.0005 | 0.0020 | 0.0042 |
| 465.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5227 | 0.5219 | -0.0008 | 0.0042 |
| | 0.6880 | 0.6884 | 0.0004 | 0.0051 |
| | 0.9487 | 0.9503 | 0.0016 | 0.0042 |
| 546.1 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5207 | 0.5199 | -0.0008 | 0.0042 |
| | 0.6973 | 0.6971 | -0.0002 | 0.0049 |
| | 0.9959 | 0.9964 | 0.0005 | 0.0042 |
| 590.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5544 | 0.5534 | -0.0010 | 0.0042 |
| | 0.7253 | 0.7242 | -0.0011 | 0.0050 |
| | 1.0942 | 1.0943 | 0.0001 | 0.0042 |
| 635.0 | 0.0000 | 0.0000 | 0.0000 | 0.0042 |
| | 0.5616 | 0.5606 | -0.0010 | 0.0042 |
| | 0.6927 | 0.6921 | -0.0006 | 0.0053 |
| | 1.0881 | 1.0885 | 0.0004 | 0.0042 |

*CNR = Customer not request

4. Stray Light*

| Standard cut-off wavelength (nm) | Unit Under Calibration(UUC) | | |
|-------------------------------------|-----------------------------|-------------------|----------------|
| | Wavelength (nm) | Transmission (%T) | Absorbance (A) |
| 200.96 \pm 0.11nm | 200.30 | 0.9505 | 2.0229 |

The Stray light transmission reference is less than 1.0%T and Stray light absorbance reference is greater than 2.00A

*Stray Light not NSC-ONSC Accredited.

The measurement uncertainty is base on a standard uncertainty multiplied by a coverage factor k=2 providing a level of confidence of approximately 95%.

*****End of Certificate*****

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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-27 FAX. 0-2719-9484



Cert. No.: 22TM676

Page.: 1 of 3

Certificate of Calibration

Equipment : Autoclave

Manufacturer : TOMY

Model : SX-700

Serial No. : 48134190

ID No. : BKK_ML0041

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : Media Preparation Room

Received Order : 20 May 2022

Calibration Date : 20 May 2022

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by :

Approved Signatory

() Pornthippa Tameyakul

() Malee Butkruea

(✓) Suwit Imjai

Issue Date : 24 May 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0041435



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2205-0404OC-2

Cert. No.: 22TM676

Page.: 2 of 3

Procedure Used :-

Calibration were conducted using in-house calibration procedure CP-OT03 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| <u>Instrument</u> | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1) Data Acquisition | 34972A | MY57013823 | 22LM24 | 26 Feb 2023 |

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

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

4. This result of calibration covers laboratory autoclaves for the sterilization of goods and material which could be infected with organisms categorized as Hazard Group 1, 2 and 3**

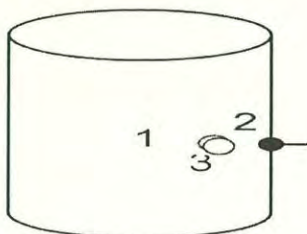
(** = Categorization of pathogens according to hazard and categories of containment, second edition, 1990)

It does not cover autoclaves for use with material infect with organisms in Hazard Group 4, for which complete containment and sterilization of infected condensate is considered to be essential.

This result of calibration does not apply to sterilizers or disinfectors used for medical, dental, pharmaceutical or veterinary purposes which are directly concerned with patient care, or those used for fabrics subjected to sterilization which are required to be dry at the end of cycle.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source



| | Environmental | | |
|--------------------------|---------------|-----------|----------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 24 | 55 | 220 |
| Finished of Calibration | 26 | 57 | 221 |

| <u>Position</u> | <u>Description</u> | <u>Ref. Std. ID No.:</u> |
|-----------------|--------------------|--------------------------|
| 1 = | Center of chamber | 19-17TC-11 |
| 2 = | Temperature sensor | 19-17TC-12 |
| 3 = | Exhaust port | 19-17TC-13 |

Signature



Equipment : Autoclave
Condition As-Received : Used Item
Reference : 2205-0404OC-2

Cert. No.: 22TM676

Page.: 3 of 3

Result of Calibration :- (*) Without Adjustment

Operating parameter Set : Temperature = 108 °C

Sterilization period = 10 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|---------------------------|---------------------------|----------|--|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 108 | 108 | 1 | 107.536 | 0.19 | 0.04 | 0.91 | 2 |
| | | 2 | 107.542 | | | | |
| | | 3 | 107.471 | | | | |

Operating parameter Set : Temperature = 115 °C

Sterilization period = 20 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|---------------------------|---------------------------|----------|--|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 115 | 115 | 1 | 114.502 | 0.15 | 0.08 | 0.89 | 2 |
| | | 2 | 114.582 | | | | |
| | | 3 | 114.539 | | | | |

Operating parameter Set : Temperature = 118 °C

Sterilization period = 10 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|---------------------------|---------------------------|----------|--|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 118 | 118 | 1 | 117.517 | 0.094 | 0.09 | 0.88 | 2 |
| | | 2 | 117.616 | | | | |
| | | 3 | 117.530 | | | | |

Result of Calibration :- (*) Without Adjustment

Operating parameter Set : Temperature = 121 °C

Sterilization period = 30 minute

| UUC* Setting (°C) | UUC* Reading (°C) | Position | Average* Standard Reading (°C) | Stability (± °C) | Pressure Reading (MPa) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|---------------------------|---------------------------|----------|--|-----------------------|--------------------------------|-------------------------|--------------------------------|
| 121 | 121 | 1 | 120.400 | 0.18 | 1.1 | 0.90 | 2 |
| | | 2 | 120.511 | | | | |
| | | 3 | 120.465 | | | | |

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

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Signature

a 1109669



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



Cert. No.: 22TM102

Page.: 1 of 3

Certificate of Calibration

Equipment : Incubator
Manufacturer : SHEL-LAB
Model : 1915A
Serial No. : 0200599
ID No. : BKK_ML0010
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : Incubation & Micrological Reading
Received Order : 21 January 2022
Calibration Date : 21 January 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Krisda Malee

| | |
|----------------|--------------|
| REVIEW BY | Sithichok T. |
| APPROVED BY | [Signature] |
| NEXT CAL. DATE | 22/07/23 |

Approved by :

Malee

Approved Signatory

- (☒) Pornthippa Tameyakul
(☒) Malee Butkruea
(☐) Suwit Imjai

Issue Date :

3 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0037377



Equipment : Incubator
 Condition As-Received : Used Item
 Reference : 2201-0616OC-1

Cert. No.: 22TM102

Page.: 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34972A | MY57013711 | 21LM7 | 16 Jun 2022 |

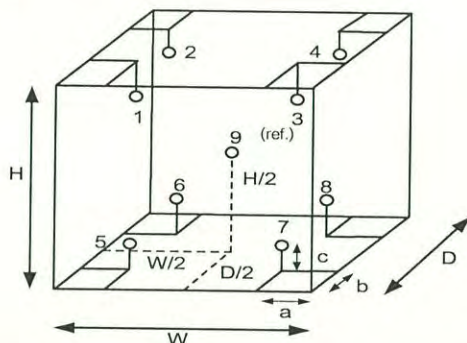
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 26 | 25 |
| REL.Humid. (%) | 53 | 54 |
| AC Supply (Volt) | 220 | 221 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 18-18RTD-01 |
| 2 | 18-18RTD-02 |
| 3 | 18-18RTD-03 |
| 4 | 18-18RTD-04 |
| 5 | 18-18RTD-05 |
| 6 | 18-18RTD-06 |
| 7 | 18-18RTD-07 |
| 8 | 18-18RTD-08 |
| 9 (ref.) | 18-18RTD-09 |

Probe Installation Details :

a = 10 cm
 b = 10 cm
 c = 10 cm

Dimension of Chamber :

D = 0.90 m
 W = 0.75 m
 H = 1.2 m
 Capacity = 0.81 m³

Malu .



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2201-0616OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 22TM102

Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 35.0 | 35.0 | 35.0 | 0.043 | 0.41 | 0.42 | 0.30 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|-----------------------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 35.0 | 34.801 | 34.868 | 34.862 | 35.012 | 35.040 | 35.010 | 35.084 | 35.040 | 35.178 |

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Mahu.



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Cert. No.: 21TM1101

Page.: 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven
Manufacturer : Binder
Model : ED240/E2
Serial No. : 00-15533
ID No. : BKK_ML0013
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : Media Preparation Room
Received Order : 7 June 2021
Calibration Date : 7 June 2021
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Preecha Hlahib

| | |
|----------------|--------------|
| REVIEW BY | Sithichok T. |
| APPROVED BY | [Signature] |
| NEXT CAL. DATE | 6/12/22 |

Approved by :

Malee

Approved Signatory

- () Pornthippa Tameyakul
(☒) Malee Butkruea
() Suwit Imjai

Issue Date :

21 June 2021

The Uncertainties are for a confidence probability of approximately 95%

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

A 0029135



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2106-0101OC-2

Cert. No.: 21TM1101

Page.: 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

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

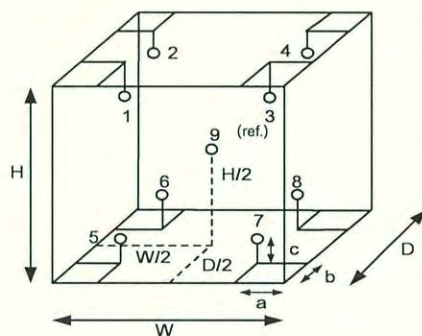
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close



| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 26 | 27 |
| REL.Humid. (%) | 65 | 72 |
| AC Supply (Volt) | 220 | 222 |

| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 19-17TC-01 |
| 2 | 19-17TC-02 |
| 3 | 19-17TC-03 |
| 4 | 19-17TC-04 |
| 5 | 19-17TC-05 |
| 6 | 19-17TC-06 |
| 7 | 19-17TC-07 |
| 8 | 19-17TC-08 |
| 9 (ref.) | 19-17TC-09 |

Probe Installation Details :

a = 5.0 cm
b = 5.0 cm
c = 5.0 cm

Dimension of Chamber :

D = 0.50 m
W = 0.80 m
H = 0.60 m
Capacity = 0.24 m³

make .



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2106-0101OC-2
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 21TM1101
Page.: 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 180 | 180 | 180 | 0.67 | 2.4 | 3.3 | 1.5 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|-----------------------------|-----------------------------|---------|---------|---------|---------|---------|---------|---------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 180 | 179.315 | 181.249 | 178.684 | 180.035 | 179.941 | 180.511 | 178.429 | 180.268 | 179.065 |

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Malu



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



Cert. No.: 22TM1571

Page : 1 of 3

Certificate of Calibration

Equipment : Hot Air Oven

Manufacturer : Binder

Model : ED 240/E2

Serial No. : 00-15533

ID No. : BKK_ML0013

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : Media Preparation Room

Received Order : 21 November 2022

Calibration Date : 21 November 2022

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Krisda Malee

Approved by :

Malee

Approved Signatory

() Pornthippa Tameyakul

(✓) Malee Butkruea

() Suwit Imjai

Issue Date : 29 November 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0048150



Equipment : Hot Air Oven
 Condition As-Received : Used Item
 Reference : 2211-0623OC-1

Cert. No.: 22TM1571

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 according to direct measurement method with Data Acquisition which connected with Thermocouple Type T.

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| Instrument | Model | Serial No. | Cert. No. | Due Date |
|----------------------|--------|------------|-----------|-------------|
| 1) Data Acquisition | 34970A | MY44067817 | 22LM121 | 22 Aug 2023 |

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

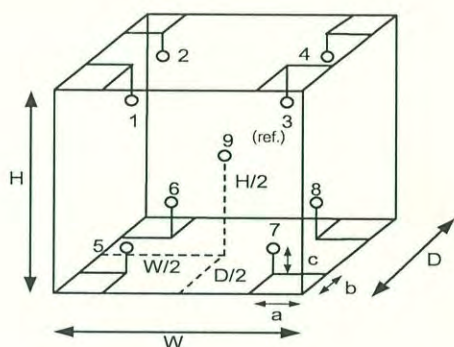
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) After Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

| Environment during calibration | | |
|--------------------------------|-----------|----------|
| | Beginning | Finished |
| Temp. (°C) | 26 | 26 |
| REL.Humid. (%) | 53 | 55 |
| AC Supply (Volt) | 219 | 220 |



| Position : | Ref. Std. ID No.: |
|------------|-------------------|
| 1 | 21-15TC-01 |
| 2 | 21-15TC-02 |
| 3 | 21-15TC-03 |
| 4 | 21-15TC-04 |
| 5 | 21-15TC-05 |
| 6 | 21-15TC-06 |
| 7 | 21-15TC-07 |
| 8 | 21-15TC-08 |
| 9 (ref.) | 21-15TC-09 |

Probe Installation Details :

a = 5.0 cm
 b = 5.0 cm
 c = 5.0 cm

Dimension of Chamber :

D = 0.50 m
 W = 0.80 m
 H = 0.60 m
 Capacity = 0.24 m³

Malu.



Equipment : Hot Air Oven
Condition As-Received : Used Item
Reference : 2211-0623OC-1
Result of Calibration :- (*) After Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 22TM1571

Page : 3 of 3

| Calibration Point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Temperature stability (± °C) | Temperature uniformity (°C) | Overall Variation (°C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|-----------------------------|------------------------|------------------------|-----------------------------------|----------------------------------|-----------------------------|-------------------------|-----------------------------|
| 180 | 180 | 180 | 0.70 | 1.5 | 2.9 | 1.4 | 2 |

| Calibration Point (°C) | Measured Temperature (°C) | | | | | | | | |
|-----------------------------|-----------------------------|---------|---------|---------|---------|---------|---------|---------|----------|
| | Position | | | | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 (ref.) |
| 180 | 179.520 | 180.585 | 178.855 | 179.482 | 178.827 | 179.938 | 179.074 | 180.199 | 180.068 |

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

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

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

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

UUC* : Unit Under Calibration

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

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

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Malu



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.: 22TM677

Page.: 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 45
Serial No. : L712.0429
ID No. : BKK_ML0056
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang ,
Bangkok 10250 Thailand
Location : Incubator & Microbiological Reading
Received Order : 20 May 2022
Calibration Date : 20 May 2022
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by :


Approved Signatory

- () Pornthippa Tameyakul
() Malee Butkruea
(☒) Suwit Imjai

Issue Date : 24 May 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0041433



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2205-0404OC-1

Cert. No.: 22TM677

Page.: 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

Instrument

Model

Serial No.

Cert. No.

Due Date

1) Data Acquisition

34972A

MY57013823

22LM24

26 Feb 2023

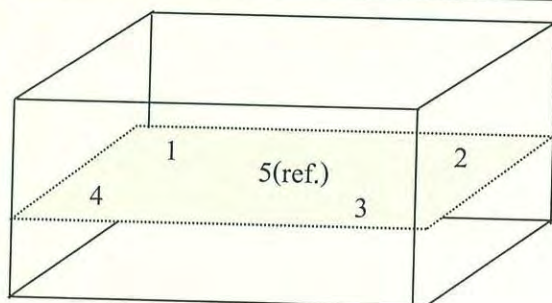
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

| | Environmental | | AC Voltage Supply (Volt) |
|--------------------------|---------------|-----------|-------------------------------|
| | (°C) | (%R.H.) | |
| Beginning of Calibration | 24 | 47 | 220 |
| Finished of Calibration | 24 | 52 | 221 |



Front

| Position : | Ref. Std. S/N.: |
|------------|--------------------|
| 1 | 4804539-006 |
| 2 | 4804539-007 |
| 3 | 4804539-008 |
| 4 | 4804539-009 |
| 5(ref.) | 4804539-010 |

Signature



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2205-0404OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM677

Page.: 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
| | | | Position | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) |
| 44.5 | 44.4 | 44.4 | 44.539 | 44.497 | 44.476 | 44.506 | 44.507 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|--------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|
| 44.5 | 0.068 | 0.030 | 0.15 | 2 |

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

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

-o0o-

Amir



TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL. 0-2717-3000-29 FAX. 0-2719-9484



Cert. No.: 23TM637
Page : 1 of 3

Certificate of Calibration

Equipment : Water Bath
Manufacturer : Memmert
Model : WNE 45
Serial No. : L712.0429
ID No. : BKK_ML0056
Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand
Location : Incubator & Microbiological Reading
Received Order : 20 April 2023
Calibration Date : 20 April 2023
Ambient Temperature : (26 ± 10) °C
Relative Humidity : (50 ± 30) %
Calibrated by : Kunchit Promprat

| | |
|----------------|-----------|
| REVIEW BY | Sithichok |
| APPROVED BY | |
| NEXT CAL. DATE | 20/4/24 |

Approved by :

Malee

Approved Signatory

- () Pornthippa Tameyakul
(/) Malee Butkruea
() Suwit Imjai

Issue Date :

24 April 2023

The Uncertainties are for a confidence probability of approximately 95%

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

A 0053357



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2304-0253OC-1

Cert. No.: 23TM637

Page : 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| <u>Instrument</u> | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1) Data Acquisition | 34970A | MY44073381 | 22LM78/1 | 12 May 2023 |

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

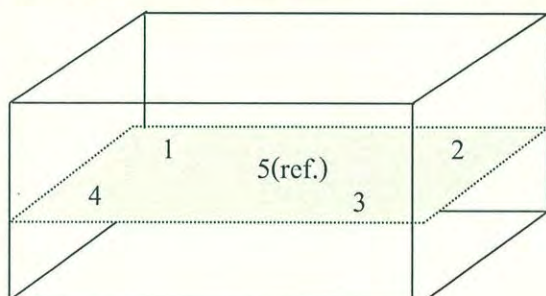
3. This certification is traceable to the International System of Unit.

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Heat transfer medium used : Water

| | <u>Environmental</u> | | <u>AC Voltage Supply</u> |
|--------------------------|----------------------|-----------|--------------------------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 25 | 45 | 223 |
| Finished of Calibration | 25 | 43 | 223 |



Front

| <u>Position :</u> | <u>Ref. Std. S/N.:</u> |
|-------------------|------------------------|
| 1 | 4803988-006 |
| 2 | 4803988-007 |
| 3 | 4804539-014 |
| 4 | 4804539-015 |
| 5(ref.) | 4804539-016 |

Malu .



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2304-0253OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 23TM637

Page : 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | | Uncertainty |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|-------------|
| | | | Position | | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) | (± °C) |
| 44.5 | 44.5 | 44.5 | 44.492 | 44.463 | 44.475 | 44.510 | 44.491 | 0.15 |
| 45.0 | 45.0 | 45.0 | 45.005 | 44.962 | 44.979 | 45.016 | 44.986 | 0.15 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Coverage Factor <i>k</i> |
|--------------------------------|----------------------|-----------------------|--------------------------------|
| 44.5 | 0.051 | 0.022 | 2 |
| 45.0 | 0.080 | 0.026 | 2 |

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

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

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Malu

HACH COMPANY

C/O AB Sciex (Thailand) Limited, Building D Room No. D3 11, 3rd Floor, No. 735/4, Srinakarin Road, Pattanakarn, Suanluang, Bangkok
 | Phone +66 (02) 026-3529 Ext. 0 | Fax +66(02) 026-3572 | www.sea.hach.com

LABX 2200107

Test Report

| | | | |
|-------------------------|---|-------------------|--------------|
| Customers | : ALS Laboratory Group (Thailand) Co., Ltd. | | |
| Equipment | : Chlorine Meter | Manufacturer | : HACH |
| Controller Model | : DR300 | ID No. | : BKK_LG0042 |
| Controller Serial No. | : 20040A001722 | Sensor Serial No. | : - |
| Date of test | : 28/01/2022 | Period | : - |
| Environment temperature | : 25.0 °C | Humidity | : 58.0 %RH |

ResultsInstrument Checked

| Item | Characteristic | Before | | After | | Remark |
|------|------------------------------|--|-------------------------------|--|-------------------------------|--------|
| 1 | Visual Inspect | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | |
| 2 | Power Supply (4.5 – 6.5 VDC) | 6.0 | VDC | 6.0 | VDC | |
| 3 | Display Check | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | |
| 4 | Keyboard Check | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | |
| 5 | Function System Program | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | <input checked="" type="checkbox"/> Pass | <input type="checkbox"/> Fail | |

Warning and Error Checked

| Item | Event | Before | | After | |
|------|------------|--|---------------------------------|--|---------------------------------|
| 6 | Error list | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Appear | <input checked="" type="checkbox"/> None | <input type="checkbox"/> Appear |

Check with Standard

| Item | Characteristic | Before | | After | | Remark |
|------|--|--------|------|-------|------|--------|
| | DPD-CHLORINE-LR | | | | | |
| 7 | Blank (0.00 mg/l) | 0.00 | mg/l | 0.00 | mg/l | |
| 8 | Standard Cl2 No. 1 (0.25 ± 0.09 mg/l) | 0.22 | mg/l | 0.24 | mg/l | |
| 9 | Standard Cl2 No. 2 (0.94 ± 0.10 mg/l) | 0.89 | mg/l | 0.90 | mg/l | |
| 10 | Standard Cl2 No. 3 (1.72 ± 0.14 mg/l) | 1.63 | mg/l | 1.67 | mg/l | |
| | DPD-CHLORINE-HR | | | | | |
| 11 | Blank (0.0 mg/l) | 0.0 | mg/l | 0.0 | mg/l | |
| 12 | Standard Cl2 No. 1 (2.2 ± 0.2 mg/l) | 2.1 | mg/l | 2.2 | mg/l | |
| 13 | Standard Cl2 No. 2 (4.1 ± 0.3 mg/l) | 3.9 | mg/l | 4.0 | mg/l | |
| 14 | Standard Cl2 No. 3 (7.0 ± 0.6 mg/l) | 6.9 | mg/l | 7.0 | mg/l | |

| | |
|----------------|----------------------|
| REVIEW BY | <u>Chayathron P.</u> |
| APPROVED BY | <u>[Signature]</u> |
| NEXT CAL. DATE | <u>28/1/23</u> |



HACH COMPANY

C/O AB Sciex (Thailand) Limited, Building D Room No. D3 11, 3rd Floor, No. 735/4, Srinakarin Road, Pattanakarn, Suanluang, Bangkok
| Phone +66 (02) 026-3529 Ext. 0 | Fax +66(02) 026-3572 | www.sea.hach.com

LABX 2200107

Summary of checked

- ☒ The instrument can work normally and efficiently. (เครื่องมือวัดสามารถทำงานได้ปกติและมีประสิทธิภาพ)
☐ The instrument can work but it's requiring to maintenance. (เครื่องมือวัดสามารถทำงานได้แต่ต้องบำรุงรักษา)
☐ The instrument could not work it's requiring to repair. (เครื่องมือวัดไม่สามารถทำงานได้และต้องการซ่อมบำรุง)

Remark:

Standard Equipment Used

| Equipment | Equipment I.D. | | |
|-----------------------------------|----------------|----------|----------------------|
| Standard Chlorine DPD-CHLORINE-LR | Lot No. | A0197 | Exp date : Jul-22 |
| Standard Chlorine DPD-CHLORINE-HR | Lot No. | A0164 | Exp date : Jun-22 |
| Digital multi meter | S/N : | 21190066 | Due date : 19-Mar-22 |
| Thermo hygrometer | S/N : | 45146347 | Due date : 30-Jul-22 |

Test By : WILAILAK S.

(Miss Wilailak Sawangpun)

Service Engineer

Approved by :

S. Suanun

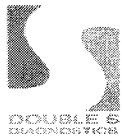
(Mr. Suanun Sartyangkool)

Position :

Assistant Service Division Manager



Be Right™



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

4 ซอยอุดมสุข 14 แขวงบางนา เขตบางนา กรุงเทพมหานคร 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 | | | | | | 01/06 | | | | | | |

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: K90 Aquikem 200

Date/Time: 30-6-25 Serial no: 27281

Service done by: Install date:

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



| | |
|----------------|----------------|
| REVIEW BY | Autcharawan S. |
| APPROVED BY | Sarasat M. |
| NEXT CAL. DATE | 12 / Jan / 23 |
| | 12 / Jan / 22 |
| | ASL |

Certificate of Calibration

ICS-2100: Anion (ID#659)

This certificate is to verify that instrument below are calibrated

by Archemica Lab Co., Ltd.

ICS-2100 S/N: 15010977

AS-HV S/N: 5450A36659

For

ALS Laboratory Group (Thailand) Co., Ltd.



Operator Signature: _____

Date: Jan 12, 2022

(Mr.Thitipong Piromkripuk)

Applications Chemist



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



Certificate of Calibration

Cert. No.: 22TM424

Page.: 1 of 3

| | |
|----------------|------------|
| Equipment : | Water Bath |
| Manufacturer : | Memmert |
| Model : | WB 45 |
| Serial No. : | L799.0009 |
| ID No. : | BKK_ML0049 |

Submitted by : ALS Laboratory Group (Thailand) Co.,Ltd.
104 Phatthanakan 40, Phatthanakan Rd.,
Khwaeng Phatthanakan, Khet Suan Luang,
Bangkok 10250 Thailand

Location : Biochemical Lab

Received Order : 21 February 2022

Calibration Date : 21 February 2022

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by :

Malee

Approved Signatory

() Pornthippa Tameyakul

(☒) Malee Butkruea

() Suwit Imjai

Issue Date : 25 February 2022

The Uncertainties are for a confidence probability of approximately 95%

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

A 0038345



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2202-0615OC-1

Cert. No.: 22TM424

Page.: 2 of 3

Procedure Used :-

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

The temperature scale used was based on ITS-90.

Condition of this result of calibration

1. Reference standard instrument:-

| <u>Instrument</u> | <u>Model</u> | <u>Serial No.</u> | <u>Cert. No.</u> | <u>Due Date</u> |
|----------------------|--------------|-------------------|------------------|-----------------|
| 1) Data Acquisition | 34970A | MY44073381 | 21LM5/1 | 20 Apr 2022 |

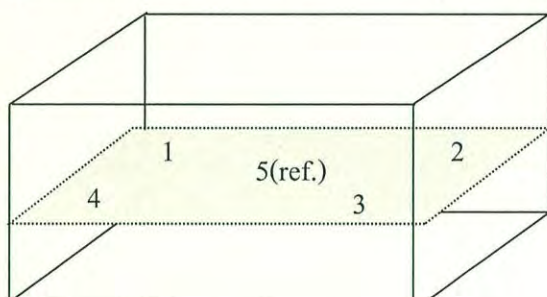
2. This certificate is valid only to the item calibrated on date and place of calibration.

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

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

| | Environmental | | AC Voltage Supply |
|--------------------------|---------------|-----------|-------------------|
| | (°C) | (%R.H.) | (Volt) |
| Beginning of Calibration | 22 | 55 | 221 |
| Finished of Calibration | 23 | 59 | 222 |



Front

| Position : | Ref. Std. S/N.: |
|------------|--------------------|
| 1 | 4803988-006 |
| 2 | 4803988-007 |
| 3 | 4804539-014 |
| 4 | 4804539-015 |
| 5(ref.) | 4804539-016 |

Malu.



Equipment : Water Bath
Condition As-Received : Used Item
Reference : 2202-0615OC-1
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source

Cert. No.: 22TM424

Page.: 3 of 3

| Calibration point (°C) | UUC* Setting (°C) | UUC* Reading (°C) | Average* Standard Reading (°C) | | | | |
|--------------------------------|---------------------------|---------------------------|----------------------------------|--------|--------|--------|----------|
| | | | Position | | | | |
| | | | 1 | 2 | 3 | 4 | 5 (ref.) |
| 42.0 | 44.4 | 44.4 | 42.032 | 42.001 | 42.032 | 42.043 | 42.033 |

| Calibration point (°C) | Uniformity (°C) | Stability (± °C) | Uncertainty (± °C) | Coverage Factor <i>k</i> |
|--------------------------------|----------------------|-----------------------|-------------------------|--------------------------------|
| 42.0 | 0.067 | 0.030 | 0.15 | 2 |

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

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

Stability : One-half of the greatest maximum difference of measured temperature at any one probe.

UUC* : Unit Under Calibration

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

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

-o0o-

Malu.

ภาคผนวก ฉ

สำเนาหนังสืออนุญาตขึ้นทะเบียนห้องปฏิบัติ
การวิเคราะห์เอกลักษณ์

ที่ อก ๐๓๑๐(๑)/ ๑๐๖๙



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ เขตราชเทวี
กรุงเทพมหานคร ๑๐๔๐๐

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 อก 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) นางสาวชนัญญาญจน์ อัมมขม | 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) นางสาวสรารักษ์ 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 พรรณิภา ขำเจริญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๕๔๒๘ |
| ๒๑) นางจิตตา 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 ศรีปัตเนตร | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๕ |
| ๒๙) นายอุทิศ อุ่นสิม | 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) นางสาวปรารค์ทิพย์...

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

สำนักงานสิ่งแวดล้อมและเฝ้าระวังมลพิษ

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| ๓๕) นางสาวปรางค์ทิพย์ กิจไพศาลศักดิ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๗๙ |
| ๓๖) นางสาวเดือนใจ ทางกลาง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๐ |
| ๓๗) นางสาวจิราพร ศิริเวช | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๑ |
| ๓๘) นายวรกร ผูกרך | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๒ |
| ๓๙) นายทอง วิริยะสทกิจ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๓ |
| ๔๐) นายธนิต เจนจบ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๔ |
| ๔๑) นายคณิศร ขำเพชร | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๕ |
| ๔๒) นายอรรคพล นิยมวิทยาพันธ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๖ |
| ๔๓) นายภูวิช พรหมสะอาด | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗ |
| ๔๔) นายธนเดช โภคาพิพัฒน์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๘ |
| ๔๕) นายชวฤทธิ์ วงษ์จันทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๙ |
| ๔๖) นายอาทิตย์ ศรีแสน | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๐ |
| ๔๗) นายเจษฎินทร์ คงศักดิ์ไทย | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๑ |
| ๔๘) นายจรัส บุญยั้ง | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๒ |
| ๔๙) นายธนาณัติ เอนก | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๓ |
| ๕๐) นายอภิวัฒน์ ทุมหนู | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๔ |
| ๕๑) นางสาวสุภาขวัญ มาก | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๙๕ |
| ๕๒) นางสาวทัตพร 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) นางศิวาวรรณ 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 |

(นายศิริระ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

กระทรวงอุตสาหกรรม

๗๒) นายสมบูรณ์...

๑๐๙) นายนนทชัย...

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| ๑๐๙) นายพนนพชัย อุปถัมภ์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๔ |
| ๑๑๐) นายณัฐพล คุณสุทธิ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๕๙๕ |
| ๑๑๑) นายณัฏวัฒน์ 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) นายมนูรินทร์ 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 วิสุม | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๖ |
| ๑๒๒) นายณัฐดนัย เจือละออง | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗ |
| ๑๒๓) นายวรวิธ ดินัก | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๘ |
| ๑๒๔) นายแสงตะวัน นະตะສັດ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๙ |
| ๑๒๕) นายยุทธพงศ์ รัตนะ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๑๐ |
| ๑๒๖) นายชัยวุฒิ ไชยชนะ | 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 ฝูญปัญญา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๑ |
| ๑๔๓) นางสาวสาธิตา ปานทอง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๒ |
| ๑๔๔) นางสาวอริสา ทองนวล | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๓ |
| ๑๔๕) นางสาวอริยา คำคลอง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๔ |

(นายศิริ จันทรเจ็ด)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

๑๔๖) นางสาวบุษดาภรณ์...

| | |
|---------------------------------|----------------------------|
| ๑๔๖) นางสาวชุตานกรณ์ สุนทรสนาน | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๕ |
| ๑๔๗) นางสาวสุดารัตน์ 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 คุณนาน | 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 จันท์เจ็ด)

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 อัครสกุลวิไล)

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] |

วิมล

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] |

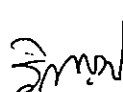
วิธีทาง)

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] |

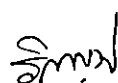


34 Chromium (III)...

(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)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
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] |

ร.พ.ว

84 Methanol...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

แบบฟอร์มรายงานผลการวิเคราะห์

| 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)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

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 ₉) | 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] |

วิฑูรย์

3 Carbon Monoxide...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิชาการวิเคราะห์ทดสอบมลพิษ

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

กรมควบคุมมลพิษ

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 จิตรสกุลใจ)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

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 จิตรสกุลวิไล)

11 Cobalt...

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

.....เรียน...../.....

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------|--|
| 11 | Cobalt | 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] |
| 12 | Copper | 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] |
| 13 | 2,4-D | 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] |
| 14 | DDD | 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] |
| 15 | DDE | 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] |
| 16 | DDT | 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] |

จิราพร

2) Soxhlet...

(นางริกาญจน์ จัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และทะเบียนห้องปฏิบัติการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|------------|---|
| 17 | Dieldrin | 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] |
| 18 | Endrin | 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] |
| 19 | Heptachlor | 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] |
| 20 | Lead | 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] |
| 21 | Lindane | 3) Digestion, Inductively Coupled Plasma Method ^[7,15] 4) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic/Mass Spectrometric Method ^[1,9,25] 2) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] |
| 22 | Mercury | 3) Automated Soxhlet Extraction, Gas Chromatographic Method ^[22,31] 1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[1,6,18] |

วิมล

2) Waste Extraction...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--------------|---|
| 23 | Methoxychlor | 2) Waste Extraction, Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[1,6,19] 3) Waste Extraction, Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[1,6,20] 4) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[18] 5) Thermal Decomposition Amalgamation and Atomic Absorption Spectrometric Method ^[19] 6) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[20] |
| 24 | Mirex | 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] |
| 25 | Molybdenum | 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] |
| 26 | Nickel | 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] |
| | | 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] |

วิภากร

27 Polychlorinated...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--|---|
| 27 | <p>Polychlorinated biphenyls (PCBs)</p> <ul style="list-style-type: none"> - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,3-Dichlorobiphenyl - 2,2',5-Trichlorobiphenyl - 2,4',5-Trichlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | <p>1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method^[1,9,23]</p> <p>2) Soxhlet Extraction, Gas Chromatographic Method^[10,23]</p> <p>3) Automated Soxhlet Extraction, Gas Chromatographic Method^[22,31]</p> |

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

28 Pentachlorophenol...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|-------------------|--|
| 28 | Pentachlorophenol | 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] |
| 29 | pH | Electrometric Method ^[29,30] |
| 30 | Selenium | 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] |
| 31 | Silver | 1) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^[1,6,15] 2) Waste Extraction, Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[1,6,16] |
| 32 | Thallium | 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] |
| 33 | Toxaphene | 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] |
| 34 | Vanadium | 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] |

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

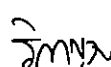
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4) Digestion...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------|--|
| 35 | Zinc | 4) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] 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] |

ดิน จำนวน 125 รายการ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--------------|--|
| 1 | Acenaphthene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 2 | Acetone | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 3 | Aldrin | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 4 | Anthracene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 5 | Antimony | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 6 | Arsenic | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 7 | Atrazine | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 8 | Barium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |



(นางริกาญจน์ ฉัตรสกุลจิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

9 Benz(a)anthracene...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------------|---|
| 9 | Benz(a)anthracene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 10 | Benzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 11 | Benzo(b)fluoranthene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 12 | Benzo(k)fluoranthene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 13 | Benzoic acid | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 14 | Benzo(a)pyrene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 15 | Benzo(g,h,i)perylene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 16 | Beryllium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 17 | Bis(2-chloroethyl)ether | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 18 | Bis(2-ethylhexyl)phthalate | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 19 | Bromodichloromethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 20 | Bromoform | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 21 | Butanol | Equilibrium Headspace, Gas Chromatographic/ Mass Spectrometric Method ^[12,24] |
| 22 | Butyl Benzyl Phthalate | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 23 | Cadmium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 24 | Carbazole | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 25 | Carbon Disulfide | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |

วิกรม

26 Carbon tetrachloride...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------|--|
| 26 | Carbon tetrachloride | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 27 | Chlordane | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 28 | p-Chloroaniline | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 29 | Chlorobenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 30 | Chlorodibromomethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 31 | Chloroform | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 32 | 2-Chlorophenol | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 33 | Chromium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 34 | Chromium (III) | 1) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,15,17] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation Method ^[7,8,16,17] |
| 35 | Chromium (VI) | Alkaline Digestion, Colorimetric Method ^[8,17] |
| 36 | Chrysene | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 37 | Cyanide | Extraction, Distillation, Colorimetric Method ^[26,27,28] |
| 38 | 2,4-D | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 39 | DDD | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |

วิฑูรย์

(นางวิภาณูจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

40 DDE...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------------|---|
| 40 | DDE | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 41 | DDT | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 42 | Dibenz(a,h)anthracene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 43 | Di-n-Butyl Phthalate | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 44 | 1,2-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 45 | 1,3-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 46 | 1,4-Dichlorobenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 47 | 3,3-Dichlorobenzidine | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 48 | 1,1-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 49 | 1,2-Dichloroethane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 50 | 1,1-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 51 | cis-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 52 | trans-1,2-Dichloroethylene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 53 | 2,4-Dichlorophenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 54 | 1,2-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 55 | 1,3-Dichloropropane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 56 | 1,3-Dichloropropene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |

วิภาณ

57 Dieldrin...

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|----------------------|---|
| 57 | Dieldrin | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 58 | Diethyl Phthalate | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 59 | 2,4-Dimethylphenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 60 | 2,4-Dinitrophenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 61 | 2,4-Dinitrotoluene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 62 | 2,6-Dinitrotoluene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 63 | Di-n-Octyl Phthalate | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 64 | Endosulfan | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 65 | Endrin | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 66 | Ethylbenzene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 67 | Fluoranthene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 68 | Fluorene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 69 | Heptachlor | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 70 | Heptachlor Epoxide | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|---------------------------|---|
| 71 | Hexachlorobenzene | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 72 | Hexachloro-1,3-butadiene | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 73 | n-Hexane | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 74 | α -HCH | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 75 | β -HCH | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 76 | γ -HCH | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 77 | Hexachlorocyclopentadiene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 78 | Hexachloroethane | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 79 | Indeno(1,2,3-cd)pyrene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 80 | Isophorone | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 81 | Lead | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 82 | Manganese | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 83 | Mercury | 1) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^[18] |

วิมล

(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

และหน่วยงานบังคับการ

2) Thermal...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--|---|
| 84 | Methanol | 2) Thermal Decomposition, Amalgamation, and Atomic Absorption Spectrophotometry ^[19] 3) Digestion, Cold-Vapor Atomic Fluorescence Spectrometric Method ^[20] Equilibrium Headspace, Gas Chromatographic/Mass Spectrometric Method ^[12,24] |
| 85 | Methoxychlor | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 86 | Methyl Bromide | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 87 | Methylene Chloride | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 88 | 2-methylphenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 89 | 2-Methylnaphthalene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 90 | Methyl tert-Butyl Ether | Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^[14,24] |
| 91 | Naphthalene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 92 | Nickel | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/Mass Spectrometric Method ^[7,16] |
| 93 | Nitrobenzene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 94 | N-Nitrosodiphenylamine | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 95 | N-Nitrosodi-n-propylamine | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 96 | Polychlorinated biphenyls (PCBs) - Aroclor 1016 - Aroclor 1221 - Aroclor 1232 | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,23] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[23,32] |

วิฑูรย์

(นางริกาญจน์ ฉัตรสกุลวิไล)

- Aroclor 1242...

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--|--|
| | <ul style="list-style-type: none"> - Aroclor 1242 - Aroclor 1248 - Aroclor 1254 - Aroclor 1260 - 2-Chlorobiphenyl - 2,2',3,5'-Tetrachlorobiphenyl - 2,2',5,5'-Tetrachlorobiphenyl - 2,3',4,4'-Tetrachlorobiphenyl - 2,2',3,4,5'-Pentachlorobiphenyl - 2,2',4,5,5'-Pentachlorobiphenyl - 2,3,3',4',6-Pentachlorobiphenyl - 2,2',3,4,4',5'-Hexachlorobiphenyl - 2,2',3,4,5,5'-Hexachlorobiphenyl - 2,2',3,5,5',6-Hexachlorobiphenyl - 2,2',4,4',5,5'-Hexachlorobiphenyl - 2,2',3,3',4,4',5-Heptachlorobiphenyl - 2,2',3,4,4',5,5'-Heptachlorobiphenyl - 2,2',3,4,4',5',6-Heptachlorobiphenyl - 2,2',3,4',5,5',6-Heptachlorobiphenyl - 2,2',3,3',4,4',5,5',6-Nonachlorobiphenyl | |
| 97 | Pentachlorophenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 98 | Phenanthrene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 99 | Phenol | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |
| 100 | Pyrene | Automated Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^[25,31] |

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|--|--|
| 101 | Selenium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 102 | Silver | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 103 | Styrene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 104 | 1,1,2,2-Tetrachloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 105 | Tetrachloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 106 | Toluene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 107 | Toxaphene | 1) Soxhlet Extraction, Gas Chromatographic Method ^[10,22] 2) Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 108 | TPH (C ₅ -C ₈) | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 109 | TPH (C ₈ - C ₁₆) | 1) Solvent Extraction, Gas Chromatographic Method ^[11,21] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[21,31] |
| 110 | TPH (C ₁₆ - C ₃₅) | 1) Solvent Extraction, Gas Chromatographic Method ^[11,21] 2) Automated Soxhlet Extraction, Gas Chromatographic Method ^[21,31] |
| 111 | 1,2,4-Trichlorobenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 112 | 1,1,1-Trichloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 113 | 1,1,2-Trichloroethane | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 114 | Trichloroethylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 115 | 2,4,5-Trichlorophenol | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |

วิมล

116 2,4,6-Trichlorophenol...

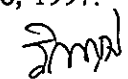
(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

| ลำดับที่ | สารมลพิษ | วิธีวิเคราะห์ |
|----------|------------------------|---|
| 116 | 2,4,6-Trichlorophenol | Automated Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^[25,31] |
| 117 | 1,3,5-Trimethylbenzene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 118 | Vanadium | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |
| 119 | Vinyl Acetate | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 120 | Vinyl Chloride | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 121 | m-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 122 | o-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 123 | p-Xylene | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 124 | Xylene (Total) | Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^[14,24] |
| 125 | Zinc | 1) Digestion, Inductively Coupled Plasma Method ^[7,15] 2) Digestion, Inductively Coupled Plasma/ Mass Spectrometric Method ^[7,16] |

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 ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ

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(นางริกาญจน์ ฉัตรสกุลวิไล)

ผู้อำนวยการกลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษ
และทะเบียนห้องปฏิบัติการ



ที่ อก ๐๓๑๐(๑)/ ๕ ๓ ๗ ๙

กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๐ ๙ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๔ กุมภาพันธ์ ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐ ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว มีความเห็นดังนี้

๑. ให้ยกเลิกเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๑๙ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายนคร สุขเจริญ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๒ |
| ๒) นายบัญชา นามเขตต์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๖๑๒๓ |
| ๓) นายอรรคพล นิยมวิทย์พาณ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๐๘๗ |
| ๔) นางสาวพัชรียา หงษ์สมดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๓ |
| ๕) นางสาวภาณิดา สุรวงศ์ตระกูล | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๑๐๔ |
| ๖) นางสาวศรณีย์ ยิ่งดี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๐๙ |
| ๗) นายสมโภช วันสา | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๕๑๙ |
| ๘) นายณัฐนันท์ ปานประเสริฐ | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๘๑๙ |
| ๙) ว่าที่ร้อยตรีภาณุพงศ์ แสนศรี | ทะเบียนเลขที่ ว-๒๐๔-จ-๗๘๓๖ |
| ๑๐) นายมนินทร์ พูลศิริ | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๒ |
| ๑๑) นายณัฐดนัย เจือละออง | ทะเบียนเลขที่ ว-๒๐๔-จ-๘๖๐๗ |
| ๑๒) นางสาวกาญจนา คงคุณ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๒๙ |
| ๑๓) นางสาวรัชนิกร เนียมกลาง | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๗ |
| ๑๔) นางสาวกัญญารัตน์ ศรีนิลทา | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๓๘ |
| ๑๕) นายศิริวัฒน์ พานิชย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๑ |
| ๑๖) นางสาวกนกภรณ์ อูระ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๕ |
| ๑๗) นางสาวจิตสุภา ประเทืองสุข | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๗ |
| ๑๘) นางสาวอริสา วิริยขันติธรรม | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๔๘ |
| ๑๙) นางสาวพนิดา ยอดอินทร์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๙๒๕๐ |

๒. ให้เพิ่มเจ้าหน้าที่...

๒. ให้เพิ่มเจ้าหน้าที่ประจำห้องปฏิบัติการวิเคราะห์ จำนวน ๕ ราย

- | | |
|---------------------------------|----------------------------|
| ๑) นายกาจบัณฑิต กิตติสุขภวณิชย์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๑ |
| ๒) นายภัทรพล สว่างใจธรรม์ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๒ |
| ๓) นายนราธิป เทือกชัยคำ | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๓ |
| ๔) นายศิริโชค พงษ์ประสม | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๔ |
| ๕) นายณัฐวุฒิ ดั่งแพง | ทะเบียนเลขที่ ว-๒๐๔-จ-๐๐๐๕ |

อนึ่ง หนังสือฉบับนี้จะหมดอายุพร้อมหนังสือต่ออายุรับขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน ที่ อก ๐๓๑๐(๑)/๑๐๖๔ ลงวันที่ ๒๘ มกราคม ๒๕๖๔ คือในวันที่ ๒ กันยายน ๒๕๖๖ ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ทำหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ



(นางริกาณจน์ นัตตรสกุลวิไล)

นักวิทยาศาสตร์ชำนาญการพิเศษ รักษาการแทน

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน

ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๔๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ที่ อก ๐๓๑๐(๑)/ ๖ ๑ ๒ ๕



กรมโรงงานอุตสาหกรรม
ถนนพระรามที่ ๖ แขวงทุ่งพญาไท
เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒ ๓ มีนาคม ๒๕๖๖

เรื่อง เปลี่ยนแปลงบุคลากรของห้องปฏิบัติการวิเคราะห์

เรียน กรรมการผู้จัดการ บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด

อ้างถึง คำขอขึ้นทะเบียน/ต่ออายุ/เปลี่ยนแปลงบุคลากร และชนิดสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกชน
ลงวันที่ ๑๐ มีนาคม ๒๕๖๖

ตามหนังสือที่อ้างถึง บริษัท เอแอลเอส แลบบอราทอรี กรุ๊ป (ประเทศไทย) จำกัด
ห้องปฏิบัติการวิเคราะห์เอกชน เลขทะเบียน ว-๒๐๔ สถานที่ตั้งเลขที่ ๑๐๔ ซอยพัฒนาการ ๔๐
ถนนพัฒนาการ แขวงพัฒนาการ เขตสวนหลวง กรุงเทพมหานคร ขอเปลี่ยนแปลงบุคลากรของห้องปฏิบัติการ
วิเคราะห์ ความละเอียดแจ้งแล้ว นั้น

กรมโรงงานอุตสาหกรรมพิจารณาแล้ว ให้เปลี่ยนแปลงชื่อเจ้าหน้าที่ประจำห้องปฏิบัติการ
วิเคราะห์ จากเดิม นางสาวสรารค์มี มงคลจิรวุฒิ ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙ เป็น นางสาวธัญญธร มงคลจิรวุฒิ
ทะเบียนเลขที่ ว-๒๐๔-จ-๔๗๑๙

ทั้งนี้ หากท่านมีความประสงค์จะยื่นคำขอใดๆ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์
ได้ที่หน้าเว็บไซต์กรมโรงงานอุตสาหกรรม ตาม QR Code ท้ายหนังสือฉบับนี้

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

-(นายประสม ดำรงพงษ์)

ผู้อำนวยการกองวิจัยและเตือนภัยมลพิษโรงงาน
ปฏิบัติราชการแทนอธิบดีกรมโรงงานอุตสาหกรรม

กองวิจัยและเตือนภัยมลพิษโรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบมลพิษและทะเบียนห้องปฏิบัติการ

โทร. ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๐๓-๕

โทรสาร ๐ ๒๔๓๐ ๖๓๑๒ ต่อ ๒๑๙๙

ไปรษณีย์อิเล็กทรอนิกส์ saraban@diw.mail.go.th



ยื่นคำขอผ่านระบบอิเล็กทรอนิกส์



“อุตสาหกรรมก้าวไกล ประเทศไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”

