



Thai Environmental Technic Limited

บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 2-Jul-24

ITEM: TSP

Serial No: (No. 15)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00

Temperature (°C): 25.0

Average Press. (mm Hg): 754.4

Average Temp (°C): 31.2

Corrected Pressure (mm Hg): 760.0

Temperature (deg K): 298.0

Corrected Average (mm Hg): -

Average Temp: (Deg K): -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope: 1.99045

Qstd Intercept: -0.00789

Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: 29.5363 Intercept: 5.9092 Corr. Coeff: 0.9873 # of Observations: 5
1	12.60	1.787	60.0	57.00	
2	9.40	1.544	54.0	52.00	
3	7.20	1.352	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\sqrt{H_2O(Pa/Pstd)(Tstd/Ta)}] - b$$

$$IC = I[\sqrt{Pa/Pstd}(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I)[\sqrt{298/Tav}(Pav/760)] - b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope


b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited

บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 3-Jul-24

ITEM: TSP

Serial No: (No. 24)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00

Temperature (°C): 25.0

Average Press. (mm Hg): 754.4

Average Temp (°C): 30.8

Corrected Pressure (mm Hg): 760.0

Temperature (deg K): 298.0

Corrected Average (mm Hg): -

Average Temp: (Deg K): -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope: 1.99045

Qstd Intercept: -0.00789

Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: 29.7233 Intercept: 5.5932 Corr. Coeff: 0.9893 # of Observations: 5
1	12.30	1.766	60.0	57.00	
2	9.80	1.577	54.0	52.00	
3	7.20	1.352	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\sqrt{H_2O(P_a/P_{std})(T_{std}/T_a)}] - b$$

$$IC = I[\sqrt{P_a/P_{std}}(T_{std}/T_a)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m([I]/[\sqrt{298/T_a}(P_a/760)] - b)$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

**TET**

Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location Thai Environmental TechnicSite ID: BangkokDate: 3-Jul-24ITEM: TSPSerial No: (No. 20)Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00Temperature (°C): 25.0Average Press. (mm Hg): 754.4Average Temp (°C): 30.2Corrected Pressure (mm Hg): 760.0Temperature (deg K): 298.0Corrected Average (mm Hg): -Average Temp: (Deg K): -

Calibration Orifice

Make: TischQstd Slope: 1.99045Model: TE-5025AQstd Intercept: -0.00789Serial#: 0068Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: <u>29.7516</u> Intercept: <u>5.6088</u> Corr. Coeff: <u>0.9890</u> # of Observations: <u>5</u>
1	12.40	1.773	60.0	57.00	
2	9.60	1.561	54.0	52.00	
3	7.20	1.352	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta)) - b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I) \text{Sqrt}(298/Tav)(Pav/760)) - b]$$

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : Approve By : 

NOTE: Ensure calibration orifice has been certified within 12 months of use



Thai Environmental Technic Limited

บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 3-Jul-24

ITEM: TSP

Serial No: (No. 31)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00

Temperature (°C): 25.0

Average Press. (mm Hg): 754.5

Average Temp (°C): 30.2

Corrected Pressure (mm Hg): 760.0

Temperature (deg K): 298.0

Corrected Average (mm Hg): -

Average Temp: (Deg K): -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope: 1.99045

Qstd Intercept: -0.00789

Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: 29.7233 Intercept: 5.5932 Corr. Coeff: 0.9893 # of Observations: 5
1	12.30	1.766	60.0	57.00	
2	9.80	1.577	54.0	52.00	
3	7.20	1.352	50.0	48.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I) \text{Sqrt}(298/Tav)(Pav/760))-b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope

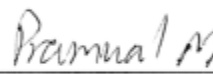
b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 3-Jul-24

ITEM: PM10

Serial No: (No. 24)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 32.6

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.2805 Intercept : 1.2747 Corr. Coeff : 0.9913 # of Observations: 5
1	12.20	1.759	60.0	60.00	
2	9.20	1.528	54.0	54.00	
3	7.20	1.352	50.0	50.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\sqrt{H_2O(Pa/Pstd)}(Tstd/Ta)] - b]$$

$$IC = 1/[\sqrt{Pa/Pstd}](Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(1/[\sqrt{298/Tav}](Pav/760)] - b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 2-Jul-24

ITEM: PM10

Serial No: (No. 12)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 32.5

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.7808 Intercept : 0.7107 Corr. Coeff : 0.9926 # of Observations: 5
1	12.00	1.744	60.0	60.00	
2	9.20	1.528	54.0	54.00	
3	7.20	1.352	50.0	50.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd))(Tstd/Ta))-b]$$

$$IC = [(\text{Sqrt}(Pa/Pstd))(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I)[\text{Sqrt}(298/Tav)(Pav/760))]-b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope


b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location : Thai Environmental Technic

Site ID : Bangkok

Date : 3-Jul-24

ITEM : PM10

Serial No : (No. 26)

Calibrate By : Pipat

Site Conditions

Barometric Pressure (mm Hg) : 760.00

Temperature (°C) : 25.0

Average Press. (mm Hg) : 754.4

Average Temp (°C) : 30.2

Corrected Pressure (mm Hg) : 760.0

Temperature (deg K) : 298.0

Corrected Average (mm Hg) : -

Average Temp: (Deg K) : -

Calibration Orifice

Make : Tisch

Model : TE-S025A

Serial# : 0068

Qstd Slope : 1.99045

Qstd Intercept : -0.00789

Calibration Due Date : 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m ³ /min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope : 34.1977 Intercept : 1.5135 Corr. Coeff : 0.9883 # of Observations: 5
1	12.20	1.759	60.0	60.00	
2	9.20	1.528	54.0	54.00	
3	7.00	1.333	50.0	50.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd)(Tstd/Ta)) - b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m([I][\text{Sqrt}(298/Tav)(Pav/760)) - b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope

b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 



Thai Environmental Technic Limited
บริษัท เทคโนโลยีสิ่งแวดล้อมไทย จำกัด

High Volume TSP&PM-10 Calibration Report

Location: Thai Environmental Technic

Site ID: Bangkok

Date: 4-Jul-24

ITEM: PM10

Serial No: (No. 29)

Calibrate By: Pipat

Site Conditions

Barometric Pressure (mm Hg): 760.00

Temperature (°C): 25.0

Average Press. (mm Hg): 754.4

Average Temp (°C): 31.5

Corrected Pressure (mm Hg): 760.0

Temperature (deg K): 298.0

Corrected Average (mm Hg): -

Average Temp (Deg K): -

Calibration Orifice

Make: Tisch

Model: TE-5025A

Serial#: 0068

Qstd Slope: 1.99045

Qstd Intercept: -0.00789

Calibration Due Date: 16-Aug-24

Calibration Information

Plate or Test #	ORIFICE (in H ₂ O)	Qstd (m3/min)	Indicate (CFM)	IC (corrected)	Linear Regression Slope: 34.8135 Intercept: 0.5379 Corr. Coeff: 0.9949 # of Observations: 5
1	12.00	1.744	60.0	60.00	
2	9.20	1.528	54.0	54.00	
3	7.40	1.371	50.0	50.00	
4	5.00	1.127	40.0	40.00	
5	3.00	0.874	30.0	30.00	

Calculations

$$Qstd = 1/m[\text{Sqrt}(H_2O(Pa/Pstd))(Tstd/Ta))-b]$$

$$IC = I[\text{Sqrt}(Pa/Pstd)(Tstd/Ta)]$$

Qstd = standard flow rate

IC = corrected chart response

I = actual chart response

m = calibrator Qstd slope

b = calibrator Qstd intercept

Ta = actual temperature during calibration (deg K)

Pa = actual pressure during calibration (mm Hg)

Tstd = 298 deg K

Pstd = 760 mm Hg

For subsequent calculation of sampler flow:

$$1/m[(I) \text{Sqrt}(298/Tav)(Pav/760))-b]$$

NOTE: Ensure calibration orifice has been certified within 12 months of use

m = sampler slope


b = sampler intercept

I = chart response

Tav = daily average temperature

Pav = daily average pressure

Calibrate By : 

Approve By : 

Certificate Of Analysis

Special Gases Mixture

Customer Details

Name:

Thai Environmental Technic Limited

Address:

1/6 Soi Ramkhamhaeng 45, Sapansoong,
Khet Saphan Sung, Bangkok 10240

Customer Tag No.:

Certificate Details

Number:

1734/23

Date of Issue:

5-Jul-2023

Expiry date:

5-Jul-2026

Material Details

Production Order:

90178560

Material Code:

640300-SK-44

Cylinder No.:

A00917SK

Gas content:

5.520 M³

Filling pressure:

145.0 bar

Valve:

CGA 660 SS

Cylinder Owner:

LINDE

Cylinder Material:

Spectra seal

Cylinder Size:

40 L

Laboratory Report

Analytical Result

Component	Normal Concentration	Analysis Result ¹	Uncertainty ²	Method of Analysis ³	Assay Date
Nitric Oxide	40.0 ppm	40.5 ppm	± 1% relative	(6) I-PB-352	28-Jun & 5-Jul-2023
Other NOx impurity In Nitrogen		Less than 2.0 ppm			

Reference Standard used in Assay

Reference Standard

Nitric Oxide
In Nitrogen

Cylinder number

258013SG

Concentration

25.32 ± 0.25 ppm

Expiry date:

13-Dec-2024

Analytical Instruments used in Assay

Instrument/Make/Model
FTIR Spectrometers Nicolet iS50Analytical Principle
FTIR-NOLast Multipoint Calibration
28-Jun-2023

Recommend usage condition

Minimum utilization: 5% of actual content or before expire date whichever comes first.

Storage condition: Keep in well ventilation and secure area.

Comments

When reordering, please quote the material number

Note:

- All results expressed in this report are on mole/mole basis, unless otherwise specified in accordance with the EPA Traceability Protocol EPA-600/R-12/531 for the Assay and Certification of Gaseous Calibration Standards using procedure G1.
- 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%.
- The measurement of this material is traceable to the SI through the reference gas standards which is traceable to Swiss National Standard of Mass or other recognised national metrology institutes.
- (1) Gas Chromatography, (2) Paramagnetic Oxygen Analyzer, (3) Electrochemical Oxygen Analyzer, (4) Electrochemical Moisture Analyzer, (5) Total Hydrocarbon Analyzer, (6) Other - Specified

Sukanya Parinyasontorn

Signatory for and on behalf of Linde (Thailand) Co., Ltd.

Page 1 of 1

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บริษัท ลินด์ (ประเทศไทย) จำกัด (มหาชน)

เลขที่ใบอนุญาตประกอบกิจการ 0101000000000000

ชั้น 15 อาคารทาวเวอร์ เอ 2/3 หมู่ 14 ถนนรามคำแหง-ตราด กม. 6.5 แขวงคลอง

บางพลี เขตสามพราน 10540 โทร/ฟาส (66) 2338-6100 โทรสาร (66) 2338-6333

โรงงานบางพลี 105 หมู่ 5 ตำบลบางพลีใหญ่ อำเภอบางพลี จังหวัดสมุทรปราการ 24180

โทร/ฟาส (66) 38 570-479-93

โทรสาร (66) 38 570-323

Linde (Thailand) Public Company Limited

PLC Registration No. 010737000765

15th Floor, Bangna Tower A, 2/3 Moo 14, Bangna Trad KM. 6.5 Road, Bangnaew

Bangplee, Samutprakarn 10540, Tel (66) 2338-6100 Fax (66) 2338-6333

Wellgrow Plant : 105 Moo 5, T.Bangsamak, A.Bangpakong, Chachoengsao 24180

Thailand, Tel (66) 38 570-479-93

Fax (66) 38 570-323

PB-002/F006

Iss. R. 2, 15 Oct 2021



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 22-Apr-24
Analyzer Type : NOx
Brand : API
Model : 200A
Serial Number : 56 (No. 17)
Range : 500 ppb

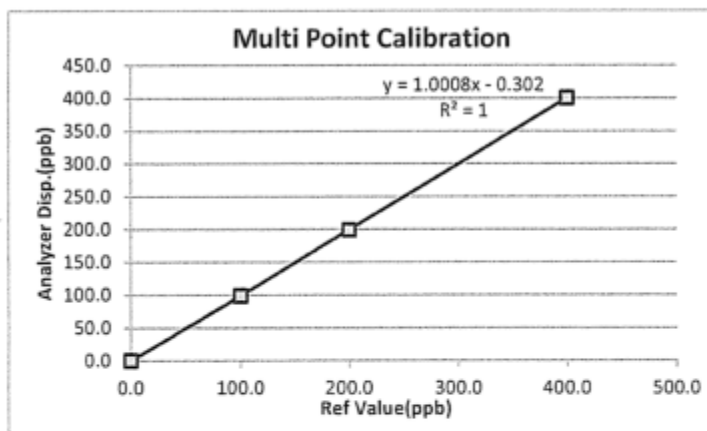
Temperature (°C) : 25°C
Barometer (mmHg) : 759.9
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.9	0.8	0.1	0.0	0.0	0.0	0.0
Span	400.0	389.0	387.0	2.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.3	0.3	0.0	0.33	0.001	0.08
100.0	99.8	99.1	0.7	-0.90	-0.009	0.90
200.0	198.8	199.6	-0.8	-0.40	-0.002	0.20
400.0	399.1	400.3	-1.2	0.30	0.001	0.08
Average Diff (%)						0.31



Calibrate by: [Signature]

Approved by: [Signature]



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 22-Apr-24
Analyzer Type : NOx
Brand : API
Model : TML-41-H-02
Serial Number : 495 (No. 23)
Range : 500 ppb

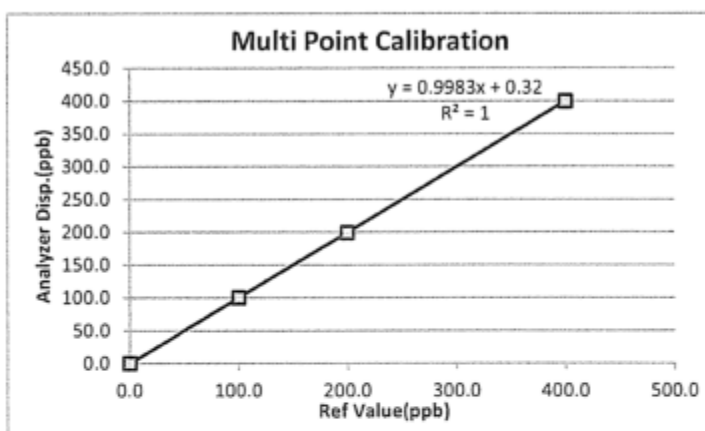
Temperature (°C) : 25°C
Barometer (mmHg) : 759.9
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.3	0.2	0.5	0.0	0.0	0.0	0.0
Span	400.0	406.0	402.0	4.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.4	0.3	0.1	0.30	0.001	0.08
100.0	101.3	100.5	0.8	0.50	0.005	0.50
200.0	200.7	199.5	1.2	-0.50	-0.003	0.25
400.0	401.2	399.8	1.4	-0.20	0.000	0.05
Average Diff (%)						0.22



Calibrate by:

[Signature]

Approved by:

[Signature]

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิควิเสณสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 22-Apr-24
Analyzer Type : NOx
Brand : API
Model : 200 E
Serial Number : 393 (No. 19)
Range : 500 ppb

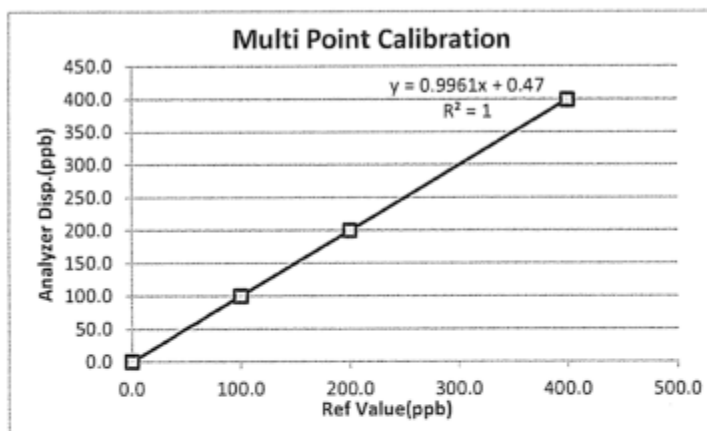
Temperature (°C) : 25°C
Barometer (mmHg) : 759.9
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.6	0.4	0.1	0.0	0.0	0.0	0.0
Span	400.0	404.0	401.0	3.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.3	0.3	0.1	0.25	0.001	0.06
100.0	101.2	100.3	0.9	0.30	0.003	0.30
200.0	200.4	199.8	0.6	-0.20	-0.001	0.10
400.0	399.8	398.8	1.0	-1.20	-0.003	0.30
Average Diff (%)						0.19



Calibrate by: _____

Approved by: _____

**TET**

Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

NOx Analyzer Calibration Report

Calibrate Date : 19-Apr-24
Analyzer Type : NOx
Brand : API
Model : 200 A
Serial Number : 777 (No. 25)
Range : 500 ppb

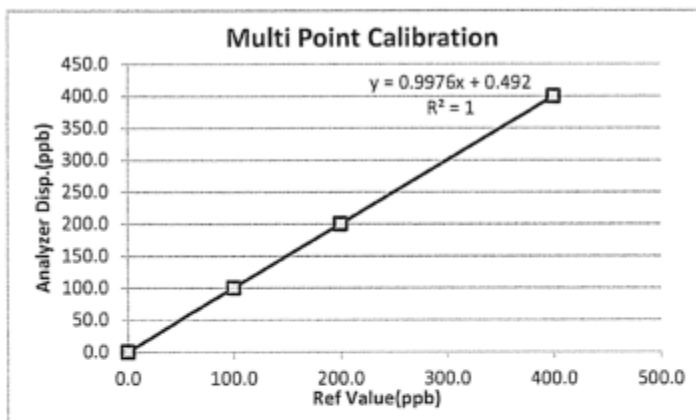
Temperature (°C) : 25°C
Barometer (mmHg) : 759.9
Humidity (50±15 %) : 50.0%RH
Dilutor : API M700 S/N 625
Zero Air : API M701 S/N 1926
Standard gas : A00917 SK

Calibration of Span

Supply Gas	Ref Value(ppb)	Before of Span.(ppb)			After of Span.(ppb)			% diff of Span
		NOx	NO	NO ₂	NOx	NO	NO ₂	
Zero	0.0	0.5	0.3	0.2	0.0	0.0	0.0	0.0
Span	400.0	392.0	391.0	1.0	400.0	400.0	0.0	0.0

Multi Point Calibration

Ref Value(ppb)	Analyzer Disp.(ppb)			Output Difference		
	NOx	NO	NO ₂	Diff(ppb)	% Diff	Abs (%) Diff
0.0	0.5	0.4	0.0	0.42	0.001	0.11
100.0	101.5	100.3	1.2	0.30	0.003	0.30
200.0	201.3	200.1	1.2	0.10	0.000	0.05
400.0	399.8	399.5	0.3	-0.50	-0.001	0.13
Average Diff (%)						0.14



Calibrate by: _____

Approved by: _____



THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804, 0-2399-0469

Calibration Certificate

Issued by : Calibration & Test Section : Meteorological Instruments Bureau

Date of Issue 1 July, 2024

Certification No. 234/24

Page : 1 of 2

Object : Wind speed and wind direction

Manufacturer : Davis Instruments Inc.

Type : Weather Wizard III

Serial No. : WC41019A77 ID No. : No.7

Customer : Thai Environmental Technic Limited.
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung, Bangkok 10240.

Calibration Condition : Temperature 25.1 °C Barometric Pressure 1010.2 hPa

NATIONAL STANDARD WIND TUNNEL :

: Micromanometer Theodor Friedrichs FC014 Serial No. 9310119


: HOOK GAGE NO 1425 Pitot Tube Theodor Friedrichs Type 0800.0000 serial 9023

N.I.S.T. Test Reference Number 731/241460 : Standard Velocity at 20 - 30 m/sec

: Ultrasonic Anemometer Model DA-650-3TV (sensor TR-90AH)

Serial Number 110730029 (sensor 120629586)

JAPAN QUALITY ASSURANCE ORGANIZATION : Standard Velocity at 0 - 20 m/sec

Calibrated by : 

Mr. Watcharapol Subwat

Mechanical Engineer

Signed :


Mr. Pisood Promsut





THAI METEOROLOGICAL DEPARTMENT

4353 Sukhumvit, Bangna, Bangkok 10260 Tel. 081-454-2804,0-2399-0469

The Result of Calibration

Certification No. 234/24

1 July, 2024

Page : 2 of 2

Standard Ultrasonic Anemometer	HOOK GAGE NO. 1425			TESTED ANEMOMETER	
	Pressure	Vacumm	Velocity	Velocity	Correction
m/sec	inches H2O	inches H2O	m/sec	m/sec	m/sec
1.00	-	-	-	0.4	0.60
3.02	-	-	-	2.7	0.32
5.00	-	-	-	4.5	0.50
7.00	-	-	-	6.7	0.30
9.02	-	-	-	8.5	0.52
11.01	-	-	-	10.7	0.31
13.01	-	-	-	12.5	0.51
15.01	-	-	-	14.7	0.31
17.02	-	-	-	16.5	0.52
20.02	-	-	-	19.7	0.32

Wind Aloft Plotting Board.	
US.DEPARTMENT OF COMMERCE WEATHER BUREAU	
WIND DIRETION	TESTED WIND DIRECTION
0	0
90	90
180	180
270	270

Calibrated by :

Watchapol

Mr. Watchapol Subwat
Mechanical Engineer



Agilent CrossLab Start Up Services

Agilent 7890 Gas Chromatograph

Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures.
- Any parts, not included in the Parts Lists section of this document, are not part of the recommended Preventive Maintenance service, nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about **Agilent Technologies services**, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- The **Agilent Community** is an excellent place to get answers, collaborate with others about applications and Agilent products, and find in-depth documents and videos relevant to Agilent technologies. Visit <https://community.agilent.com/welcome>.
- To access **Agilent University**, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful **Agilent Resource Center** web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>.
- Need technical support, FAQs, supplies? – visit our **Support Home page** <http://www.agilent.com/search/support>.
- **Videos** about specific preparation requirements for your instrument can be found by searching the **Agilent YouTube** channel at <https://www.youtube.com/user/agilent>.
- **7890B Manuals** are also available on Agilent.com:
 - **Safety**
https://www.agilent.com/cs/library/usermanuals/public/7890B_Safety.pdf
 - **Installation and First Startup**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Installation.pdf
 - **Operation Manual**
https://www.agilent.com/cs/library/usermanuals/Public/7890B_Operation.pdf
 - **Maintaining Your GC**
https://www.agilent.com/cs/library/usermanuals/public/G3430-90052%207890B_Maintaining%20Guide.pdf

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Only select those pages that relate to the system or module being serviced.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Section not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance service in the order of the tasks listed.
- Complete the Service Review section together with the customer.
- Complete the fields for page numbers at the foot of each selected page
- Complete the total number of pages field in the Service Completion section
- ***Ask the customer to sign the Service Completion section including the customer's and your signature.***

Additional Instruction Notes

- Check for any active service notes for this unit. If there are any applicable "Safety" or "Modification Recommended" Service notes, plan to implement the changes on this unit before doing any qualification service.
- Do not implement firmware updates, unless you get approval from the customer and are sure that they are compatible with the instrument control software.

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table below.

Instrument System Name and ID

GC 7890A

Instrument System Site and Location

Lab

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3440A	CN 10723012
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components, settings as defined by current Service Notes.
- ☒ Check for required firmware updates and verify with customers if they would like them installed.
- ☒ Before starting the following procedures, record the Detector Signal Output(s) in the results table. If the GC is turned OFF or in a service mode, comparing the detector outputs before and after the service is not possible.

Preventive Maintenance Procedure

Clean and inspect GC

- ☒ Unplug power cord from the power source.
- ☒ Open GC covers and vacuum/remove any dust/debris. Pay particular attention to cooling fans.
- ☒ Inspect internal connectors for proper contact and placement.
- ☒ Reconnect Power to the GC. Power the GC on and verify the power on self-test passed.
- ☒ Verify oven motor spins freely and turns on with the oven door closed; off when the door is opened.
- ☒ Verify operation of all other fans - the inlet and EPC cooling fans.
- ☒ Verify oven intake/outlet flap assembly is operating smoothly while heating and cooling the oven

Inlet and detector consumable replacement

- ☒ For the inlets installed, perform Inlet maintenance as defined in the 7890 manual – “Maintaining Your GC” - for the inlet(s) installed.
- ☒ Replace the split vent trap cartridge filter on units with these inlets: Split/Splitless Capillary (SSL), Multi-Mode Inlet (MMI), Programmed Temperature Vaporizer (PTV), Volatiles Interface (VI).
- ☒ If the inlet system is used in Split Mode with viscous samples, inspect and clean the split vent tube on the inlet and flush or replace the tubing between the inlet and the split vent trap.
- ☐ If the GC includes a Flame Ionization Detector (FID), replace the jet. If the ignitor shows any buildup of sample or corrosion, replace the ignitor. Examine the FID collector and castle assemblies for contamination – clean as necessary.

Zero Sensors and Leak test

- ☒ Zero all pressure sensors per the procedure in the 7890 “Advanced User Guide”.
- ☒ Perform inlet pressure decay test(s) as defined in the 7890 “Troubleshooting Manual”.
If the PM is done in preparation for an Operational Qualification, then the pressure decay test defined within that protocol can be used for the PM.
- ☒ Record if test passed or failed in the results table.

ALS Maintenance

- ☒ **Section NOT applicable**
- ☐ Check all cabling and configuration settings between GC, tray, and injectors.
- ☐ Vacuum or remove any dust, especially around fans.
- ☐ Check operation of all fans.
- ☐ Check syringe for smooth plunger operation.
- ☐ Check for smooth operation of the needle support – clean if necessary

Restore Instrument

- ☒ Restore the normal operating conditions or customer method using the Browser interface or Data System.
- ☒ Purge the system with carrier flow for 15 minutes
- ☒ Bake out the system, then restore the normal operating conditions
- ☒ After equilibration, check and record the post PM detector signal output values. Results should be similar or lower than the detector outputs recorded prior to PM.
- ☒ Perform a chemical checkout. If this is a routine PM, inject the customer's sample using the ALS if applicable. This will act as a final checkout of both the ALS and the GC.

Note: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument set up and checkout.

Signature Page

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review with the customer this service, parts replaced, and test results obtained.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comments box or if necessary, in the customer's IQ records.
- ☐ Supply the customer with a copy of the Smart Alerts flyer.
- ☐ Describe Smart Alerts to the customer.
- ☐ Install Smart Alerts if requested.

7890 GC Test Results Table

Detector Signal Outputs	Before PM Service	After PM Service
Front detector output	N/A	N/A
Back detector output	N/A	N/A
AUX detector output	N/A	N/A
Pressure decay test	Expected test result	Actual test result
Front inlet pressure decay test	Pass	Pass
Back inlet pressure decay test	Pass	Pass

7890 Parts List Table

The following kits are recommended for capillary and purged packed inlets. If this is a general PM and the customer has a preferred set of consumables, you may use the customer's consumables.

Part description	Part number	Product or model# where used	Quantity consumed
SSL Capillary Inlet PM kit, Splitless	5188-6497	7890A/B	1
SSL Capillary Inlet PM kit, split	5188-6496	7890A/B	1
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Low Pressure Drop Split Liner - with Glass Wool	5190-2295	7890A/B	N/A
PP Inlet PM kit	5188-6498	7890A/B	N/A
Split vent trap PM kit, single cartridge (for MMI, PTV & VI)	5188-6495	7890A/B	N/A
MMI Cleaning Kit	G3510-60820	7890A/B	N/A
PTV Septumless Head Rebuild Kit	5182-9747	7890A/B	N/A
PTV Septumless Head Teflon Guide	5182-9748	7890A/B	N/A
Ignitor (glow plug) assembly with O-ring	19231-60680	7890A/B	N/A
FID Collector Rebuild/Cleaning Kit	G1531-67000	7890A/B	N/A
Standard .011-inch FID Jet for capillary FID base	G1531-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary FID base	G1531-80620	7890A/B	N/A
Standard .018-inch FID Jet for packed column with packed FID base	18710-20119	7890A/B	N/A
Standard .011-inch FID Jet for capillary column with packed/adaptable FID base	19244-80560	7890A/B	N/A
High Temperature .018-inch FID Jet for capillary column with packed/adaptable FID base	19244-80620	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID	G1534-80580	7890A/B	N/A
NPD Jet, universal fit, .011-inch ID Extended tip	G1534-80590	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Gold Seal with Washer	5190-6144	7890A/B	N/A
SSL Capillary Ultra Inert Inlet Splitless Liner - Single taper with Glass Wool	5190-2293	7890A/B	N/A
**FID Collector Replacement Kit, if needed	G1531-67001	7890A/B	N/A

Service Engineer Comments

If there are any specific points you wish to note as part of performing the service or other items of interest for the customer, please write include them in this box.

Service Completion

Service request number 6007097419 Date service completed 26 Jun 2021

Agilent signature Adirek D. Customer signature 100

Total number of pages in this document 8

Agilent CrossLab Start Up Services

Agilent GCMS Preventive Maintenance Checklist

Agilent Preventive Maintenance provides factory recommended service for your analytical instruments to assure reliable operation and the accuracy of your results.

Delivered by highly trained and certified service engineers using genuine Agilent parts and supplies, Agilent Preventive Maintenance provides everything you need to reduce unplanned downtime and keep your systems operating at their peak. This checklist will be completed at the end of the service and provided to you as a record of the preventive maintenance activities.

Introduction

Select the appropriate PM to be done and then perform the checklist under that section

- ☐ Interim Preventive Maintenance 6 months
- ☒ Major Preventive Maintenance Yearly

This checklist covers the following model(s):

Type	Model
SQ	5973 Series MSD
SQ	5975 Series MSD
SQ	5977 Series MSD
TQ	7000 Series MS/MS
TQ	7010 Series MS/MS
QTOF	7200 Series QTOF
QTOF	7250 Series QTOF

Customer Information

- Customers should provide all necessary operating supplies upon request of the engineer.
- A customer representative should be available to the engineer while performing the preventive maintenance procedures. Customers are responsible for regular maintenance and are encouraged to observe the service representative.
- Any parts not included in the Parts Lists section of this document are not part of the recommended Preventive Maintenance service nor are they included in the price of this service.
- If a system requires the use of extra or special procedures and/or parts for the maintenance service, then these must be ordered separately and charged as a repair, which may incur additional costs.

Important Customer Web Links

- For more information about *Agilent Technologies services*, please visit our website using the following URL: <http://www.agilent.com/en-us/products/crosslab-instrument-services/service-repair>
- To access *Agilent University*, visit <http://www.agilent.com/crosslab/university/> to learn about training options, which include online, classroom and onsite delivery. A training specialist can work directly with you to help determine your best options.
- A useful *Agilent Resource Center* web page is available, which includes short videos on maintenance, quick lists of consumables for new instruments, and other valuable information. Check out the Resource Page here: <https://www.agilent.com/en-us/agilentresources>
- Need technical support, FAQs, supplies? – visit our *Support Home* page at <http://www.agilent.com/search/support>
- Get answers. Share insights. Build connections:
Join the *Agilent Community* at <https://community.agilent.com/welcome>

Service Engineer's Responsibilities

- Contact the customer and ensure that all necessary supplies are available before the preventive maintenance visit.
- Complete empty fields with the relevant information.
- Complete the relevant checkboxes in the checklist using either a "X" or tick mark "✓".
- Check **"Section not applicable"** check boxes to indicate services/tasks not delivered, as appropriate.
- Complete the Preventive Maintenance services in the most logical order relevant to the individual system service in the order of the tasks listed.
- Complete the **Service Review** section together with the customer.
- Ask the customer to sign the Service Completion section including the customer's and your signature.

Additional Instruction Notes

- Preventive maintenance is a factory recommended procedure designed to reduce the likelihood of electromechanical failures. Failure to perform preventive maintenance may reduce the long-term reliability of certain instruments and systems. **Two preventative maintenances (PMs) per year are recommended, the Major PM Service will be performed annually with an Interim PM performed 6 months after the Major PM.**

System Information

- ☐ Check this box if an instrument configuration report is attached instead of completing the table.

Instrument System Name and ID	MS 5 975 C
Instrument System Site and Location	Lab

List System Component Product Numbers	List the Serial Numbers of each Component
1. G3171A	US71236314
2.	
3.	
4.	
5.	
6.	
7.	
8.	

Preparation

- ☒ Discuss any specific issues with the customer before starting.
- ☒ Review the instrument logbook for recorded problems and comments.
- ☒ Save instrument control settings before starting the procedure.
- ☒ Perform a general inspection of the system for cleanliness.
- ☒ Check for proper installation of parts, assemblies, sensors etc.
- ☒ Check system for required installation of components and settings as defined by current Service Notes
- ☒ Check for firmware updates and verify with customers if they would like them installed. Firmware update(s) are strongly recommended.

Customer Responsibilities

Customers should ensure that all necessary operating supplies, consumables, and usage-dependent items such as gases, vials, syringes, calibrant solution and solvents required for successful preventive maintenance are available. A customer representative should be available while the preventive maintenance is being performed.

Important notice for customers

The customer should complete the following before the Support Provider arrives on site:

- ☐ Perform an autotune and retain the printed tune report just prior to the start of the PM to verify performance of the equipment.

Note: it is recommended to have the customer run the autotune and tune evaluation prior to the PM and then start the vent cycle so that the instrument will be ready for the service representative.

Definition of the Task/Recommended items within the document

Task		Recommended			
Yes	No	Interim	Major	As needed	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Yes selected means that the task was done or the part was required.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	No selected means that the task was not done or the part was not required.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Interim selected means that this task is recommended to be done at 6-month intervals.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	Major selected means that this task is recommended to be done yearly; if the customer would like a service to be done at the 6-month interval then the service could be purchased.
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	As needed selected means that the task was done or the part was used as needed. For example, there could be two types of filters that could be used and this was the one selected.

Preventive Maintenance Procedures

Yes/No	Interim/Major	Description
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Perform general inspection of system for cleanliness
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Discuss any problems the customer is having with the instrument
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Review customer maintenance records and exclude maintenance on recently serviced items
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Review the most recent autotune report. This will give a starting point for evaluating spectral peaks, baseline noise, peak shape, mass assignments and resolution.

		GCMS	
Yes/No	Interim/Major	Description	
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Record Instrument model no.	G 3192 A
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Record Instrument serial no.	US 71236314
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Record Rough Vacuum	
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Record Manifold Vacuum	
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Type of Column installed	DB - 624

				System Checks
Yes/No	Interim/Major			Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify that calibration peaks were seen prior to starting the PM
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Vent the instrument
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inspect vacuum hoses, pump, exhaust tubing, and power cords for excessive wear.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Visually inspect calibrant levels – PFTBA PFDTD (if appl.), IRM (if appl.). Refill if available.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Look for any obvious external damage or problems.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clean air intake(s). Cosmetic cover(s) may need to be removed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system line voltage meets instrument specifications: Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>

				Wet Mechanical vacuum pumps
Yes/No	Interim/Major			Description
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of oil leakage. Check pump gasket for leakage.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Drain and replace mechanical pump oil.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace Oil Mist Filter if applicable.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent oil changes if the oil is dirty
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Don't use mist filters with Chemical Ionization.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed. Visually confirm that no oil returns up vacuum hose.
				Dry Mechanical vacuum pumps - Diaphragm
Yes/No	Interim/Major			Description
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Clear air flow paths of dust.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	If vacuum is poor, then replace the diaphragm pump.
<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

				Dry Mechanical vacuum pumps - Scroll
Yes/No	Interim/Major			Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the tips seal on the IDP pump.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check for evidence of poor vacuum – Turbo power demand, poor manifold vacuum, etc.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Replace the Exhaust Filter if required.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Discuss with customer the need for more frequent changes, if needed.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Inform customer that pump gas ballast should be installed all the time.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Perform anti-suckback valve test. Power on until side plate is held closed, power off and check that side plate holds closed.

				Cleaning System and Filters	
Yes/No	Interim/Major			Description	
				Fans	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Remove dust from fans and vent covers.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Verify fans are functional and that there is enough space around the instrument for proper cooling.
				Source cleaning	
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Open analyzer and remove the source.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Disassemble, Clean, Re-assemble source.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Re-install source and close analyzer.
				Filters	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Replace RMSH-2 Helium gas filter – if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Replace RMSN-2 Nitrogen gas filter – If applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		Replace RMSHY-2 Hydrogen gas filter – if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		CP17988 – Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount, and Filter – if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		CP17974 – Gas Clean Filter Kit GC/MS 1/8"; Mount and Filter – if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		CP17973 – Gas Clean Filter; Replacement Filter – if applicable.
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		5190-9071 – Methane Gas Filter – if applicable

Guidance: If gas filter is replaced, write the change date on the filter using a permanent marker.

				System post-check
Yes/No	Interim/Major			Description
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Pump system back down. Wait until system stability has been achieved.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system vacuum reading(s) via the gauge controller.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Leak Check
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Verify system in manual tune
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Compare against previous tune file report(s)
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Change to Tune and verify that all temperatures, pressures, and gas flows reach method set points
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Check manually that you have calibration peaks.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	EI Autotune Performed

Guidance: If the PM Service is performed prior to a qualification service, then use the qualification procedure as a guide for final instrument setup and checkout.

Service Review

- ☒ Attach available reports/printouts of all tests to this documentation.
- ☒ Record the Preventive Maintenance service activity in the customer's records/logbook. Record the PM event in the Smart Alerts logbook, if applicable.
- ☒ Update/reset instrument maintenance counters as appropriate.
- ☒ Affix the PM sticker to the system or instrument logbook based on the customer's request.
- ☒ Complete the Service Engineer Comments section if there are additional comments.
- ☒ Review this service, parts replaced, and test results obtained with the customer.
- ☐ If the instrument firmware was updated, record the details of the change in the Service Engineer's Comment box. Systems in a compliant environment may need additional documentation.

Agilent Test Results Table

Test Description	Expected Test Result	Actual Test Result

Agilent Consumed Parts List Table

☐ Section not applicable

Part Description	Part Number	Product or Model# where used	Quantity consumed

Signature Page

Service Engineer Comments (optional)

If there are any specific points you wish to note as part of performing the installation or other items of interest for the customer, please write in this box.

Service Completion

Service request number 6007047419 Date service completed 26 Jun 2024

Agilent signature Adirek R. Customer signature 100

Total number of pages in this document 12

Parts – As needed as part of the PM

Common MS Filters and Seals – 5973/5975/5977/7000/7010/7200/7250 Series

Supplies						
Yes/No	Interim/Major/As needed	Description	Part number			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Helium gas filter – if required	RMSH-2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Nitrogen gas filter – if required	RMSN-2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Gas Clean Carrier Gas Kit for 7890 for Nitrogen or Helium; Bracket, Mount and Filter – if required	CP17988			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Gas Clean Filter Kit GC/MS 1/8 in (complete replacement kit) – if required	CP17974			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Gas Clean GS/MS Filter – if required	CP17973			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Chemical Ionization Gas Purifier (CI systems) – if required	5190-9071			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	Agilent AVF Platinum, 1 quart	5191-5851			

Gas filters need to be changed only if required

MS Maintenance Supplies for 5973/5975/5977 Series

Supplies						
Yes/No	Interim/Major/As needed	Description	Part number			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Diffusion pump fluid (Diffusion Pump Models)	6040-0809 Qty 2			
<input checked="" type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (IDP-3 Dry Pump Models)	G7077-67018			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (no tools – CSD P/N)	5190-9561			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-3 Tip Seal Replacement Kit (no tools – VPD P/N)	IDP3TS			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Filter element for IDP-3	REPLSLRFILTER2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	DS42 Oil Mist Eliminator 3/4G & 3/8	SR03706556			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Exhaust oil mist trap (thread) Edwards/Pfeiffer	G1099-80039			

MS Maintenance Supplies for 7000/7010 Series

Supplies						
Yes/No	Interim/Major/As needed	Description	Part number			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Nitrogen gas filter	RMSN-2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-10 Tip Seal Replacement Kit (IDP-10 Dry Scroll Pump Models)	G7004-67023			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-10 Tip Seal Replacement Kit (no tools – VPD P/N)	X3807-67000			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Oil Mist Filter RV5	G6600-80043			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Filter element for the IDP-10	REPLSLRFILTER1			

MS Maintenance Supplies for 7200/7250 Series

Supplies						
Yes/No	Interim/Major/As needed	Description	Part number			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Nitrogen gas filter – if required	RMSN-2			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	RIS Probe Maintenance Kit (7200 Series only)	G7005-60170			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	DS202 Oil Mist Eliminator	SR03706800			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-15 Tip Seal Replacement Kit (IDP-15 Dry Pump Models)	5190-9613			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	IDP-15 Tip Seal Replacement Kit (no tools – VPD P/N)	X3815-67000			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	Filter element, for SH-110/SH-112/IDP-15 exhaust silencer	REPLSLRFILTER			
<input type="checkbox"/> <input checked="" type="checkbox"/>	<input type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>	DS 3/8 MAG. PLUG AND GASKET	SR03701824			

MS Maintenance Supplies for JetClean

Supplies						
Yes/No	Interim/Major/As needed	Description	Part number			

<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	Big Universal Trap, 1/8" fittings, Hydrogen, if required	RMSHY-2
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Consumable Parts Reference – Purchasable by customer, not included as part of PM

Common MSD Maintenance Supplies 5973/5975/5977/7000/7010/7200/7250 Series

					Common Recommended Consumables Parts	
Yes/No	Interim/Major/As needed	Description			Part number	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	El High Temperature Filaments	G7005-60061 Qty 2
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	HES El Filaments	G7002-60001
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	LE-El Filaments	G3850-60021
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI High Temperature Filament – all MSDs	G7005-60072
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PFTBA GCMS Tuning Standard calibrant	05971-60571
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PFDTD calibrant, 1 mL	8500-8510
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	PFET, IRM calibrant for GC QTOF 0.5 mL	5190-0531

MSD Maintenance Supplies 5973/5975/5977 Series

					Supplies	
Yes/No	Interim/Major/As needed	Description			Part number	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal (tip and spring combo)	G1999-60412
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal spring (spring only)	G1999-20023
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Repeller insulator	G1099-20133 Qty 2
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transfer-Line Tip Base, Threaded	G3870-20548

MS Maintenance Supplies for 7000/7010 Series

					Supplies	
Yes/No	Interim/Major/As needed	Description			Part number	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal - 7000	G1999-60412
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal - 7010	G7002-60412
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal (tip only)	G3870-20542
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	CI Interface tip seal spring (spring only)	G1999-20023
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Repeller insulator - 7000	G1099-20133 Qty 2
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Transfer-Line Tip Base, Threaded	G3870-20548

MS Maintenance Supplies for 7200 Series

					Supplies	
Yes/No	Interim/Major/As needed	Description			Part number	
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Extractor Lens Insulator	G7005-20133
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ion Focus Insulator	G7005-20442
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	Ring Heater/Sensor Assembly	G7005-60110
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	RIS Xfer Tip	G7005-20542
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	RIS Xfer Tip Spring	G7005-20024

MS Maintenance Supplies for 7250 Series

Yes/No	<input type="checkbox"/>	<input type="checkbox"/>	Supplies	
Yes/No	Interim	Major	As needed	
			Description	Part number
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Lens insulator/holder (HES)	G7002-20074
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Ring heater/sensor assembly (HES)	G7002-60043
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Ceramic insulator for Extractor (HES)	G7002-20064
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Transfer-Line Tip Cap, Threaded	G3870-20547
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Transfer-Line Tip Base, Threaded	G3870-20548
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			El Extractor Transfer Tip	G3870-20542
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			CI Tip Compression Spring	G1999-20023

MS Maintenance Supplies for Intuvo 9000 MS Systems

Yes/No	<input type="checkbox"/>	<input type="checkbox"/>	Supplies	
Yes/No	Interim	Major	As needed	
			Description	Part number
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Swaged MS Tail - Packaged	G4590-60009
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Swaged MS Tail (HES) - Packaged	G4590-60109

Common MS Maintenance Supplies

Parts required				
Yes/No	Interim	Major	As needed	
			Description	Part number
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Abrasive paper, 30 um	5061-5896
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Alumina powder	393706201
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Cloths, clean (pkg of 15)	05980-60051
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Cloths, cleaning (pkg of 300)	9310-4828
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Cotton swabs (pkg of 100)	5080-5400
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Gloves, clean, large	8650-0030
<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			Gloves, clean, small	8650-0029



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

CALIBRATION CERTIFICATE

Submitted by : THAI ENVIRONMENTAL TECHNIC LIMITED.

Address : 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphansung, Bangkok, 10240, Thailand.

Calibrated at : Electrical and Electronic Standards Laboratory, Industrial Metrology and Testing Service Centre.
Soi 1C, Bangpoo Industrial Estate, Sukhumvit Rd., Muang, Samutprakan 10280.

Instrument Calibrated :

Description : Sound Calibrator

Manufacturer : Tenmars

Model : TM-100

Serial No. : 180501628

Ambient Environment

Temperature : $(23 \pm 3) ^\circ\text{C}$

Relative Humidity : $(50 \pm 15) \%$

Ambient Pressure : $(101.325 \pm 1.500) \text{ kPa}$

Standards used :

1. Digital Function Synthesizer NF Electronic DF-193A S/N 122037.
2. Measuring Amplifier Bruel&Kjaer 2636 S/N 1537484.
3. Programmable Attenuator Tamagawa TPA-303A S/N OF 2214.
4. Digital Multimeter Agilent 34401A S/N MY44005560.
5. Pressure Transmitter Vaisala PTB202AD S/N T0650001.
6. Audio Analyzer Panasonic VP-7722A S/N 041477D122.
7. Condenser Microphone B&K 4180 S/N 2633526.

Calibration Procedure: CP-102-04 based on IEC 60942-2003. The sound pressure level of instrument was measured by standard microphone using an insert voltage technique.

This instrument has been calibrated against standards maintained at Electrical and Electronic Standards Laboratory (EEL), which are traceable to the International System of Units through the National Institute of Metrology (Thailand).

The information on actual reading is attached herewith and the uncertainty limits quoted refer to the measured values only.

Date of Receipt : 1 Aug. 2024

Date of Calibration : 13 Aug. 2024

1/3

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BLMTC.002 Rev.5

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THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

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

Nominal Output of Unit Under Test = 94 dB re 20 μ Pa at 1000 HzAcoustic Output in dB re 20 μ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0°C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	94.58	0.58	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	990.7	-9.3	± 1.5	$\pm 2.0\%$

3. Total distortion

Standard Microphone Type	Measured Total distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	1.74	± 0.50	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Date of Calibration : 13 Aug. 2024

2 / 3
J

The results relate only to the items tested/calibrated or value assigned.
Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.4

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Fax. (66) 0 2323 9165
E-mail : mtc@tistr.or.th

Office
196 Phahonyothin Road, Chatuchak, Bangkok 10900,
Thailand
Tel. (66) 0 2579 1121-30 ext. 5219, 5225, 5217
Fax. (66) 0 2579 8592
E-mail : sumalee@tistr.or.th



THAILAND INSTITUTE OF SCIENTIFIC AND TECHNOLOGICAL RESEARCH (TISTR)

Request No. 21-67/0566

MTC No. EEL. BP. 1/0867

Nominal Output of Unit Under Test = 114 dB re 20 μ Pa at 1000 Hz

Acoustic Output in dB re 20 μ Pa , Corrected to Reference Conditions : 101.325 kPa , 23.0 °C and 50 %RH

1. Sound Pressure Level

Standard Microphone Type	Measured Sound Pressure Level (dB)	Deviated value (dB)	Uncertainty (dB)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	114.61	0.61	± 0.10	± 0.75 dB

2. Frequency

Standard Microphone Type	Measured Frequency (Hz)	Deviated value (Hz)	Uncertainty (Hz)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	985.9	-14.1	± 1.5	$\pm 2.0\%$

3. Total Distortion

Standard Microphone Type	Measured Total Distortion (%)	Uncertainty (%)	Tolerance limit IEC60942:2003 Class 2
1/2 inch Bruel&Kjaer 4180	3.00	± 0.70	$\pm 4.0\%$

Note : 1. No adjustment.

2. The calibrator pressure correction was not included.

3. The microphone volume correction was not included.

Calibrated by :

.....
(Mr. Weerachai Deechaiyae)

Approved by :

.....
(Mr. Prawate Kluaypa)

Director
TISTR

Electrical and Electronic Standards Laboratory

Industrial Metrology and Testing Service Centre

Date of Calibration : 13 Aug. 2024

Date of Issue : 15 Aug. 2024

Ref : 2011267080102854001

End of Certificate

3 / 3

The results relate only to the items tested/calibrated or value assigned.

Advertising the Report/Certificate and publicity of the results except in full are prohibited unless written permission is obtained from the governor of TISTR.

FM.BL.MTC.002 Rev.5

Head Office

35 Mu. 3 Tambon Khlong Ha, Amphoe Khlong Luang,
Changwat Pathumthani 12120, Thailand
Tel. (66) 0 2577 9036
Fax. (66) 0 2577 9009

Office/Laboratory

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Changwat Samutprakan 10280, Thailand
Tel. (66) 0 2323 1672-80 ext. 115, 116
(66) 08 3219 9440
E-mail : mtc@tistr.or.th Website : www.tistr.or.th

Office

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(66) 08 1889 6827



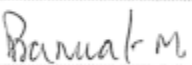
Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-Oct-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-Oct-2024
Calibrator Serial NO.	: 180501628		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
21	ACO	6226	070049	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
23	RION	NL-21	00487676	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.2	114.2	114.2	114.2			
25	ACO	6226	100098	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
26	ACO	6226	100099	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	114.8	114.8	114.8	114.8			
28	ACO	6226	100101	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
29	ACO	6226	100102	94.0	93.8	93.8	93.8	93.8	94.0	0.2	PASS
				114.0	113.9	113.9	113.9	113.9			
30	ACO	6226	100106	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.1	114.1	114.1	114.1			
31	ACO	6226	110098	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
32	ACO	6226	110105	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
34	ACO	6226	110099	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			

Calibration By : 

Approve by : 



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-Oct-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-Oct-2024
Calibrator Serial NO.	: 180501628		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
35	ACO	6226	110097	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
36	ACO	6226	110102	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
37	ACO	6226	110101	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
38	ACO	6226	110106	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
39	ACO	6226	110104	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
40	ACO	6226	110100	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
41	ACO	6226	130127	94.0	94.2	94.2	94.2	94.2	94.0	0.2	PASS
				114.0	114.0	114.0	114.0	114.0			
42	ACO	6226	130128	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
44	ACO	6226	130130	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
45	ACO	6226	130131	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By :

Approve by :



Thai Environmental Technic Limited
บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด

Sound Level Meter Calibration Report

Equipment Type	: Sound Level Meter	Calibration Date	: 1-Oct-2024
Calibrator	: TENMARS Sound Calibrator TM-100	Barometric pressure (mmHg)	: 759.0 mmHg
Standard	: IEC 60942	Temperature (23±3)°C	: 25.00 °C
Accuracy	: 94.0 ±0.3 dB and 114.0±0.5 dB	Relative Humidity(50±15 %)	: 50.0 % RH
Frequency	: at 1,000 Hz ±1%	Dued Date of Calibrate	: 31-Oct-2024
Calibrator Serial NO.	: 180501628		

Item	Instrument Calibrated			Reference Acoustic dB	Before Adjust				After Adjust ± dB	Deviation ± dB	Result Calibrate
	Brand	Model	Serial NO.		ครั้งที่ 1	ครั้งที่ 2	ครั้งที่ 3	เฉลี่ย			
57	ACO	6226	160099	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
58	ACO	6226	160143	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
59	ACO	6226	160203	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
60	ACO	6226	160204	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
61	ACO	6226	160205	94.0	93.9	93.9	93.9	93.9	94.0	0.2	PASS
				114.0	114.0	114.0	114.0	114.0			
62	ACO	6226	160211	94.0	93.9	93.9	93.9	93.9	94.0	0.1	PASS
				114.0	113.9	113.9	113.9	113.9			
63	ACO	6226	160212	94.0	94.0	94.0	94.0	94.0	94.0	0.0	PASS
				114.0	114.0	114.0	114.0	114.0			
64	ACO	6226	160213	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			
66	ACO	6226	160215	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.1	114.1	114.1	114.1			
67	ACO	6226	160216	94.0	94.1	94.1	94.1	94.1	94.0	0.1	PASS
				114.0	114.0	114.0	114.0	114.0			

Calibration By : 

Approve by : 





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



Certificate of Calibration

Cert.No.: 24CHO573

Page.: 1 of 2

Equipment :	pH Meter
Manufacturer :	Horiba
Model :	F-71G
Serial No. :	V3B1F8H3
ID No. :	Ins-LAB-025
Condition As-Received:	Used Item
Received Date :	30 October 2024
Calibration Date :	31 October 2024
Reference :	2410-0784OC-1
Submitted by :	Thai Environmental Technic Limited 1/6 Soi Ramkhamhaeng 145, Khwaeng/Khet Saphan Sung, Bangkok 10240
Calibration Place :	Laboratory (Thai Environmental Technic Limited)
Ambient Temperature :	(26.1 to 25.8) °C (On-Site)
Relative Humidity :	(58.6 to 64.2) % (On-Site)
Calibration Procedure :	In - house method : - CP-OCH2 by direct measurement with DC voltage standard and direct measurement with certified reference material (CRM)
Calibrated by :	Saithip Meangmai 
Approved by :	 Approved Signatory
() Unnopphol Harachai	
(✓) Ponpan Paipim	
() Saithip Meangmai	
Issue Date :	2 November 2024

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.



Cert.No.: 24CHO573

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	46530031	130RC098	24E3004	12 Sep 2025
2) Digital Thermometer	307901	70RC137	24I973	01 Sep 2025

- This Certification is traceable to SI Through Technology Promotion Association (Thailand - Japan)

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	1034203	27 Sep 2026
pH 6.876	CPA chem	1005301	15 June 2026
pH 9.174	CPA chem	1005302	15 June 2025

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 Document Process Calibrator 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.: V3B1F8H3	4.000	177.48	177.5	4.000	0.058	2.00
	6.860	8.28	8.3	6.860	0.058	2.00
	7.000	0.00	0.0	7.000	0.058	2.00
	9.180	-128.97	-128.9	9.180	0.058	2.00
	10.000	-177.48	-177.4	10.000	0.058	2.00

Function : pH Measurement

Performing three buffers standard curve by using buffer nominal pH (4,7,9)

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.: 9X2E0223	4.008	4.007	167.0	0.0048	2.00
	6.876	6.855	-0.3	0.0065	2.00
	9.174	9.158	-136.6	0.0096	2.00

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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TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
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534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG BANGKOK 10250
TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert. No.: 24TM986

Page : 1 of 3

Equipment : BOD Incubator

Manufacturer : Accuplus

Model : i250-DS

Serial No. : 2059-1017-0029

ID No. : Ins-LAB-047

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Laboratory (Thai Environmental Technic Limited)

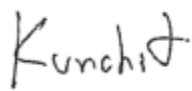
Received Order : 24 June 2024

Calibration Date : 24 June 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Krisda Malee

Approved by : 
Approved Signatory

() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 04 July 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : BOD Incubator
 Condition As-Received : Used Item
 Reference : 2406-0672OC-3

Cert. No.: 24TM986
 Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 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:-

<u>Instrument</u>	<u>Serial No.</u>	<u>Cert. No.</u>	<u>Traceable</u>	<u>Due Date</u>
1) Data Acquisition	MY57013711	23LM115	TPA	11 Jul 2024

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.

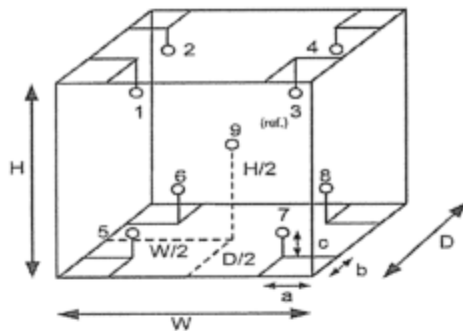
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Not Available

Environment during calibration		
	Beginning	Finished
Temp. (°C)	24	25
REL.Humid. (%)	53	51
AC Supply (Volt)	220	221



Position :	Ref. Std. ID No.:
1	22-18RTD-2/1
2	18RTD-2/2
3	18RTD-2/3
4	18RTD-2/4
5	18RTD-2/5
6	18RTD-2/6
7	18RTD-2/7
8	18RTD-2/8
9 (ref.)	18RTD-2/9

Probe Installation Details :

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

Dimension of Chamber :

D = 0.48 m
 W = 0.50 m
 H = 1.1 m
 Capacity = 0.26 m³



Equipment : BOD Incubator
Condition As-Received : Used Item
Reference : 2406-06720C-3
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Not Available

Cert. No.: 24TM986
Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
20.0	20.0	20.0	0.42	0.55	0.99	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	(± °C)
20.0	20.176	20.044	20.228	20.018	20.021	19.995	19.849	19.839	19.863	0.64

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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TEL.0-2717-3000-29 FAX.0-2719-9484



Certificate of Calibration

Cert.No.: 24MM272

Page.: 1 of 3

Equipment : Electronic Balance

Manufacturer : Mettler Toledo

Model : AB204

Serial No. : 1116392227

ID No. : Ins-LAB-033

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Balance Room


Received order : 09 April 2024

Calibration Date : 10 April 2024

Ambient Temperature : 15 °C to 40 °C

Relative Humidity : 30 % to 90 %

Calibrated by : Khit Ruttanaprapachai

Approved by : 
Approved Signatory

() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 12 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-0113OC-14

Cert.No.: 24MM272

Page: 2 of 3

Procedure used :-

Calibration were conducted using in-house calibration procedure CP-OB01 based on UKAS LAB 14 according to direct measurement method against standard weight.

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>Test report No.</u>	<u>Due date</u>
1) Standard Weight Set (E2)	15884	-	70RC138	MM-0020-23	30 Jan 2025

- This certificate is valid only to the item calibrated on date and place of calibration.
- This result of calibration was made on requested at the point specified by customer.
- This certificate is not certified for any commercial transaction.
- This certification is traceable to the International System of Unit.

Result of calibration () Without Adjustment (*) After Adjustment by External Calibration

Range capacity : 0 g to 210 g Resolution 0.0001 g

Before Adjustment :

<u>Applied Weight</u>	<u>Balance Reading</u>	<u>Correction</u>	<u>Measurement Uncertainty</u>	<u>Coverage Factor</u>
(g)	(g)	(g)	(\pm mg)	(k)
100	100.0000	0.0000	0.19	2
200	200.0001	-0.0001	0.30	2

After Adjustment :

1. Determination of the standard deviation of weighing machine (n = 10)

<u>Applied Weight</u>	<u>Standard Deviation of Reading (g)</u>
(g)	
100	0.00007
200	0.00008



Equipment : Electronic Balance
Condition As-Received : Used Item
Reference : 2404-0113OC-14

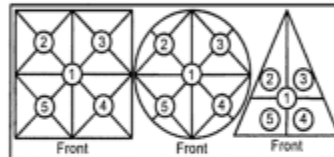
Cert.No.: 24MM272

Page: 3 of 3

Result of calibration

2. Effect of off center loading

A mass of 100 g was placed at various positions on the pan. The weighing machine reading error obtained is given in the table



Maximum difference between off-center and central loading

Position 1 (g)	Position 2 (g)	Position 3 (g)	Position 4 (g)	Position 5 (g)
0.0000	+0.0001	0.0000	+0.0001	+0.0003

(g)
0.0003

3. Departure from nominal value

<u>Applied Weight</u> (g)	<u>Balance Reading</u> (g)	<u>Correction</u> (g)	<u>Measurement Uncertainty</u> (± mg)	<u>Coverage Factor</u> (k)
Unload	0.0000	0.0000	0.14	2.11
0.01	0.0101	-0.0001	0.14	2.11
0.1	0.1001	-0.0001	0.14	2.11
0.5	0.5002	-0.0002	0.14	2.11
1	1.0002	-0.0002	0.14	2.11
5	5.0000	0.0000	0.14	2.11
10	10.0001	-0.0001	0.14	2.11
25	25.0000	0.0000	0.15	2.07
50	49.9999	+0.0001	0.15	2.06
100	100.0002	-0.0002	0.19	2
200	200.0002	-0.0002	0.30	2

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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MAINTENANCE REPORT

OPTIMA 8000

Customer :	บริษัท เทคนิกสิ่งแวดล้อมไทย	Date Tested:	September 27, 2024
	จำกัด	Recommendation Recertification	
Address :	1/6 ซอยรามคำแหง 145,	Period	6 Months
	แขวงสะพานสูง, เขตสะพานสูง,	Recertification Due:	March 26, 2568
	กรุงเทพฯ 10240 TH	Date Last Certified:	March 28, 2024
User Name:	คุณ ภัทรพงศ์ โคตะมา	Visit Number:	2 OF 2
Phone:	02-3737799, 081-1303495	TH ONE SOURCE Phone:	081-7316733, 081-1086572
E-mail:	Ketsarin.Chuayphan@eurofinsasia.co	E-mail :	thonesource@gmail.com

CONFIGURATION TESTED

MODEL

OPTIMA 8000

N0772045

SERIAL NUMBER

078S1310024C

1F1380368

ACCESSORIES/COMPONENT NOT INCLUDED

WinLab32 Version 5.5.0

PN:6150T21E4Q1E

TESTED EQUIPMENT

IPV Methods

TEST STANDARD USED

Mixed standard 1/10

Mixed standard 1/100

PE NUMBER

N0691579

N9300221

CUSTOMER SUPPLIED

2 % HNO3

10 % HNO3

COMMENTS



MAINTENANCE REPORT

OPTIMA 8000

SERIAL NUMBER 078S1310024C
DATE TESTED
September 27, 2024
1. MECHANICAL CHECKS

A. Inspect and clean all fans and filters.

☐ OK

B. Inspect and replace as necessary, all torch components including the RF Flat coil

☐ OK

C. Inspect all tubing for sign of clacking or leaking.

☐ OK

D. Adjust water and gas pressure regulator settings.

☐ OK

E. Inspect and leak check pneumatics drawers.

☐ OK

F. Clean the exterior of the instrument.

☐ OK

2. OPTICAL CHECKS

A. Inspect and clean all optical components.

☐ OK

B. As required, check and replace all purge filters.

☐ OK

C. Recheck optical alignment.

☐ OK

3. COOLING SYSTEM CHECKS

A. Perform preventive maintenance on chiller.

☐ OK

B. Flush out water the chiller and replace with coolant mix30plus every twelve months

☐ OK

4. PERFORMANCE CHECKS

A. Torch View Alignment.

☐ OK

B. Wavelength Calibration.

☐ OK



MAINTENANCE REPORT OPTIMA 8000

SERIAL NUMBER	078S1310024C	DATE TESTED	September 27, 2024
PARAMETER	SPECIFICATION	FINAL VAULE	
Precision			
Zn 213.856	% RSD ≤ 1.0	0.80	
Mg 280.260	% RSD ≤ 1.0	0.65	
Mg 285.207	% RSD ≤ 1.0	0.96	
Ba 455.403	% RSD ≤ 1.0	0.39	
Detection Limits: Axial			
	As 193 nm, 3(sd) ≤ 10.0 ppb	8.89	
	Se 196 nm, 3(sd) ≤ 5.0 ppb	5	
	Tl 190 nm, 3(sd) ≤ 10.0 ppb	8.49	
	Pb 220 nm, 3(sd) ≤ 3.0 ppb	3.0	
BEC: Axial	Mn 257 nm, ≤ 30 ppb	3.19	
Detection Limits: Radial			
	As 193 nm, 3(sd) ≤ 60.0 ppb	3.05	
	Zn 213 nm, 3(sd) ≤ 2.0 ppb	0.11	
	Mn 257 nm, 3(sd) ≤ 1.0 ppb	0.03	
	La 379 nm, 3(sd) ≤ 3.0 ppb	0.16	
	Ba 455 nm, 3(sd) ≤ 0.3 ppb	0.03	
	Ba 493 nm, 3(sd) ≤ 0.6 ppb	0.04	
BEC: Radial	Mn 257 nm, ≤ 30 ppb	6.73	
Spectral Resolution: UV			
	As 193 nm, ≤ 0.009	0.00770	
	Ni 231 nm, ≤ 0.011	0.00853	
	Ni 341 nm, ≤ 0.015	0.01270	
Spectral Resolution: VIS			
	Ba 455 nm, ≤ 0.020	0.01617	



MAINTENANCE REPORT

OPTIMA 8000

SERIAL NUMBER 078S1310024C DATE TESTED September 27, 2024

Remarks :

Commissioning follow as commissioning performance sheets.

Calculate MnBEC = $IB * STD \text{ Conc} / IS - IB$, where standard conc = 1000 ug/L

IB = Intensity of blank

IS = Intensity of Standard

Used Mira Mist Nebulizer

This is to certify that the above tests have been performed and the configuration tested



meets



does not meet

This certificate does not modify PerkinElmer's standard terms and condition of sale, including warranty terms.

Service Department TH One Source Co., Ltd.

Krungchai T.

(**Krungchai Treevichien**)

Customer Support Engineer

```

=====
Align View XY Axial for analyte Mn 257.610
X-position Y-position Intensity
-2.0 15.0 1816338.1
-1.6 15.0 2530610.3
-1.2 15.0 3189278.3
-0.8 15.0 3614260.9
-0.4 15.0 3926066.0
0.0 15.0 3834572.0
0.4 15.0 3678909.6
0.8 15.0 3156679.3
1.2 15.0 2495238.4
1.6 15.0 2541267.5
2.0 15.0 1751387.0
-0.4 10.0 55987.3
-0.4 10.5 85699.0
-0.4 11.0 165498.0
-0.4 11.5 368327.5
-0.4 12.0 678081.3
-0.4 12.5 1199292.7
-0.4 13.0 1786433.0
-0.4 13.5 2906912.3
-0.4 14.0 3839977.9
-0.4 14.5 4759744.0
-0.4 15.0 5401740.9
-0.4 15.5 5841016.4
-0.4 16.0 6008449.1
-0.4 16.5 5567893.2
-0.4 17.0 4510535.5
-0.4 17.5 3802817.9
-0.4 18.0 3001780.4
-0.4 18.5 2146077.0
-0.4 19.0 1316878.0
-0.4 19.5 799272.1
-0.4 20.0 463382.8
-1.2 16.0 4859205.2
-0.8 16.0 5531906.7
-0.4 16.0 5846490.8
0.0 16.0 5683533.7
0.4 16.0 5207908.3
-0.4 14.0 4289105.7
-0.4 14.5 4791674.6
-0.4 15.0 5586702.4
-0.4 15.5 5920442.0
-0.4 16.0 5921171.7
-0.4 16.5 5593601.7
-0.4 17.0 4758747.4
-0.4 17.5 3840338.4
-0.4 18.0 3070470.1
=====

```

27/9/2567 10:25:06 aligned for analyte Mn 257.610

X viewing position set to -0.4 mm having Peak intensity 5921171.7 for Axial viewing

Y viewing position set to 16.0 mm having Peak intensity 5921171.7 for Axial viewing

```

=====
Align View X Radial for analyte Mn 257.610

```

```

X-position Y-position Intensity
-7.0 15.0 49486.2
-6.5 15.0 56575.6
-6.0 15.0 69024.4
-5.5 15.0 83981.4
-5.0 15.0 104895.3
-4.5 15.0 131033.5
-4.0 15.0 163001.2
-3.5 15.0 195402.6
-3.0 15.0 249468.8
-2.5 15.0 342466.5
-2.0 15.0 451795.1
-1.5 15.0 553731.8
-1.0 15.0 667318.0

```

-0.5	15.0	757255.0
0.0	15.0	767649.3
0.5	15.0	735056.1
1.0	15.0	615631.0
1.5	15.0	471489.5
2.0	15.0	333664.2
2.5	15.0	246754.1
3.0	15.0	208559.5
3.5	15.0	163643.5
4.0	15.0	124333.8
4.5	15.0	98031.2
5.0	15.0	75416.8
5.5	15.0	56950.9
6.0	15.0	42516.0
6.5	15.0	32928.9
7.0	15.0	24783.4

27/9/2567 10:28:26 aligned for analyte Mn 257.610

X viewing position set to 0.0 mm having Peak intensity 767649.3 for Radial viewing
=====

=====

Analysis Begun

Start Time: 27/9/2567 10:48:28
Logged In Analyst: TET
Spectrometer: Optima 8000

Plasma On Time: 27/9/2567 10:17:24
Technique: ICP Continuous
Autosampler: S10

Sample Information File:

Batch ID:

Results Data Set: DLRL_A270924

Results Library: C:\Users\Public\PerkinElmer\ICP\Data\Results\Results.mdb

Method Loaded

Method Name: DLRL-Cal

IEC File:

Method Description: Calibration for later test

Method Last Saved: 27/9/2567 10:48:23

MSF File:

Sequence No.: 1

Sample ID: Calib Blank 1

Analyst:

Initial Sample Wt:

Dilution:

Wash Time:

Autosampler Location:

Date Collected: 27/9/2567 10:48:32

Data Type: Original

Initial Sample Vol:

Sample Prep Vol:

Nebulizer Parameters: Calib Blank 1

Analyte	Back Pressure	Flow
All	187.0 kPa	0.55 L/min

Mean Data: Calib Blank 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc. Units
As 193.696	24.2	6.15	25.39%	[0.00] mg/L
Zn 213.857	405.8	9.47	2.33%	[0.00] mg/L
Mn 257.610	454.5	55.73	12.26%	[0.00] mg/L
La 379.478	68.3	4.48	6.55%	[0.00] mg/L
Ba 455.403	12522.9	87.42	0.70%	[0.00] mg/L
Ba 493.408	9724.3	90.69	0.93%	[0.00] mg/L

Sequence No.: 2

Sample ID: Calib Std 1

Analyst:

Initial Sample Wt:

Dilution:

Wash Time:

Autosampler Location:

Date Collected: 27/9/2567 10:52:55

Data Type: Original

Initial Sample Vol:

Sample Prep Vol:

Nebulizer Parameters: Calib Std 1

Analyte	Back Pressure	Flow
All	186.0 kPa	0.55 L/min

Mean Data: Calib Std 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc. Units
As 193.696	10332.8	118.28	1.14%	[5.0] mg/L
Zn 213.857	114998.8	1360.71	1.18%	[1.0] mg/L
Mn 257.610	1278603.3	34089.13	2.67%	[1.0] mg/L
La 379.478	276804.5	4517.14	1.63%	[1.0] mg/L
Ba 455.403	698163.6	19112.73	2.74%	[0.1] mg/L
Ba 493.408	525803.8	7197.41	1.37%	[0.1] mg/L

Calibration Summary

As 193.696	1	Lin, Calc Int	-0.0	2067	0.00000	1.000000
Zn 213.857	1	Lin, Calc Int	0.0	115000	0.00000	1.000000
Mn 257.610	1	Lin, Calc Int	0.0	1279000	0.00000	1.000000
La 379.478	1	Lin, Calc Int	0.0	276800	0.00000	1.000000

Ba 455.403	1	Lin, Calc Int	0.0	6982000	0.00000	1.000000
Ba 493.408	1	Lin, Calc Int	0.0	5258000	0.00000	1.000000

```

=====
Sequence No.: 3                      Autosampler Location:
Sample ID: 10% HNO3                 Date Collected: 27/9/2567 10:55:58
Analyst:                            Data Type: Original
Initial Sample Wt:                  Initial Sample Vol:
Dilution:                          Sample Prep Vol:
Wash Time:
=====

```

```

-----
Nebulizer Parameters: 10% HNO3
Analyte          Back Pressure    Flow
All              187.0 kPa         0.55 L/min
-----

```

```

-----
Mean Data: 10% HNO3

```

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
As 193.696	988.0	0.5 mg/L	0.29	478.1 g/L	294.98	61.70%
Zn 213.857	485.2	0.0 mg/L	0.00	4.2 g/L	4.00	94.81%
Mn 257.610	1240.6	0.0 mg/L	0.00	1.0 g/L	0.34	34.95%
La 379.478	101.6	0.0 mg/L	0.00	0.4 g/L	0.17	46.17%
Ba 455.403	467.6	0.0 mg/L	0.00	0.1 g/L	0.05	75.51%
Ba 493.408	449.7	0.0 mg/L	0.00	0.1 g/L	0.01	8.86%

```

=====
Method Loaded
Method Name: DLRL-Check              Method Last Saved: 25/2/2543 11:12:48
IEC File:                           MSF File:
Method Description: As-60,Zn-2, Mn1.0,La-3,Ba455-0.3,Ba493-0.6
=====

```

```

=====
Sequence No.: 4                      Autosampler Location:
Sample ID: 2% HNO3                 Date Collected: 27/9/2567 10:59:33
Analyst:                            Data Type: Original
Initial Sample Wt:                  Initial Sample Vol:
Dilution:                          Sample Prep Vol:
Wash Time:
=====

```

```

-----
Nebulizer Parameters: 2% HNO3
Analyte          Back Pressure    Flow
All              186.0 kPa         0.55 L/min
-----

```

```

-----
Mean Data: 2% HNO3

```

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
As 193.696	-14.2	-0.0 mg/L	0.00	-6.9 g/L	3.05	44.45%
Zn 213.857	-157.8	-0.0 mg/L	0.00	-1.4 g/L	0.11	7.91%
Mn 257.610	-162.2	-0.0 mg/L	0.00	-0.1 g/L	0.03	24.90%
La 379.478	53.6	0.0 mg/L	0.00	0.2 g/L	0.16	83.90%
Ba 455.403	387.1	0.0 mg/L	0.00	0.1 g/L	0.03	48.81%
Ba 493.408	260.0	0.0 mg/L	0.00	0.0 g/L	0.04	75.57%

=====

Analysis Begun

Start Time: 27/9/2567 11:10:10 Plasma On Time: 27/9/2567 10:17:24
Logged In Analyst: TET Technique: ICP Continuous
Spectrometer: Optima 8000 Autosampler: S10

Sample Information File:
Batch ID:
Results Data Set: DLXL_A270924
Results Library: C:\Users\Public\PerkinElmer\ICP\Data\Results\Results.mdb

=====

Method Loaded

Method Name: DLXL-Cal Method Last Saved: 5/10/2552 13:39:33
IEC File: MSF File:
Method Description: Calibration for later test

=====

Sequence No.: 1 Autosampler Location:
Sample ID: Calib Blank 1 Date Collected: 27/9/2567 11:10:14
Analyst: Data Type: Original
Initial Sample Wt: Initial Sample Vol:
Dilution: Sample Prep Vol:
Wash Time:

Nebulizer Parameters: Calib Blank 1

Analyte	Back Pressure	Flow
All	188.0 kPa	0.55 L/min

Mean Data: Calib Blank 1

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc.	Units
As 193.696	36.8	3.17	8.62%	[0.00]	g/L
Se 196.026	37.0	0.88	2.37%	[0.00]	g/L
Tl 190.801	-63.7	8.31	13.05%	[0.00]	g/L
Pb 220.353	452.0	5.57	1.23%	[0.00]	g/L

=====

Sequence No.: 2 Autosampler Location:
Sample ID: DL-Standard Date Collected: 27/9/2567 11:12:44
Analyst: Data Type: Original
Initial Sample Wt: Initial Sample Vol:
Dilution: Sample Prep Vol:
Wash Time:

Nebulizer Parameters: DL-Standard

Analyte	Back Pressure	Flow
All	187.0 kPa	0.55 L/min

Mean Data: DL-Standard

Analyte	Mean Corrected Intensity	Std.Dev.	RSD	Conc.	Units
As 193.696	8456.7	552.97	6.54%	[1000]	g/L
Se 196.026	746.3	33.45	4.48%	[500]	g/L
Tl 190.801	10699.7	205.35	1.92%	[1000]	g/L
Pb 220.353	23233.1	423.05	1.82%	[500]	g/L

Calibration Summary

Analyte						
As 193.696	1	Lin, Calc Int	0.0	8.457	0.00000	1.000000
Se 196.026	1	Lin, Calc Int	0.0	1.493	0.00000	1.000000
Tl 190.801	1	Lin, Calc Int	0.0	10.70	0.00000	1.000000
Pb 220.353	1	Lin, Calc Int	-0.0	46.47	0.00000	1.000000

=====

Sequence No.: 3 Autosampler Location:
Sample ID: 10%HNO3 Date Collected: 27/9/2567 11:15:41

Analyst: Data Type: Original
Initial Sample Wt: Initial Sample Vol:
Dilution: Sample Prep Vol:
Wash Time:

Nebulizer Parameters: 10% HNO_3

Analyte Back Pressure Flow
All 186.0 kPa 0.55 L/min

Mean Data: 10% HNO_3

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
As 193.696	91.2	10 g/L	3.00	10 g/L	3.00	27.84%
Se 196.026	41.2	30 g/L	9.83	30 g/L	9.83	35.57%
Tl 190.801	6.5	1 g/L	1.08	1 g/L	1.08	178.82%
Pb 220.353	29.3	1 g/L	0.27	1 g/L	0.27	43.60%

=====

Method Loaded

Method Name: DLXL-Check Method Last Saved: 25/2/2543 10:51:16

IEC File: MSF File:

Method Description: Sample Std.Dev As/Tl <=10 g/l ,Se<=5 g/l ,Pb<=3 g/l

=====

Sequence No.: 4	Autosampler Location:
Sample ID: 2% HNO_3	Date Collected: 27/9/2567 11:18:19
Analyst:	Data Type: Original
Initial Sample Wt:	Initial Sample Vol:
Dilution:	Sample Prep Vol:
Wash Time:	

Nebulizer Parameters: 2% HNO_3

Analyte Back Pressure Flow
All 188.0 kPa 0.55 L/min

Mean Data: 2% HNO_3

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
As 193.696	23.1				8.89	38.48%
Se 196.026	54.0				5.00	13.59%
Tl 190.801	-58.5				8.49	14.53%
Pb 220.353	434.8				0.17	4.18%

=====
Method Loaded
Method Name: Precision
IEC File:
Method Description: N=10- 1.0% RSD
Method Last Saved: 22/4/2554 10:20:08
MSF File:

=====
Sequence No.: 3
Sample ID: Precision
Analyst:
Initial Sample Wt:
Dilution:
Wash Time:
Autosampler Location:
Date Collected: 27/9/2567 10:36:22
Data Type: Original
Initial Sample Vol:
Sample Prep Vol:

Nebulizer Parameters: Precision
Analyte Back Pressure Flow
All 188.0 kPa 0.55 L/min

Mean Data: Precision

Analyte	Mean Corrected Intensity	Calib. Conc. Units	Std.Dev.	Sample Conc. Units	Std.Dev.	RSD
Zn 206.200	242436.8				1928.28	0.80%
Mg 280.271	2192985.1				14305.05	0.65%
Mg 285.213	122825.5				1173.82	0.96%
Ba 455.403	5765331.2				22705.37	0.39%

=====



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



Certificate of Calibration

Cert.No.: 24CHO222

Page.: 1 of 3

Equipment : Spectrophotometer
Manufacturer : Labtech
Model : Blue Star A
Serial No. : 1606UV1507
ID No. : Ins-LAB-004
Condition As-Received: Used Item
Received Date : 09 April 2024
Calibration Date : 09 April 2024
Reference : 2404-0113OC-2
Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240
Calibration Place : Laboratory (Thai Environment Technic Limited)
Ambient Temperature : (29.2 - 31.4) °C (On-Site)
Relative Humidity : (45.2 - 40.3) % (On-Site)
Calibration Procedure : In - house method :
CP-OCH4 based on ASTM E 275-01
Calibrated by : Saithip Meangmai
Approved by : 
Approved Signatory
() Unnopphol Harachai
(✓) Ponpan Paipim
() Saithip Meangmai
Issue Date : 17 April 2024

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. : 24CHO222

Page : 2 of 3

Condition of calibration result

1. Reference Standard Material :

<u>Material</u>	<u>Serial No.</u>	<u>Certificate No.</u>	<u>Due date</u>
1. Absorbance Standard set	42527	116226	08 Nov 2025
2. Wavelength Standard set	29829	114509	11 Sep 2025
3. Wavelength Standard set	29829	114510	11 Sep 2025
4. Stray Light Standard set	14004	108964	01 Feb 2025

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

3. This certificate is traceable to the International System of Unit maintained through :

- Starna Scientific Ltd.

4. Spectral BandWidth : 2 nm

Scan Speed : Slow

Calibration Results : without adjustment

Wavelength Accuracy

Certified Values of Reference Material (nm)	UUC Reading (nm)	Uncertainty of Measurement (\pm nm)	Coverage Factor <i>k</i>
361.00	360.6	0.16	2.00
472.47	471.6	0.16	2.00
536.66	536.2	0.16	2.00
748.48	748.4	0.16	2.00
879.27	879.0	0.16	2.00



Cert. No. : 24CHO222

Page : 3 of 3

Calibration Results : without adjustment

Photometric Accuracy

Wavelength (nm)	Certified Values of Reference Material (Abs)	UUC Reading (Abs)	Uncertainty of Measurement (\pm Abs)	Coverage Factor <i>k</i>
420.0	Zero	0.0002	0.0028	2.00
	0.5739	0.5722	0.0028	2.00
	0.7085	0.7074	0.0030	2.00
	1.0169	1.0146	0.0028	2.00
546.1	Zero	-0.0001	0.0028	2.00
	0.5214	0.5211	0.0028	2.00
	0.6935	0.6926	0.0030	2.00
	0.9978	0.9960	0.0028	2.00
635.0	Zero	0.0000	0.0028	2.00
	0.5626	0.5623	0.0028	2.00
	0.7577	0.7570	0.0030	2.00
	1.0946	1.0927	0.0028	2.00

Stray Light

* Straylight at 260.49 nm \pm 0.11 nm	Reading at 260.49 nm \pm 0.11 nm
Abs	2.2284
%T	0.57

Remark

- Each individual filter is measured against the empty filter holder (blank) used to zero the spectrophotometer
- Cut-off wavelength of stray light reference material (Potassium Iodide) at Wavelength
- Result = Pass, If Absorbance > 2.00 Abs and Transmission < 1.0 %T at Wavelength
- * : Not NSC-ONSC Accredited

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-



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



Certificate of Calibration

Cert. No.: 24TM618

Page : 1 of 3

Equipment : Incubator

Manufacturer : Memmert

Model : INE 500

Serial No. : E505.1143

ID No. : Ins-LAB-042

Submitted by : Thai Environmental Technic Limited
1/6 Soi Ramkhamhaeng 145,
Khwaeng/Khet Saphan Sung,
Bangkok 10240

Location : Bacteria Room


Received Order : 09 April 2024

Calibration Date : 09 - 10 April 2024

Ambient Temperature : (26 ± 10) °C

Relative Humidity : (50 ± 30) %

Calibrated by : Preecha Hlahib

Approved by : 
Approved Signatory

() Ponpan Paipim
() Suwit Imjai
(✓) Kunchit Promprat

Issue Date : 12 April 2024

The Uncertainties are for a confidence probability of approximately 95%

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



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0113OC-4

Cert. No.: 24TM618

Page : 2 of 3

Procedure Used :-

Calibration were conducted using calibration procedure CP-OT02 based on TLAS G-20 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	Serial No.	Cert. No.	Traceable	Due Date
1) Data Acquisition	MY49023932	23LM122	TPA	26 Jul 2024

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.

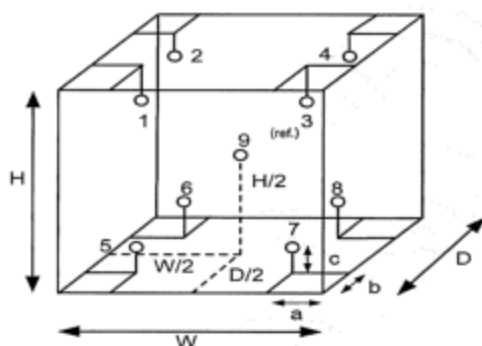
Remark : TPA : Technology Promotion Association (Thailand - Japan)

Result of Calibration :- (*) Without Adjustment

Function of UUC* : Temperature Source

Fresh air setting : Close

Environment during calibration		
	Beginning	Finished
Temp. (°C)	26	26
REL.Humid. (%)	43	46
AC Supply (Volt)	220	222



Position :	Ref. Std. ID No.:
1	20-16RTD-01
2	20-16RTD-02
3	20-16RTD-03
4	23-16RTD-04
5	22-16RTD-05
6	20-16RTD-06
7	20-16RTD-07
8	22-16RTD-08
9 (ref.)	22-16RTD-09

Probe Installation Details :

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

Dimension of Chamber :

D = 0.40 m
W = 0.56 m
H = 0.48 m
Capacity = 0.11 m³



Equipment : Incubator
Condition As-Received : Used Item
Reference : 2404-0113OC-4
Result of Calibration :- (*) Without Adjustment
Function of UUC* : Temperature Source
Fresh air setting : Close

Cert. No.: 24TM618

Page : 3 of 3

Calibration Point (°C)	UUC* Setting (°C)	UUC* Reading (°C)	Temperature stability (± °C)	Temperature uniformity (°C)	Overall Variation (°C)	Coverage Factor <i>k</i>
35.0	35.0	35.0	0.038	0.35	0.52	2
41.5	41.5	41.5	0.034	0.33	0.43	2
44.5	44.5	44.5	0.076	0.71	0.98	2

Calibration Point (°C)	Measured Temperature (°C)									Uncertainty (± °C)
	Position									
	1	2	3	4	5	6	7	8	9 (ref.)	
35.0	34.863	35.186	35.280	35.237	35.068	35.296	35.068	35.348	35.184	0.30
41.5	41.453	41.676	41.772	41.662	41.703	41.799	41.677	41.856	41.738	0.30
44.5	44.056	44.860	44.953	44.885	44.378	44.776	44.450	44.844	44.733	0.30

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 %.

-o0o-



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 100

Customer :	บริษัท เทคนิคสิ่งแวดล้อมไทย จำกัด	Date Tested:	27-ก.ย.-67
Address :	1/6 ซอยรามคำแหง 145, แขวงสะพานสูง, เขตสะพานสูง, กรุงเทพฯ 10240 TH	Recommendation Recertification Period	6 Months
User Name:	คุณ กิตติศักดิ์ เมืองงาม	Recertification Due:	26-มี.ค.-68
Phone:	02-3737799	Date Last Certified:	28-มี.ค.-67
E-mail:	phorntip.p@tet1995.com	Visit Number:	2 of 2
	Ketsarin.Chuayphin@eurofinsasia.com	TH ONE SOURCE Phone:	081-7316733, 082-1086572
		E-mail:	thonesource@gmail.com

CONFIGURATION TESTED		
MODEL	SERIAL NUMBER	SOFTWARE
AAAnalyst 100	040S0110503	AA WinLab 3.2
TEST STANDARD USED	PART NUMBER	
Copper	N9300183	
Filter 0.2 %	MG0-057	



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAnalyst 100

SERIAL NUMBER 040S0110503

DATE TESTED 27-n.u.-67

1. OPTIC CHECKS

A. Optical alignment condition (if necessary)

☐ OK

B. Condition of Mirrors,Lenses etc.(if necessary)

☐ OK

2. GAS SYSTEM CHECKS

A. Leak test all internal and external gas box joints

☐ OK

B. All gas box safety features

☐ OK

C. Burner system including nebulizer and all o-ring and gasket

☐ OK

D. Drain system (safety)

☐ F

3. ELECTRONICS CHECKS

A. Power Supplies

+ 5.00 Vdc \pm 0.2 Vdc + 5.02 Vdc

+ 11.50 Vdc \pm 0.2 Vdc + 11.46 Vdc

+ 15.00 Vdc \pm 1.0 Vdc +14.99 Vdc

- 15.00 Vdc \pm 1.0 Vdc -15.06 Vdc

+ 35.00 Vdc \pm 3.0 Vdc +35.14 Vdc

4. WAVELENGTH ACCURACY TEST

A. Zn Lamp wavelength 213.9 nm \pm 0.3 nm. 213.88 nm.

B. Ni Lamp wavelength 232.0 nm \pm 0.3 nm. 232.11 nm.

C. Cu Lamp wavelength 324.8 nm \pm 0.3 nm. 324.80 nm.



MAINTENANCE REPORT

ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL

AAAnalyst 100

SERIAL NUMBER 040S0110503

DATE TESTED 27-n.u.-67

5. PERFORMANCE TESTS

SPEC.

RESULTS

*A. Neutral density filter checks with Copper (324.8 nm)

Neutral Density Filter $0.2 \pm 10\%$

0.180

0.175 Abs.

B. AA Baseline noise test with Copper (324.8 nm)

Integration time = 0.5 seconds

Replicates = 99 times

Standard Deviation

≤ 0.001

0.000

C. Flame sensitivity with Copper (324.8nm)

(5 mg/L Cu Standard a read time of 10 seconds

10 replicates, standard burner)

Stainless steel nebulizer

≥ 0.25

0.32 Abs.

%RSD

0.41 %

Measured Characteristic Concentration :

0.068 mg/L



MAINTENANCE REPORT
ATOMIC ABSORPTION SPECTROPHOTOMETER MODEL
AAAnalyst 100

SERIAL NUMBER 040S0110503

DATE TESTED 27-n.u.-67

Remarks :

This is to certify that the above tests have been performed and the configuration tested



meets



does not meet

This certificate does not modify PerkinElmer's standard terms and condition of sale,
including warranty terms.

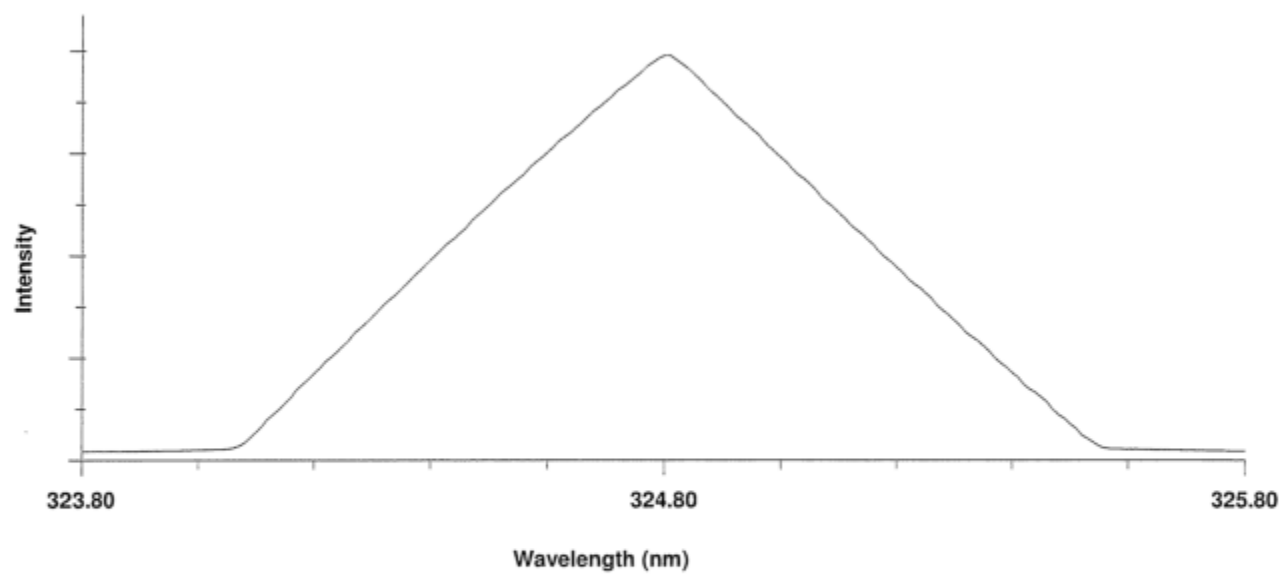
Service Department TH ONE SOURCE CO., LTD.

Krungchai T.

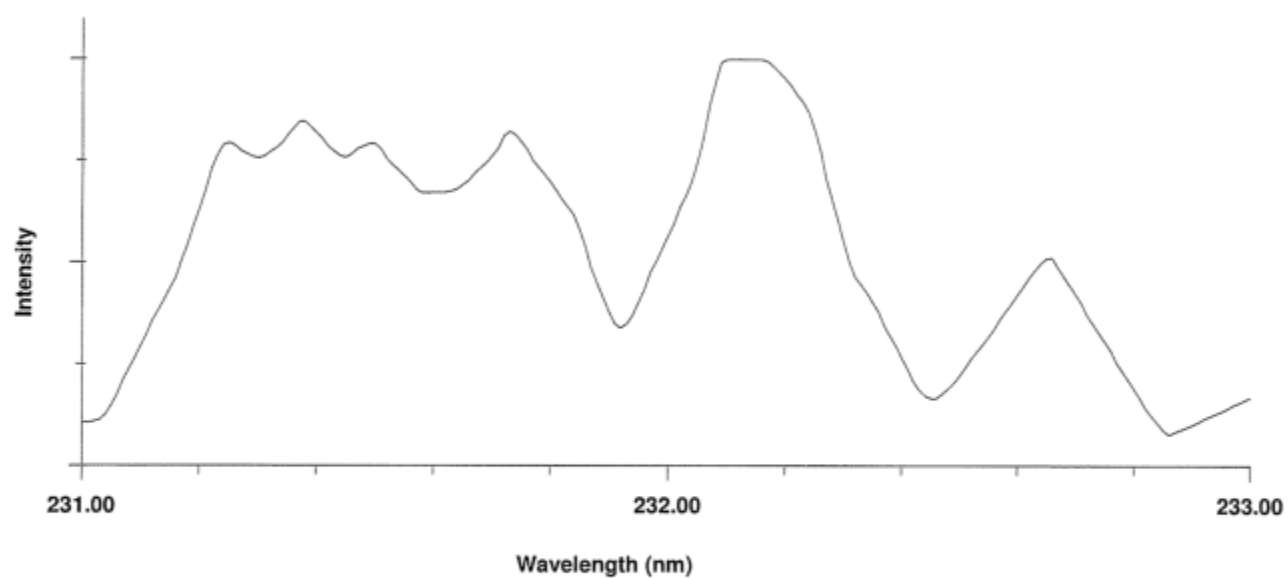
(**Krungchai Treevichien**)

Customer Support Engineer

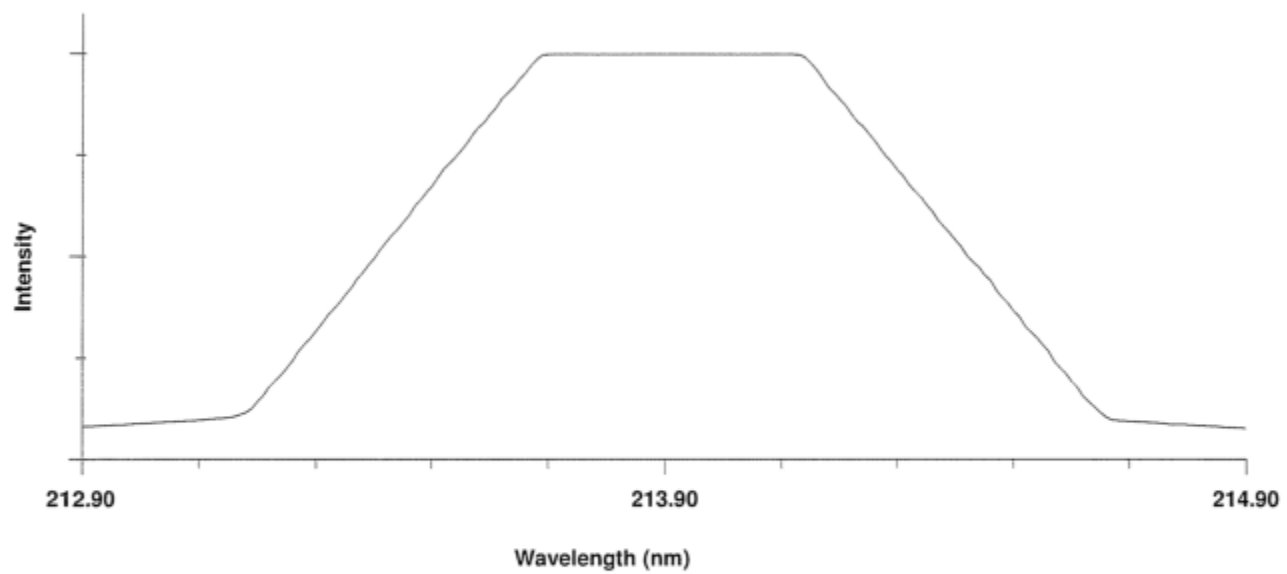
Current Wavelength: 325.80 Peak Wavelength: 324.80



Current Wavelength: 233.00 Peak Wavelength: 232.11



Current Wavelength: 214.90 Peak Wavelength: 213.88



=====

Element: Cu	Seq. No.: 4	AS Loc.: ---	Date: 09/27/2024
Sample ID: Copper 5 ppm			

Repl	SampleConc	StdConc	BlkCorr	Time
#	mg/L	mg/L	Signal	
1			0.320	00:31:13
2			0.321	00:31:27
3			0.323	00:31:41
4			0.323	00:31:55
5			0.323	00:32:09
6			0.323	00:32:24
7			0.323	00:32:37
8			0.325	00:32:51
9			0.322	00:33:05
10			0.321	00:33:19
Mean:			0.322	
SD :			0.001	
%RSD:			0.41	

Method Name: Cu Baseline Element: Cu
Method Description: Cu BL Noise

Date: 01/01/2002
Technique: Flame Calibration Equation: Zero Intercept: Nonlinear
Wavelength: 324.8 nm Slit Width: 0.70 nm
Lamp Current: 15 Energy: 71
Sample Info File: Untitled Results Data Set:

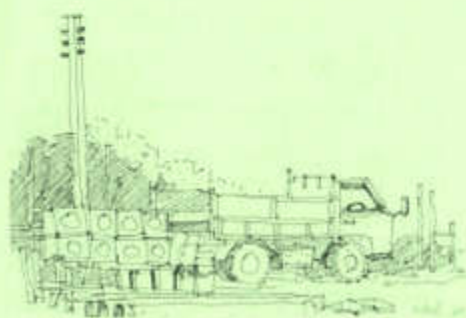
Element: Cu Seq. No.: 3 AS Loc.: --- Date: 01/01/2002
Sample ID: Sample000

Rep1	SampleConc	StdConc	BlkCorr	Time
#	mg/L	mg/L	Signal	
1			-0.001	14:06:30
2			-0.001	14:06:32
3			-0.001	14:06:34
4			-0.001	14:06:36
5			-0.001	14:06:38
6			-0.001	14:06:40
7			-0.001	14:06:43
8			-0.001	14:06:45
9			-0.001	14:06:47
10			-0.001	14:06:49
11			-0.001	14:06:51
12			-0.001	14:06:53
13			-0.001	14:06:55
14			-0.001	14:06:57
15			-0.001	14:06:59
16			-0.001	14:07:02
17			-0.001	14:07:04
18			-0.001	14:07:06
19			-0.001	14:07:08
20			-0.001	14:07:10
21			-0.001	14:07:12
22			-0.001	14:07:14
23			-0.001	14:07:17
24			-0.001	14:07:19
25			-0.001	14:07:21
26			-0.001	14:07:23
27			-0.001	14:07:25
28			-0.002	14:07:27
29			-0.002	14:07:29
30			-0.001	14:07:32
31			-0.001	14:07:34
32			-0.001	14:07:37
33			-0.001	14:07:39
34			-0.001	14:07:41
35			-0.001	14:07:43
36			-0.001	14:07:45
37			-0.001	14:07:47
38			-0.001	14:07:49
39			-0.001	14:07:51
40			-0.001	14:07:54
41			-0.001	14:07:56
42			-0.001	14:07:58
43			-0.001	14:08:00
44			-0.002	14:08:02
45			-0.001	14:08:04
46			-0.001	14:08:06
47			-0.001	14:08:08
48			-0.001	14:08:11
49			-0.001	14:08:13
50			-0.001	14:08:15
51			-0.001	14:08:17
52			-0.001	14:08:19
53			-0.001	14:08:21
54			-0.001	14:08:23
55			-0.001	14:08:25
56			-0.002	14:08:28
57			-0.002	14:08:30
58			-0.002	14:08:32
59			-0.001	14:08:35

60	-0.002	14:08:37
61	-0.002	14:08:39
62	-0.002	14:08:41
63	-0.002	14:08:44
64	-0.002	14:08:46
65	-0.001	14:08:48
66	-0.001	14:08:50
67	-0.002	14:08:52
68	-0.001	14:08:54
69	-0.001	14:08:56
70	-0.001	14:08:58
71	-0.002	14:09:01
72	-0.001	14:09:03
73	-0.001	14:09:05
74	-0.001	14:09:07
75	-0.002	14:09:09
76	-0.002	14:09:11
77	-0.002	14:09:13
78	-0.002	14:09:15
79	-0.002	14:09:18
80	-0.002	14:09:20
81	-0.002	14:09:22
82	-0.001	14:09:24
83	-0.001	14:09:26
84	-0.001	14:09:28
85	-0.001	14:09:30
86	-0.002	14:09:32
87	-0.001	14:09:35
88	-0.001	14:09:38
89	-0.001	14:09:40
90	-0.001	14:09:42
91	-0.001	14:09:44
92	-0.001	14:09:46
93	-0.001	14:09:48
94	-0.001	14:09:50
95	-0.001	14:09:53
96	-0.001	14:09:55
97	-0.001	14:09:57
98	-0.001	14:09:59
99	-0.001	14:10:01
Mean:	-0.001	
SD :	0.000	
%RSD:	22.41	

ภาคผนวก ฉ

หนังสือขึ้นทะเบียนห้องปฏิบัติการวิเคราะห์เอกชน
เลขทะเบียน ว-236





ที่ อท ๐๓๑๐๓/ ๙ ๘ ๘ ๖

กรมโรงงานอุตสาหกรรม

ถนนพระรามที่ ๖ แขวงทุ่งพญาไท

เขตราชเทวี กรุงเทพฯ ๑๐๔๐๐

๒๕๖๖

๒ มิถุนายน

เรื่อง คอยุทพจน์สิทธิ์รับทะเบียนต้องปฏิบัติตามการวิเคราะห์เอกสาร

เรียน กรรมการผู้จัดการ บริษัท เทคนิคเวิลด์แอนด์ไทย จำกัด

อ้างถึง คำขอขึ้นทะเบียน/คอยุทพจน์สิทธิ์แบบเอกสาร และขอใบสารมลพิษของห้องปฏิบัติการวิเคราะห์เอกสาร

ลงวันที่ ๓ มิถุนายน ๒๕๖๖

สิ่งที่ส่งมาด้วย เอกสารแนบท้ายคำขอขึ้นทะเบียนต้องปฏิบัติตามการวิเคราะห์เอกสาร

บริษัท เทคนิคเวิลด์แอนด์ไทย จำกัด จำนวน ๒๘ แผ่น

ตามหนังสือที่อ้างถึง อ้างถึง บริษัท เทคนิคเวิลด์แอนด์ไทย จำกัด ขอต่ออายุหนังสือขึ้นทะเบียนต้อง

ห้องปฏิบัติการวิเคราะห์เอกสาร เลขทะเบียน ๖-๒๓๖-๙-๐๐๐๓ สถานที่ตั้งเลขที่ ๓/๖ ซอยรามคำแหง ๓๕.๕ แขวงสะพานสูง

เขตสะพานสูง กรุงเทพมหานคร ขอกรมโรงงานอุตสาหกรรม นั้น

กรมโรงงานอุตสาหกรรมที่จวนมาแล้ว ให้บริษัท เทคนิคเวิลด์แอนด์ไทย จำกัด คอยุทพจน์สิทธิ์ขึ้น

ทะเบียนต้องปฏิบัติตามการวิเคราะห์เอกสาร โดยมีองค์ประกอบดังนี้

ก. ผู้ควบคุมห้องปฏิบัติการวิเคราะห์เอกสาร

๑) นายอรรถพร ใจดี

๒) นางสาววิรัตน์ ประชุมแดง

๓) นางพรทิพย์ เพชรชัย

๔) นายสมชาย ปิยะวงกุล

๕) นายประมวล อุตสาร

๖) นายวิรุฬห์ สุชาติ

๗) นางสาวพอลีน อัครชัยสุวรรณ

๘) นางสาวณิชากรณณ เริ่มประชาธิปไตย

๙) นางสาวสุจิตพรณ ศรีสุวรรณ

๑๐) นางสาวอนิชา กนกชาติ

๑๑) นางสาวณิชา นิลวิรัตน์

๑๒) นางสาวพัชรพรณ ส่วนมาก

๑๓) นายสุวิทย์พงษ์ อยุทธ

๑๔) นางสาวดวงกรก สีนนท์

๑๕) นางสาวศิริพร กาจิต

๑๖) นายจุฑาธิ ศรีบุญ

๑๗) นายอัครชัยสิทธิ์ วันที่

๑๘) นายอัครชัยสิทธิ์ วันที่

๑๙) นายอัครชัยสิทธิ์ วันที่

๒๐) นายอัครชัยสิทธิ์ วันที่

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๓๒) นายอัครชัยสิทธิ์ วันที่

๓๓) นายอัครชัยสิทธิ์ วันที่

- ๒ -

- ๓๓) นายจิรวัฒน์ อิมพะสัย พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๓
- ๓๔) นางสาวนิตยา เข็มวัฒนา พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๔
- ๓๕) นางสาวณิชากรณณ เริ่มประชาธิปไตย พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๕
- ๓๖) นายอัครชัยสิทธิ์ นื่องงม พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๖
- ๓๗) นายเทพพงศ์ เขียววัฒนา พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๗
- ๓๘) นายณัฐวุฒิ พูลสงวน พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๘
- ๓๙) นางสาวนุชศิริ อรรถ พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๓๙
- ๔๐) นางสาววรรณศิริ สุวิวัฒน์ พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๐
- ๔๑) นายวิฑูรย์ วลัยรัตน์ พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๑
- ๔๒) นางสาวกัญชกา จอแสงเงิน พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๒
- ๔๓) นางสาวสุจิตรา อยุ่เป็น พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๓
- ๔๔) นางสาวณิชา ศรีนิมิต พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๔
- ๔๕) นายเจษฎา แซ่หว้า พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๕
- ๔๖) นายอรุณพล วงศ์สวัสดิ์ พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๖
- ๔๗) นายประสิทธิ์ จินตสุข พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๗
- ๔๘) นายบุญพล กรังคนา พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๘
- ๔๙) นายวีรพล บุคสา พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๔๙
- ๕๐) นายพิชญ์ อยุ่วิวัฒน์ พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๕๐
- ๕๑) นายณัฐดนัย ศรีรัตนวิชาญช พระปิ่นเกล้าที่ ๖-๒๓๖-๙-๐๐๕๑

ค. ขอขึ้นทะเบียนผลิตภัณฑ์ที่ได้รับทะเบียนให้นำใบวิเคราะห์ยื่นขึ้นยื่น นำใบขึ้น ยากพินัย ถึงปฎิภาหวิ
วชที่ไปจัดแล้ว และยื่น ตามสิ่งที่มีมาด้วย

หนังสือฉบับนี้จะมีผลตั้งแต่วันที่ ๑๓ มีนาคม ๒๕๖๖ หากประสงค์จะขอต่ออายุหนังสือ
รับขึ้นทะเบียนต้องปฏิบัติตามการวิเคราะห์เอกสาร ให้ยื่นคำขอต่ออายุพร้อมเอกสารประกอบคำขอต่อ
กรมโรงงานอุตสาหกรรม ภายใน ๓๐ วัน ก่อนวันสิ้นสุดของหนังสือขึ้นทะเบียนต้องปฏิบัติตามการวิเคราะห์เอกสาร
ทั้งนี้ สามารถยื่นคำขอผ่านระบบอิเล็กทรอนิกส์ที่กรมโรงงานอุตสาหกรรม

จึงเรียนมาเพื่อทราบ

ขอแสดงความนับถือ

๖ มิถุนายน ๒๕๖๖

นายอรรถพร ใจดี
ผู้อำนวยการกองทะเบียนผลิตภัณฑ์
ผู้ตรวจการทะเบียนผลิตภัณฑ์โรงงาน

กองวิจัยและพัฒนายานยนต์ใช้โรงงาน

กลุ่มมาตรฐานวิธีการวิเคราะห์ทดสอบผลิตภัณฑ์และทะเบียนต้องปฏิบัติตามการ

โทร. ๐ ๒๕๔๐ ๖๓๖๖ ต่อ ๒๐๓-๕

โทรสาร ๐ ๒๕๔๐ ๖๓๖๖ ต่อ ๒๐๓-๕

ไปรษณีย์อิเล็กทรอนิกส์ sarabang@w.mall.go.th



“อุตสาหกรรมก้าวหน้าไกล ประเพณีไทยก้าวหน้า ร่วมกันพัฒนา อุตสาหกรรมสีเขียว”

เอกสารแนบท้ายหนังสือรับข้อเสนอยุติการปฏิบัติงานวิเคราะห์เอกสาร

บริษัท เพชรบุรีเคมีภัณฑ์ จำกัด เลขทะเบียน ๖-๒๒๖

ที่ อท ๐๓๐๑.๑/ ๔๘ ๗ ๖

ลงวันที่ ๒๒ มิถุนายน ๒๕๖๖

ขอทำสารเคมีที่ได้รับขึ้นทะเบียนจากกรมโรงงานอุตสาหกรรม จำนวน ๓๓ รายการ

บัญชี จำนวน ๕๐ รายการ

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Alcln	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
2	Arsenic	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽¹⁾
3	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
4	α-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
5	γ-BHC	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
6	Biochemical Oxygen Demand	5-Day BOD Test, Azide Modification Method ⁽¹⁾
7	Cadmium	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
8	Chemical Oxygen Demand	Closed Reflux, Titrimetric Method ⁽¹⁾
9	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
10	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
11	Color	ADMI Weighted-Ordinate Spectrophotometric Method ⁽¹⁾
12	Copper	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
13	Cyanide	Distillation, Colorimetric Method ⁽¹⁾
14	4,4'-DDE	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
15	4,4'-DDT	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
16	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾

17 Endosulfan I...

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ลำดับที่	สารเคมี	วิธีวิเคราะห์
17	Endosulfan I	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
18	Endosulfan II	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
19	Endosulfan Sulfate	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
20	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
21	Formaldehyde	Distillation, Colorimetric Method ⁽¹⁾
22	Free Chlorine	DPD Ferrous Titrimetric Method ⁽¹⁾
23	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
24	Heptachlor Epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
25	Hexavalent Chromium	Colorimetric Method ⁽¹⁾
26	Lead	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
27	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
28	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽¹⁾
29	Nickel	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
30	Oil & Grease	1) Liquid-Liquid, Partition-Gravimetric Method ⁽¹⁾ 2) Soxhlet Extraction Method ⁽¹⁾
31	pH	Electrometric Method ⁽¹⁾
32	Phenols	Distillation, Direct Photometric Method ⁽¹⁾
33	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽¹⁾
34	Sulfide	1) Iodometric Method ⁽¹⁾ 2) Methylene Blue Method ⁽¹⁾
35	Temperature	Laboratory and Field Methods ⁽¹⁾
36	Total Dissolved Solids	Dried at 180 °C ⁽¹⁾
37	Total Kjeldahl Nitrogen	Macro-Kjeldahl Method ⁽¹⁾
38	Total Suspended Solids	Dried at 103-105 °C ⁽¹⁾

39 Trivalent Chromium...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
39	Trivalent Chromium	Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ⁽¹⁾
40	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾

น้ำดื่ม จำนวน 122 ขวด

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Acenaphthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
2	Acetone	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
3	Aldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
4	Anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
5	Antimony	1) Digestion, Direct Air-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾
6	Arsenic	3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ⁽¹⁾
7	Atrazine	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
8	Barium	1) Digestion, Direct Nitrous Oxide-Acetylene Flame Method ⁽¹⁾ 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾
9	Benz(a)anthracene	3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾ Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
10	Benzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
11	Benz(b)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
12	Benzok(a)fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾

13 Benzoic acid...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
13	Benzoic acid	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
14	Benz(a)pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
15	Benz(g,h,i)perylene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
16	Beryllium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
17	Bis(2-chloroethyl)ether	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
18	Bis(2-ethylhexyl)phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
19	Bromodichloromethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
20	Bromoform	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
21	Bulanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
22	Butyl benzyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
23	Cadmium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ⁽¹⁾ 2) Digestion, Inductively Coupled Plasma Method ⁽¹⁾
24	Carbazole	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
25	Carbon disulfide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
26	Carbon tetrachloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
27	Chlordane	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
28	p-Chloroaniline	Liquid-Liquid Extraction, Gas Chromatographic Method ⁽¹⁾
29	Chlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
30	Chlorodibromomethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾
31	Chloroform	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾

32 Chromium...

ลำดับที่	สารเคมี	วิธีการตรวจ
32	Chromium	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a) 3) Digestion, Inductively Coupled Plasma Method ^(a)
33	Chromium (III)	1) Digestion, Direct Air-Acetylene Flame Method; Colorimetric Method; Calculation ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method; Colorimetric Method; Calculation ^(a) 3) Digestion, Inductively Coupled Plasma Method; Colorimetric Method; Calculation ^(a)
34	Chromium (VI)	Colorimetric Method ^(a)
35	Chrysene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
36	Cyanide	Distillation, Colorimetric Method ^(a)
37	2,4-D	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
38	DOO	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
39	DOE	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
40	DOT	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
41	Dibenz(a,h)anthracene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
42	D(n-butyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
43	1,2-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
44	1,3-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
45	1,4-Dichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
46	1,1-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
47	1,2-Dichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
48	1,1-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
49	cis-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)

50 trans-1,2-Dichloroethylene...

ลำดับที่	สารเคมี	วิธีการตรวจ
50	trans-1,2-Dichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
51	1,2-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
52	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
53	1,3-Dichloropropane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
54	Dieldrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
55	Diethyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
56	2,4-Dimethylphenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
57	2,4-Dinitrophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
58	2,4-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
59	2,6-Dinitrotoluene	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
60	Di-n-Octyl phthalate	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
61	Endosulfan	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
62	Endrin	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
63	Ethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
64	Fluoranthene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
65	Fluorene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
66	Heptachlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
67	Heptachlor epoxide	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
68	Hexachloro-1,3-butadiene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
69	n-Hexane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
70	α-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
71	β-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
72	γ-HCH	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
73	Hexachlorocyclopentadiene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)

74 Hexachloroethane...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
74	Hexachloroethane	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
75	Indeno[1,2,3-cd]pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
76	Isophorone	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
77	Lead	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
78	Manganese	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a)
79	Mercury	3) Digestion, Inductively Coupled Plasma Method ^(a) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(a)
80	Methanol	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
81	Methoxychlor	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
82	Methyl bromide	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
83	Methylene chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
84	2-Methylphenol	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
85	2-Methylnaphthalene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
86	Methyl tert-butyl ether	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
87	Naphthalene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
88	Nickel	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
89	Nitrobenzene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
90	N-Nitrosodiphenylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)

91 N-Nitrosodi-n-propylamine...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
91	N-Nitrosodi-n-propylamine	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
92	Polychlorinated Biphenyls PCB-1016 PCB-1221 PCB-1232 PCB-1242 PCB-1248 PCB-1254 PCB-1260	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a) 1) Distillation, Direct Photometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
93	Pentachlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
94	pH	Electrometric Method ^(a)
95	Phenanthrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
96	Phenol	1) Distillation, Direct Photometric Method ^(a) 2) Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
97	Pyrene	Liquid-Liquid Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(a)
98	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(a)
99	Silver	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a)
100	Styrene	3) Digestion, Inductively Coupled Plasma Method ^(a) Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
101	1,1,2,2-Tetrachloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
102	Tetrachloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
103	Toluene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
104	Toxaphene	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
105	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(a)

106 TPH (C₅-C₁₀)...

ลำดับที่	สารเคมี	วิธีการตรวจ
106	TPH (C ₁₀ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
107	TPH (C ₁₀ -C ₁₆)	Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
108	1,2,4-Trichlorobenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
109	1,1,1-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
110	1,1,2-Trichloroethane	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
111	Trichloroethylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
112	2,4,5-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
113	2,4,6-Trichlorophenol	Liquid-Liquid Extraction, Gas Chromatographic Method ^(a)
114	1,3,5-Trimethylbenzene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
115	Vanadium	1) Digestion, Electrothermal Atomic Absorption Spectrometric Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)
116	Vinyl acetate	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
117	Vinyl chloride	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
118	m-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
119	o-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
120	p-Xylene	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
121	Xylene (Total)	Purge and Trap Gas Chromatographic/ Mass Spectrometric Method ^(a)
122	Zinc	1) Digestion, Direct Air-Acetylene Flame Method ^(a) 2) Digestion, Inductively Coupled Plasma Method ^(a)

ภาคผนวก...

ภาคผนวก (ปฏิกิริยาเคมี) จำนวน 18 รายการ

ลำดับที่	สารเคมี	วิธีการตรวจ
1	Antimony	1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^(a) 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^(a) 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(a) Isokinetic Sampling, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(a) Instrumental Analyzer Method ^(a) Absorption Sampling, Ion Chromatographic Method ^(a) 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^(a) 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^(a) Adsorption Sampling, Gas Chromatographic Method ^(a) Isokinetic Sampling, Analysis by ISO/IEC 17025 Accredited Laboratory or Analysis by Department of Industrial Works Registered Laboratory (Dioxins/Furans Analysis Approved) ^(a) Absorption Sampling, Ion Chromatographic Method ^(a) Absorption Sampling, Ion Chromatographic Method ^(a) Absorption Sampling, Iodometric Method ^(a) 1) Isokinetic Sampling, Digestion, Inductively Coupled Plasma Method ^(a) 2) Isokinetic Sampling, Digestion, Direct Air-Acetylene Flame Method ^(a) 3) Isokinetic Sampling, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(a) Isokinetic Sampling, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(a) Ringelmann's Method ^(a) 1) Absorption Sampling, Phenoldisulfonic acid Method ^(a) 2) Instrumental Analyzer Method ^(a)
2	Arsenic	
3	Carbon monoxide	
4	Chlorine	
5	Copper	
6	Cresol	
7	Dioxins/Furans	
8	Hydrogen Chloride	
9	Hydrogen Fluoride	
10	Hydrogen Sulfide	
11	Lead	
12	Mercury	
13	Opacity	
14	Oxides of Nitrogen	

15 Sulfur dioxide...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
15	Sulfur dioxide	1) Absorption Sampling, Barium-Thorin Titrimetric Method ^(๒) 2) Instrumental Analyzer Method ^(๒)
16	Sulfuric acid	Isokinetic Sampling, Barium-Thorin Titrimetric Method ^(๒)
17	Total Suspended Particulate	Isokinetic Sampling, Gravimetric Method ^(๒)
18	Xylene	Absorption Sampling, Gas Chromatographic Method ^(๒)

สิ่งปนเปื้อนที่วัดได้ทั้งหมด จำนวน 36 ชนิด

ลำดับที่	สารเคมี	วิธีวิเคราะห์
1	Aldrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(๒,๒๔) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(๒,๒๔) 3) Soxhlet Extraction, Gas Chromatographic Method ^(๒,๒๔)
2	Antimony	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(๒,๑๖) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖)
3	Arsenic	5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 6) Digestion, Inductively Coupled Plasma Method ^(๒,๑๖) 1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(๒,๑๖)
4	Barium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(๒,๑๖)

4) Digestion...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
5	Beryllium	4) Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 6) Digestion, Inductively Coupled Plasma Method ^(๒,๑๖) 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(๒,๑๖) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 6) Digestion, Inductively Coupled Plasma Method ^(๒,๑๖)
6	Cadmium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(๒,๑๖) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖) 6) Digestion, Inductively Coupled Plasma Method ^(๒,๑๖)
7	Chlordane	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(๒,๒๔) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(๒,๒๔) 3) Soxhlet Extraction, Gas Chromatographic Method ^(๒,๒๔)
8	Chromium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(๒,๑๖) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(๒,๑๖)

3) Waste Extraction...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
9	Chromium (III)	3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{11.14.14} 4) Digestion, Flame Atomic Absorption Spectrometric Method ^{11.13} 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{11.14} 6) Digestion, Inductively Coupled Plasma Method ^{11.14} 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^{11.13.14.18} 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Waste Extraction, Colorimetric Method; Calculation ^{11.14.18} 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method; Waste Extraction, Colorimetric Method; Calculation ^{11.14.18} 4) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^{11.13.15.18} 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ^{11.14.18} 6) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ^{11.14.18} 1) Waste Extraction, Colorimetric Method ^{11.18} 2) Alkaline Digestion, Colorimetric Method ^{11.18} 1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^{11.13} 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{11.14} 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{11.14} 4) Digestion, Flame Atomic Absorption Spectrometric Method ^{11.13} 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{11.14} 6) Digestion, Inductively Coupled Plasma Method ^{11.14}
10	Chromium (VI)	
11	Cobalt	

12 Copper...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
12	Copper	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^{11.13} 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{11.14} 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{11.14} 4) Digestion, Flame Atomic Absorption Spectrometric Method ^{11.13} 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{11.14} 6) Digestion, Inductively Coupled Plasma Method ^{11.14} 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{11.24} 2) Soxhlet Extraction, Gas Chromatographic Method ^{11.24} 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 2) Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 3) Soxhlet Extraction, Gas Chromatographic Method ^{11.24} 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 2) Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 3) Soxhlet Extraction, Gas Chromatographic Method ^{11.24} 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 2) Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 3) Soxhlet Extraction, Gas Chromatographic Method ^{11.24} 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 2) Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 3) Soxhlet Extraction, Gas Chromatographic Method ^{11.24} 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 2) Solid-Phase Extraction, Gas Chromatographic Method ^{11.24} 3) Soxhlet Extraction, Gas Chromatographic Method ^{11.24}
13	2,4-D	
14	DDO	
15	DOE	
16	DDT	
17	Dieldrin	

18 Endrin...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
18	Endrin	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.1) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.2) 3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.3)
19	Heptachlor	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.1) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.2) 3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.3)
20	Lead	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.13.1)
21	Lindane	4) Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 6) Digestion, Inductively Coupled Plasma Method ^(1.13.1) 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.1) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.2) 3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.3)
22	Mercury	1) Waste Extraction, Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.14.1) 2) Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ^(1.14.1) 1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.1) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.2)
23	Methoxychlor	3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.3)

3) Soxhlet...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
24	Mirex	3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.1) 1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1.12.1) 2) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.1)
25	Molybdenum	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.13.1) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 6) Digestion, Inductively Coupled Plasma Method ^(1.13.1)
26	Nickel	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1.13.1) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(1.13.1) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1.13.1) 6) Digestion, Inductively Coupled Plasma Method ^(1.13.1)
27	Polychlorinated Biphenyls Aroclor 1016 Aroclor 1221 Aroclor 1232 Aroclor 1242 Aroclor 1248 Aroclor 1254 Aroclor 1260 2,4,6-Trichlorobiphenyl 2,2',5,5'-Tetrachlorobiphenyl	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^(1.12.1) 2) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1.12.1) 3) Soxhlet Extraction, Gas Chromatographic Method ^(1.12.1)

2,2',4,5,5'...

ลำดับที่	คุณสมบัติ	วิธีการวิเคราะห์
28	2,2',4,5,5'-Pentachlorobiphenyl 2,2',3,4,4',5'-Hexachlorobiphenyl 2,2',4,4',5,5'-Hexachlorobiphenyl 2,2',3,4,4',5,5'-Heptachlorobiphenyl Pentachlorophenol	1) Waste Extraction, Separatory Funnel Liquid-Liquid Extraction, Gas Chromatographic Method ^{(1.3)(4)} 2) Soxhlet Extraction, Gas Chromatographic Method ^(11.24)
29	Selenium	1) Waste Extraction, Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^{(1.6)(21)} 2) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7.21)
30	Silver	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^{(1.6)(3)} 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{(1.6)(8)} 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{(1.6)(14)} 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.13) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14) 6) Digestion, Inductively Coupled Plasma Method ^(7.14)
31	Thallium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^{(1.6)(3)} 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^{(1.6)(8)} 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^{(1.6)(14)} 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.13) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14) 6) Digestion, Inductively Coupled Plasma Method ^(7.14)

ลำดับที่	สารเคมี	วิธีการวิเคราะห์
32	Toxaphene	1) Waste Extraction, Solid-Phase Extraction, Gas Chromatographic Method ^(1,12,14) 2) Solid-Phase Extraction, Gas Chromatographic Method ^(12,14) 3) Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ^(1,17)
33	Trichloroethylene	1) Waste Extraction, Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(1,12,14) 2) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,18)
34	Vanadium	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,13,18) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,13,18) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13,14) 4) Digestion, Flame Atomic Absorption Spectrometric Method ^(1,13) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,18) 6) Digestion, Inductively Coupled Plasma Method ^(1,14) Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ^(13,14)
35	Vinyl chloride	1) Waste Extraction, Digestion, Flame Atomic Absorption Spectrometric Method ^(1,13,18) 2) Waste Extraction, Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,13,18) 3) Waste Extraction, Digestion, Inductively Coupled Plasma Method ^(1,13,14)
36	Zinc	4) Digestion, Flame Atomic Absorption Spectrometric Method ^(1,13) 5) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(1,18) 6) Digestion, Inductively Coupled Plasma Method ^(1,14)

สืบ จำนวน 121 รายการ

ลำดับที่	สารแม่พิมพ์	วิธีวิเคราะห์
1	Acenaphthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
2	Acetone	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
3	Aldrin	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
4	Anthracene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
5	Antimony	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14)
6	Arsenic	3) Digestion, Inductively Coupled Plasma Method ^(1.14) Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7.17)
7	Atrazine	Soxhlet Extraction, Gas Chromatographic Method ^(1.24)
8	Barium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14)
9	Benz(a)anthracene	3) Digestion, Inductively Coupled Plasma Method ^(1.14) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
10	Benzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
11	Benzobifluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
12	Benzokifluoranthene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
13	Benzoic acid	Mass Spectrometric Method ^(1.27)
14	Benzo(a)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
15	Benzo(g,h,i)perylene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
16	Beryllium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15)

2) Digestion...

สืบ จำนวน 121 รายการ

ลำดับที่	สารแม่พิมพ์	วิธีวิเคราะห์
17	Bis(2-chloroethyl)ether	2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14) 3) Digestion, Inductively Coupled Plasma Method ^(1.14)
18	Bis(2-ethylhexyl)phthalate	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
19	Bromodichloromethane	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
20	Bromoform	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
21	Butanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
22	Butyl benzyl phthalate	Mass Spectrometric Method ^(1.27) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
23	Cadmium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.14)
24	Carbazole	3) Digestion, Inductively Coupled Plasma Method ^(1.14) Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
25	Carbon disulfide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
26	Carbon tetrachloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
27	Chlordane	Soxhlet Extraction, Gas Chromatographic Method ^(1.24)
28	p-Chloroaniline	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(1.27)
29	Chlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
30	Chlorodibromomethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
31	Chloroform	Mass Spectrometric Method ^(1.27) Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(1.24)
32	Chromium	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15)

2) Digestion...

ลำดับที่	สารเคมี	วิธีวิเคราะห์
33	Chromium (III)	2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ⁽¹⁾⁽¹⁶⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽¹⁶⁾ 1) Digestion, Flame Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ⁽⁷⁾⁽¹⁾⁽¹⁶⁾ 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method; Alkaline Digestion, Colorimetric Method; Calculation ⁽⁷⁾⁽¹⁾⁽¹⁶⁾ 3) Digestion, Inductively Coupled Plasma Method; Alkaline Digestion, Colorimetric Method; Calculation ⁽⁷⁾⁽¹⁾⁽¹⁶⁾
34	Chromium (VI)	Alkaline Digestion, Colorimetric Method ⁽⁸⁾⁽¹⁶⁾
35	Chrysene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
36	Cyanide	1) Extraction, Distillation, Titrimetric Method ⁽²⁾⁽²⁾⁽²⁰⁾ 2) Extraction, Distillation, Colorimetric Method ⁽²⁾⁽²⁾⁽²⁰⁾
37	2,4-D	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
38	DOO	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
39	DDE	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
40	DDT	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
41	Dibenz(a,h)anthracene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
42	Di-n-butyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
43	1,2-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
44	1,3-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
45	1,4-Dichlorobenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
46	1,1-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
47	1,2-Dichloroethane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
48	1,1-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾

49 cis-1,2-Dichloroethylene-

379

ลำดับที่	สารเคมี	วิธีวิเคราะห์
49	cis-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
50	trans-1,2-Dichloroethylene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
51	1,2-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
52	1,3-Dichloropropane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
53	1,3-Dichloropropene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
54	Dieldrin	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
55	Diethyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
56	2,4-Dimethylphenol	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾
57	2,4-Dinitrophenol	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾
58	2,4-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾
59	2,6-Dinitrotoluene	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²¹⁾
60	Di-n-Octyl phthalate	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
61	Endosulfan	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
62	Endrin	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
63	Ethylbenzene	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
64	Fluoranthene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
65	Fluorene	Soxhlet Extraction, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
66	Heptachlor	Mass Spectrometric Method ⁽¹⁾⁽²¹⁾
67	Heptachlor epoxide	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
68	Hexachloro-1,3-butadiene	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
69	n-Hexane	Purge and Trap, Gas Chromatographic/Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
70	α-HCH	Mass Spectrometric Method ⁽¹⁾⁽²⁴⁾
71	β-HCH	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾
72	γ-HCH	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁴⁾

73 Hexachlorocyclopentadiene-

379

ลำดับที่	สารเคมี	วิธีวิเคราะห์
73	Hexachlorocyclopentadiene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
74	Hexachloroethane	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
75	Indene(1,2,3-cd)pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
76	Isophorone	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
77	Lead	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.14)
78	Manganese	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.14)
79	Mercury	Digestion, Cold-Vapor Atomic Absorption Spectrometric Method ⁽⁸⁾
80	Methanol	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
81	Methoxychlor	Soxhlet Extraction, Gas Chromatographic Method ^(11.21)
82	Methyl bromide	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
83	Methylene chloride	Purge and Trap, Gas Chromatographic Method ^(11.24)
84	2-Methylphenol	Soxhlet Extraction, Gas Chromatographic Method ^(11.21)
85	2-Methylnaphthalene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
86	Methyl tert-butyl ether	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
87	Naphthalene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)
88	Nickel	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.14)

ลำดับที่	สารเคมี	วิธีวิเคราะห์
89	Nitrobenzene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
90	N-Nitrosodiphenylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
91	N-Nitrosodi-n-propylamine	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
92	Polychlorinated Biphenyls	Soxhlet Extraction, Gas Chromatographic Method ^(11.21)
	Aroclor 1016	
	Aroclor 1221	
	Aroclor 1232	
	Aroclor 1242	
	Aroclor 1248	
	Aroclor 1254	
	Aroclor 1260	
	2,2',5,5'-Tetrachlorobiphenyl	
	2,2',4,5,5'-Pentachlorobiphenyl	
	2,2',3,4,4',5'-	
	Hexachlorobiphenyl	
	2,2',4,4',5,5'-	
	Hexachlorobiphenyl	
	2,2',3,4,4',5,5'-	
	Heptachlorobiphenyl	
93	Pentachlorophenol	Soxhlet Extraction, Gas Chromatographic Method ^(11.24)
94	Phenanthrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
95	Phenol	Soxhlet Extraction, Gas Chromatographic Method ^(11.21)
96	Pyrene	Soxhlet Extraction, Gas Chromatographic/ Mass Spectrometric Method ^(11.21)
97	Selenium	Digestion, Hydride Generation/Atomic Absorption Spectrometric Method ^(7.21)
98	Silver	1) Digestion, Flame Atomic Absorption Spectrometric Method ^(7.15) 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ^(7.16) 3) Digestion, Inductively Coupled Plasma Method ^(7.14)
99	Styrene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ^(11.24)

ลำดับที่	สารเคมี	วิธีวิเคราะห์
100	1,1,2,2-Tetrachloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
101	Tetrachloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
102	Toluene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
103	Toxaphene	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽⁴⁾
104	TPH (C ₅ -C ₆)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
105	TPH (C ₇ -C ₁₀)	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽⁸⁾
106	TPH (C ₁₀ -C ₁₃)	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽⁸⁾
107	1,2,4-Trichlorobenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
108	1,1,1-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
109	1,1,2-Trichloroethane	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
110	Trichloroethylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
111	2,4,5-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽⁸⁾
112	2,4,6-Trichlorophenol	Soxhlet Extraction, Gas Chromatographic Method ⁽¹⁾⁽²⁾⁽⁸⁾
113	1,3,5-Trimethylbenzene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
114	Vanadium	1) Digestion, Flame Atomic Absorption Spectrometric Method ⁽¹⁾⁽¹¹⁾ 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ⁽¹⁾⁽¹⁶⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽²⁾⁽⁸⁾
115	Vinyl acetate	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
116	Vinyl chloride	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
117	m-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
118	o-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
119	p-Xylene	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾

120 Xylene (Total)

Signature

ลำดับที่	สารเคมี	วิธีวิเคราะห์
120	Xylene (Total)	Purge and Trap, Gas Chromatographic/ Mass Spectrometric Method ⁽¹⁾⁽²⁾⁽⁸⁾
121	Zinc	1) Digestion, Flame Atomic Absorption Spectrometric Method ⁽¹⁾⁽¹⁸⁾ 2) Digestion, Graphite Furnace Atomic Absorption Spectrometric Method ⁽¹⁾⁽¹⁶⁾ 3) Digestion, Inductively Coupled Plasma Method ⁽¹⁾⁽²⁾⁽⁸⁾

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