Restricted Chemicals Test Results

Device - LM324APWR

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Table Of Contents

TI Report Number : 73864618

Component : Semiconductor Device

Analysis Type : RoHS 10 & Halogens

Analysis Date : 05/28/2024

[redacted]

This report supersedes all previous documents bearing the test report number [redacted]

The following sample(s) was/were submitted and identified by/on behalf of the client as: **Sample Description: Standard TI Wafer**

Sample Received Date: **05/16/2024**

Testing Period: **05/16/2024 – 05/28/2024**

Revision Date : 05/28/2024

Revision Summary : Typo on Testing Period section revised from "06/16/2024 – 05/28/2024" to "05/16/2024 – 05/28/2024".

Test Requested : Please refer to the result summary.

Test Method & Results : Please refer to next page(s).

Result Summary :

Test(s) Requested	Conclusion
1. RoHS Directive (EU) 2015/863 Amending Annex II to Directive 2011/65/EU	PASS
2. Halogen Content	See Test Results
3. Element Content (As Requested by Client)	See Test Results

[redacted]

1. RoHS Directive (EU) 2015/863 Amending Annex II to Directive 2011/65/EU

Test Item(s):	Unit	Test Method	Result 1	MDL	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cd and Pb by ICP-OES and /or ICP-MS)	ND	2	100
Lead (Pb)	mg/kg		ND	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+A1:2017 (Determination of Hg by ICP-OES and/ or ICP-MS)	ND	2	1000
Hexavalent Chromium (CrVI) #	mg/kg	With reference to IEC 62321-7-2:2017 (Determination of CrVI by UV-VIS)	ND*	8	--
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB and PBDE by GC-MS)	ND	-	1000
Monobromobiphenyl	mg/kg		ND	5	-
Dibromobiphenyl	mg/kg		ND	5	-
Tribromobiphenyl	mg/kg		ND	5	-
Tetrabromobiphenyl	mg/kg		ND	5	-
Pentabromobiphenyl	mg/kg		ND	5	-
Hexabromobiphenyl	mg/kg		ND	5	-
Heptabromobiphenyl	mg/kg		ND	5	-
Octabromobiphenyl	mg/kg		ND	5	-
Nonabromobiphenyl	mg/kg		ND	5	-
Decabromobiphenyl	mg/kg		ND	5	-
Sum of PBDEs	mg/kg		ND	-	1000
Monobromodiphenyl ether	mg/kg		ND	5	-
Dibromodiphenyl ether	mg/kg		ND	5	-
Tribromodiphenyl ether	mg/kg		ND	5	-
Tetrabromodiphenyl ether	mg/kg		ND	5	-
Pentabromodiphenyl ether	mg/kg		ND	5	-
Hexabromodiphenyl ether	mg/kg		ND	5	-
Heptabromodiphenyl ether	mg/kg		ND	5	-
Octabromodiphenyl ether	mg/kg		ND	5	-
Nonabromodiphenyl ether	mg/kg		ND	5	-
Decabromodiphenyl ether	mg/kg		ND	5	-
Bis (2-ethylhexyl) Phthalate (DEHP)	mg/kg	IEC 62321-8:2017 (Determination of DEHP, BBP, DBP and DIBP by GC-MS)	ND	50	1000
Butyl Benzyl Phthalate (BBP)	mg/kg		ND	50	1000
Dibutyl Phthalate (DBP)	mg/kg		ND	50	1000
Diisobutyl Phthalate (DIBP)	mg/kg		ND	50	1000
Conclusion	/	/	PASS	/	/

Sample Description:

1. Standard TI Wafer

Note:

(a) mg/kg = ppm；0.1wt% = 1000ppm
(b) ND= not detected
(c) MDL = Method Detection Limit
(d) # =
    a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm2. The sample coating is considered to contain CrVI
    b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 µg/cm2). The coating is considered a non-CrVI based coating.
    c. The result between 0.10 µg/cm2 and 0.13 µg/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.
    d. For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing represent status of the sample at the time of testing.
(e) - = not regulated
(f) * = Total Chromium analysis by ICP-MS and/or ICP-OES was not detected in submitted sample. Therefore, Hexavalent Chromium determination using UV-Visible Spectroscopy was not performed.
(g) IEC 62321 series is equivalent to EN 62321 series http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101::::FSP_ORG_ID,FSP_LANG_ID:1258637,25

2. Halogen Content

Test Method(s): With reference to IEC 62321-3-2:2020 "Determination of certain substances in electrotechnical products – Part 3-2: Screening – Fluorine, bromine and chlorine in polymer and electronics by combustion-ion chromatography (C-IC), and/or with reference to BS EN 14582:2016 – Analysis was performed by ion chromatography.

Test Item(s):	Unit	Results (ppm)	Reporting Limit (ppm)
		1	
Chlorine (Cl)	mg/kg	ND	50
Bromine (Br)	mg/kg	ND	50
Fluorine (F)	mg/kg	ND	50

Sample Description:
1. Standard TI Wafer

Note: 1. ppm = parts per million
2. mg/kg = ppm
3. 1% = 10000 ppm (mg/kg)
4. ND = Not Detected, reported when the reading is less than the reporting limit value.

3. Element Content (As Requested by Client)

Test Method: With reference to US EPA Method 3050B followed by analysis using ICP-MS.

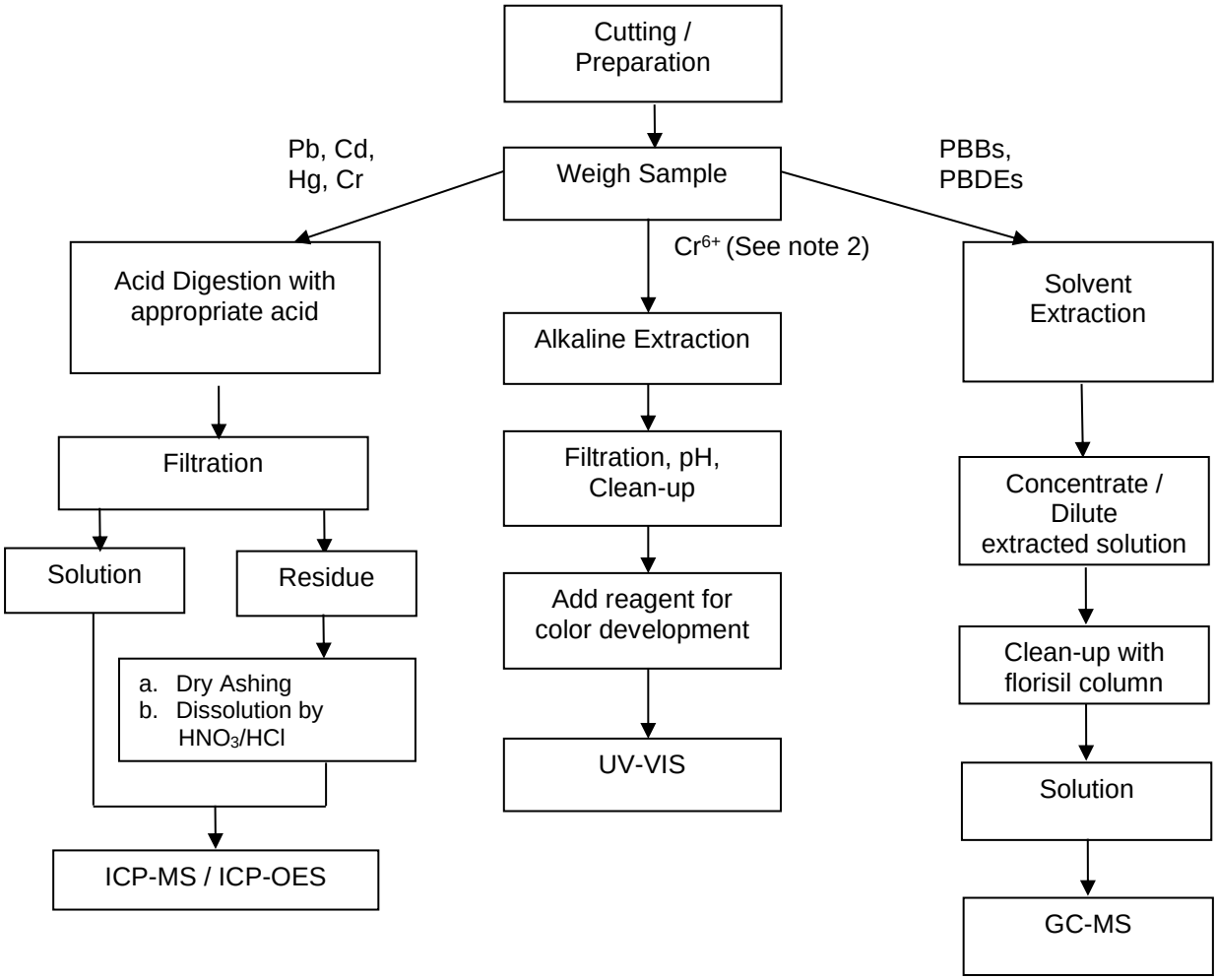
Test Item		Result (mg/kg)	Reporting Limit (mg/kg)
		1	
Arsenic	(As)	ND	5
Beryllium	(Be)	ND	5
Antimony	(Sb)	ND	5

Sample Description:

1. Standard TI Wafer

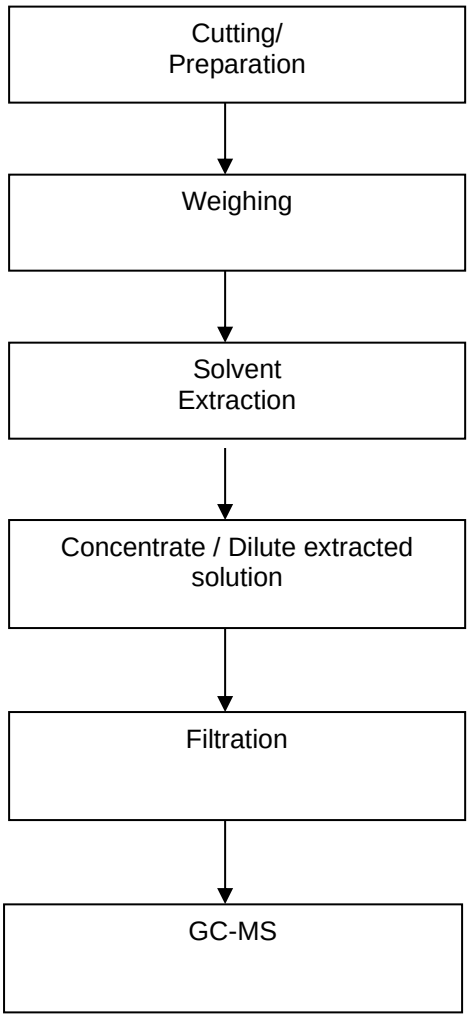
Note: 1. ppm = parts per million
2. mg/kg = ppm
3. 1% = 10000 ppm (mg/kg)
4. ND = Not Detected, reported when the reading is less than the reporting limit value.

Flowchart for RoHS:

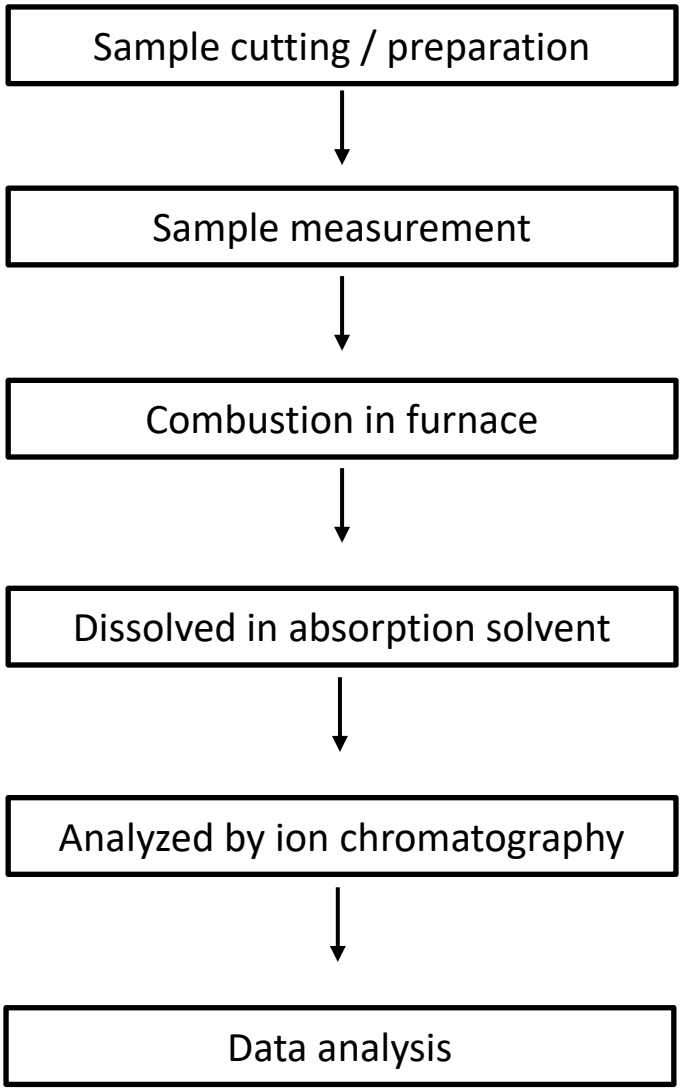


Note : 1. The Cr, Cd, Pb and Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.
2. Cr^{6+} is performed only when total Cr is detected

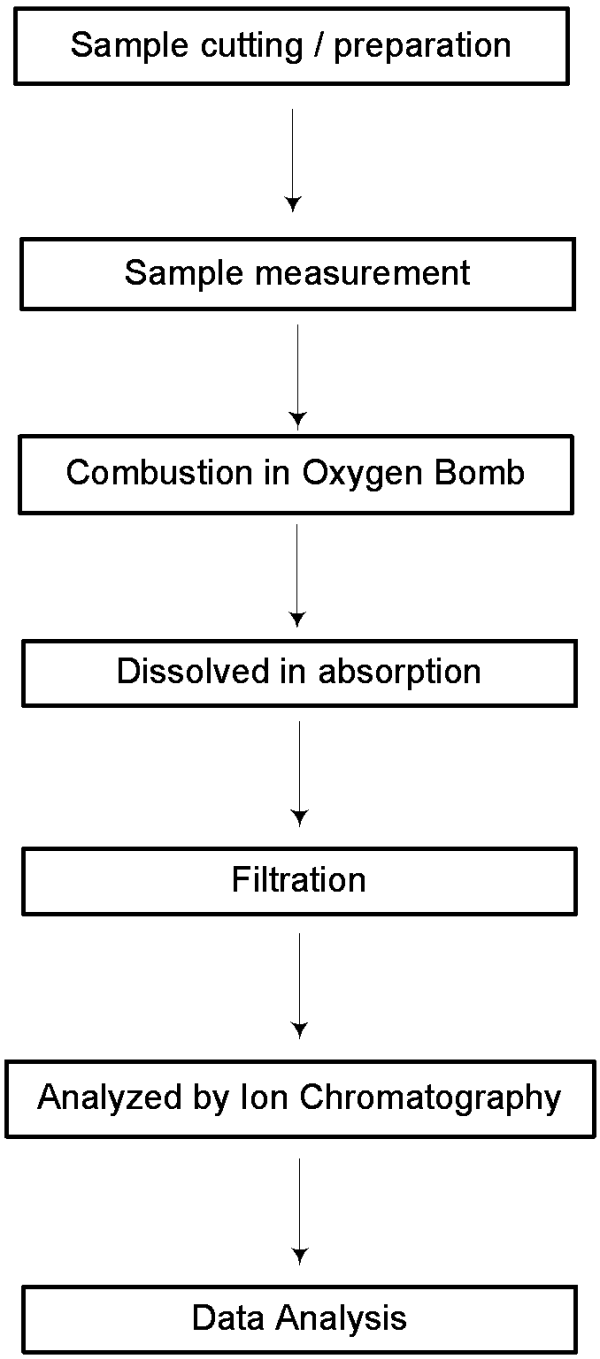
Flowchart for Phthalates:



Flow Chart of Halogen Test by Combustion Ion Chromatography:



Halogen Testing Flow Chart (EN 14582):



TI Report Number : 76575778

Component : Bond Wire

Analysis Type : RoHS 10 & Halogens

Analysis Date : 05/21/2024

[redacted]

Test Report [redacted] Date: 21-May-2024 Page: 1 of 18

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The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]

Sample Name : COPPER WIRE

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Sample Receiving Date : 15-May-2024

Testing Period : 15-May-2024 to 21-May-2024

Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).

(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

[redacted]

Test Part Description

No.1 : COPPER COLORED METAL WIRE

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb)		mg/kg	2	n.d.	1000
Mercury (Hg)	With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	µg/cm²	0.1	n.d.	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	-
Decabromodiphenyl ether		mg/kg	5	n.d.	-
Sum of PBDEs		mg/kg	-	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Polychlorinated naphthalene (PCNs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Polychlorinated terphenyls (PCTs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Triphenyl tin (TPT)		mg/kg	0.03	n.d.	-
Dibutyl tin (DBT)		mg/kg	0.03	n.d.	-
Dioctyl tin (DOT)		mg/kg	0.03	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	n.d.	-
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
PFOA and its salts (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	Negative	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ-HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Butyl benzyl phthalate (BBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-

Note：

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. **= Qualitative analysis (No Unit)
6. Negative = Undetectable ; Positive = Detectable
7. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI).
   b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
8. ▲：The MDL was evaluated for element / tested substance.
   Conversion Formula：AX = A × F

AX	A	F
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

   Parameter Conversion Table： https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others
9. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	TetrabutylAmmonium perfluorooctanesulfonate (PFOS-$N(C_4H_9)_4$)	111873-33-7
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5
	Cobalt perfluorooctanoate (PFOA-Co)	35965-01-6

[redacted].

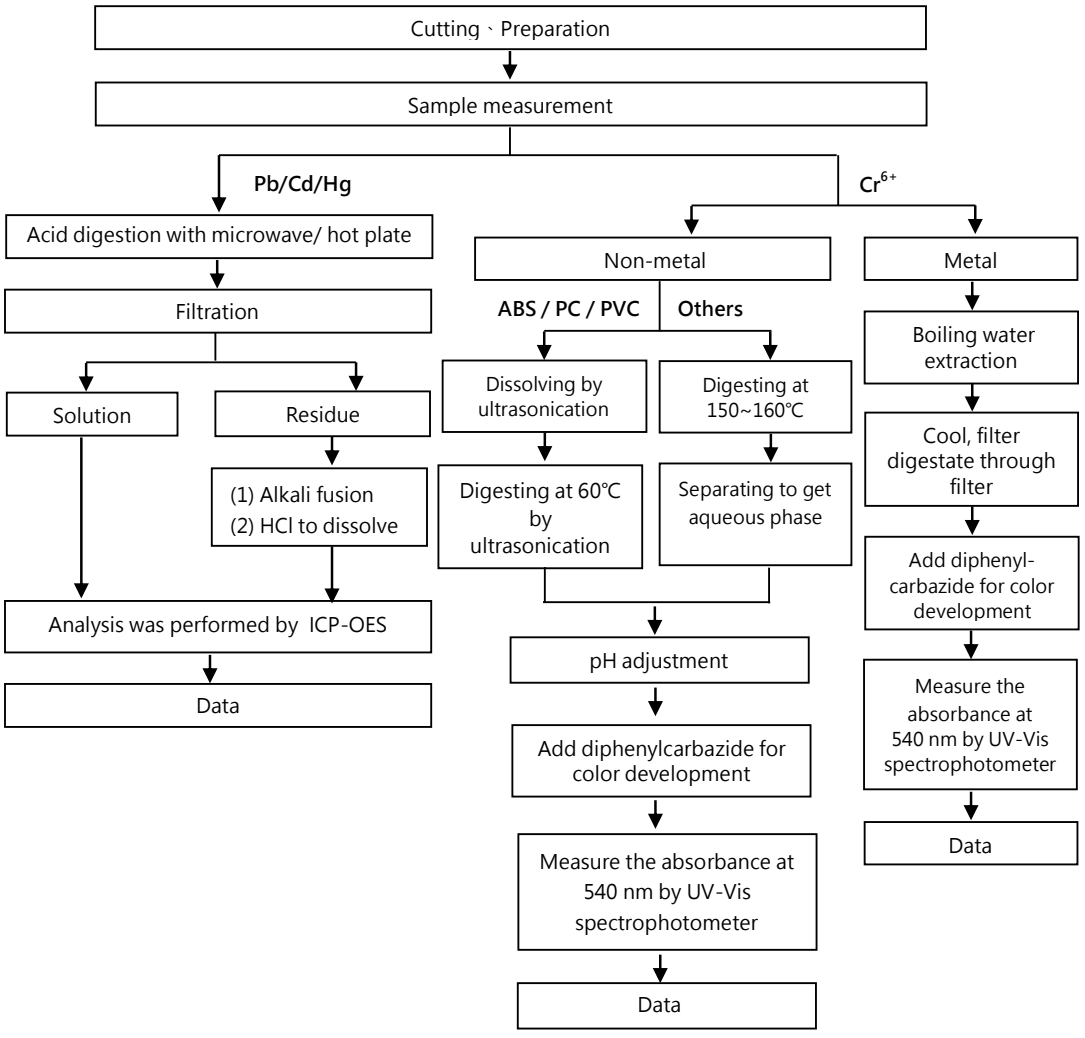
Group Name	Substance Name	CAS No.
PFOA, its salts & derivatives	Cesium perfluorooctanoate (PFOA-Cs)	17125-60-9
	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) (PFOA-Cr(3^{+}))	68141-02-6
	Pentadecafluorooctanoic acid--piperazine (2/1)PFOA-NH($C_4H_{10}N$)	423-52-9
	Pentadecafluorooctanoate (anion)	45285-51-6
	Perfluorooctanoic Anhydride	33496-48-9

[redacted]

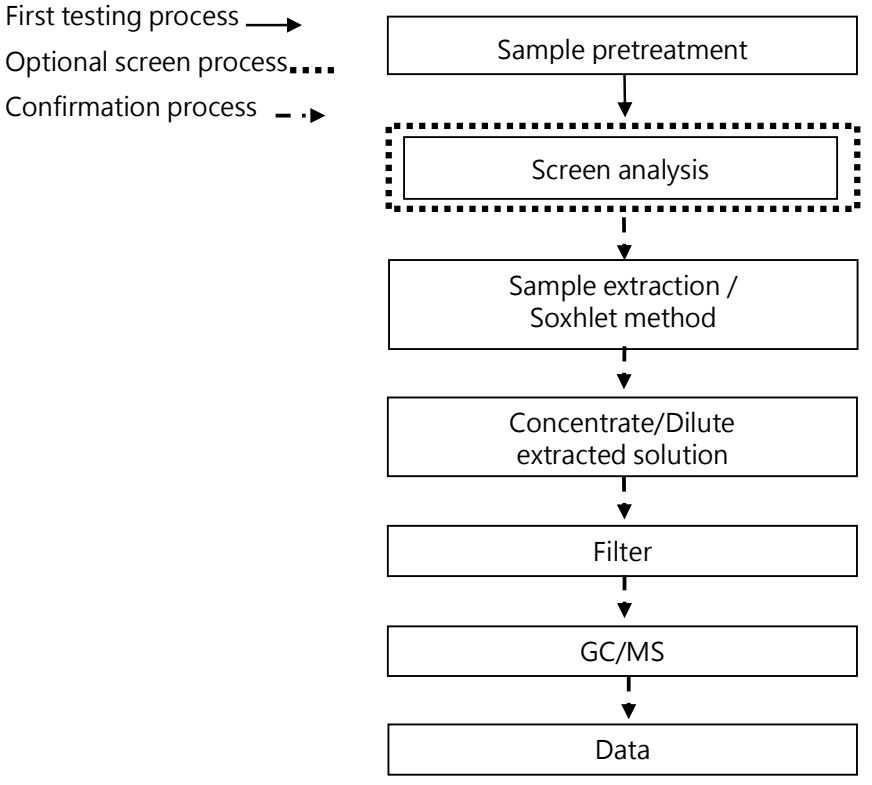
Analytical flow chart of heavy metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr^{6+} test method excluded)

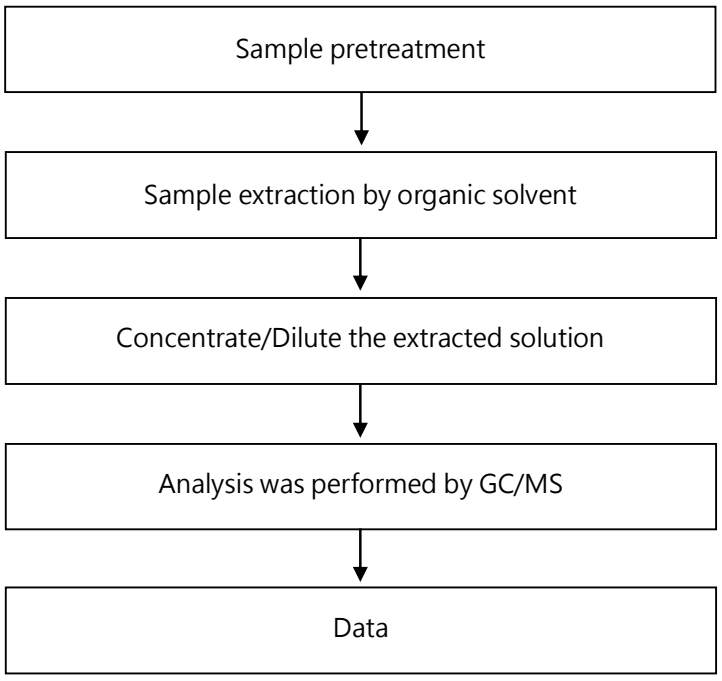


Analytical flow chart – PBBs / PBDEs

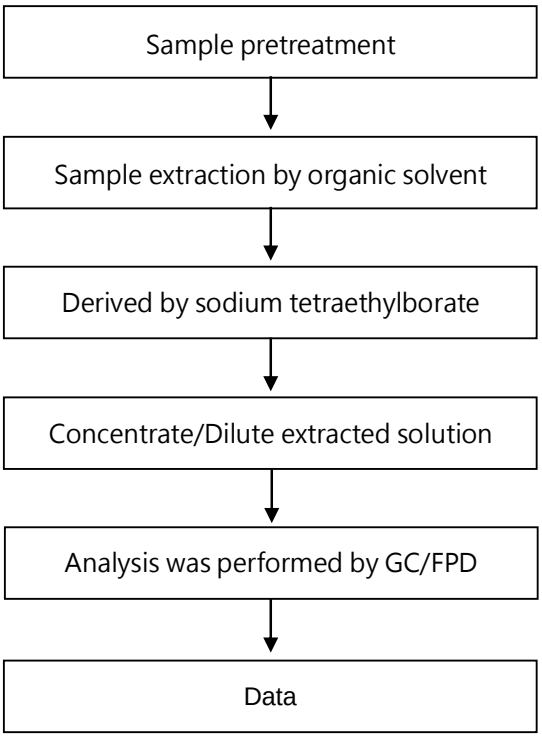


Analytical flow chart

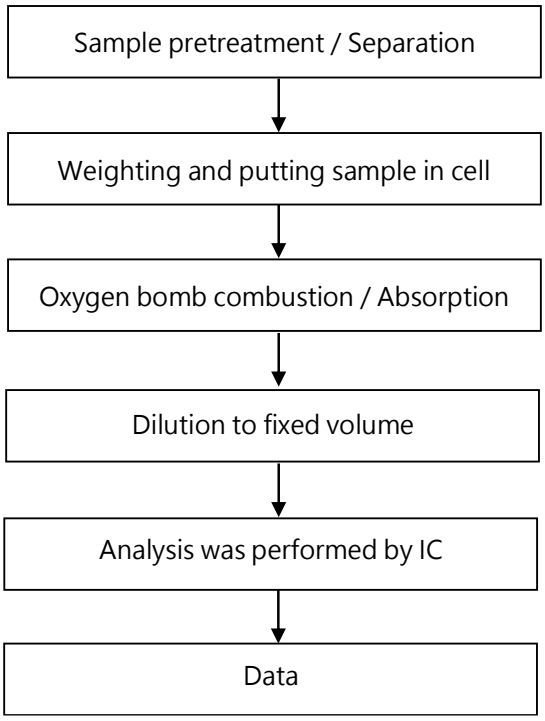
* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



Analytical flow chart - Organic-Tin



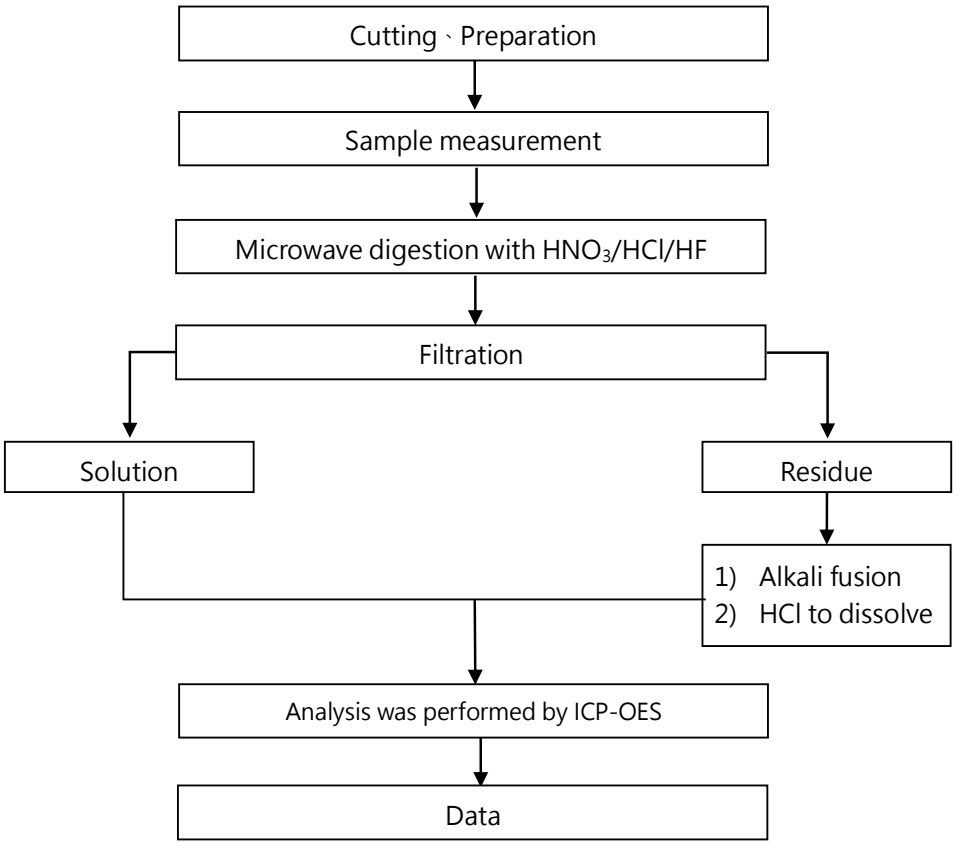
Analytical flow chart - Halogen



Analytical flow chart of elements (Heavy metal included)

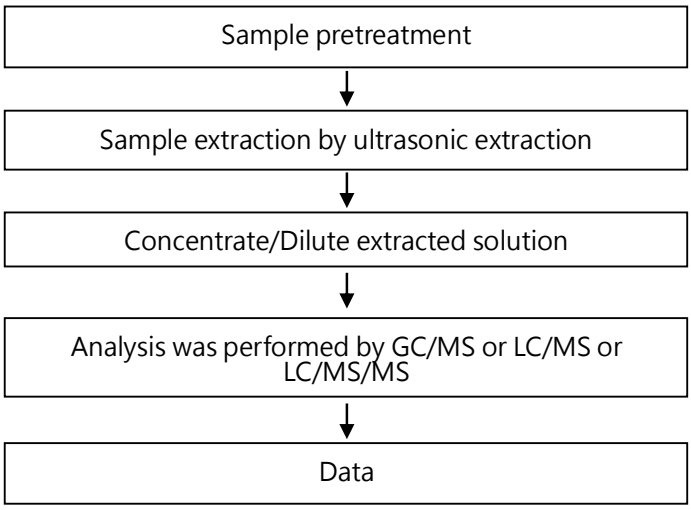
These samples were dissolved totally by pre-conditioning method according to below flow chart.

【Reference method：US EPA 3051A、US EPA 3052】

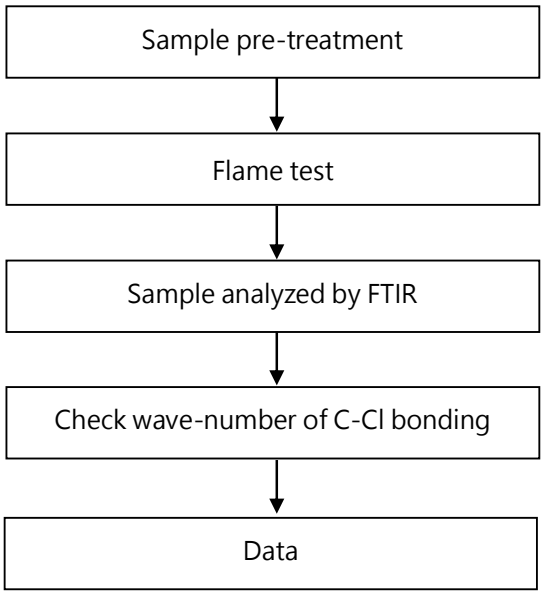


* US EPA 3051A method does not add HF.

Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)

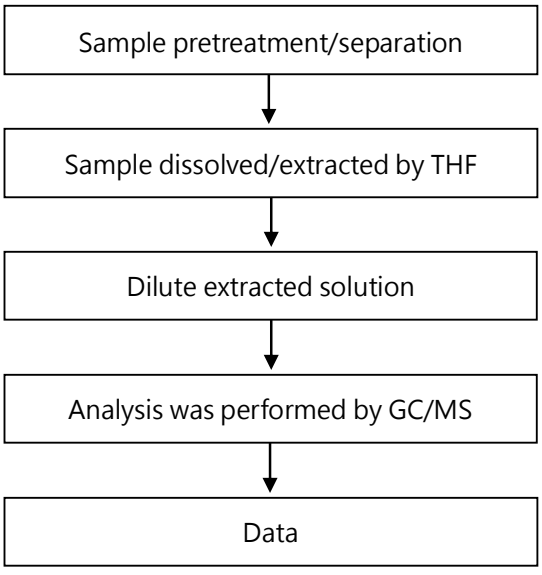


Analysis flow chart - PVC

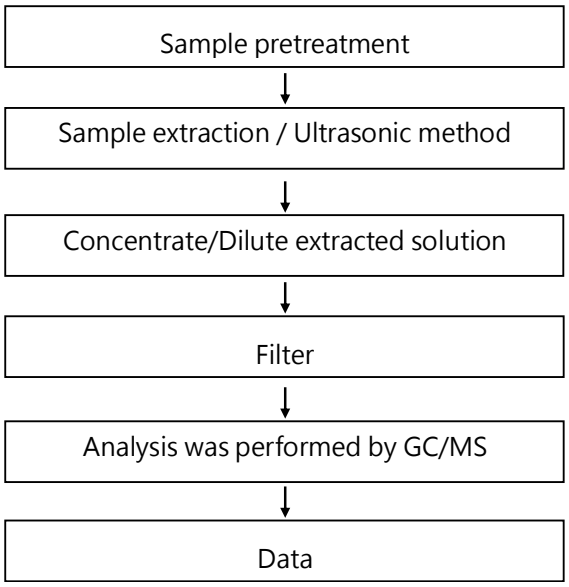


Analytical flow chart - Phthalate

【Test method: IEC 62321-8】



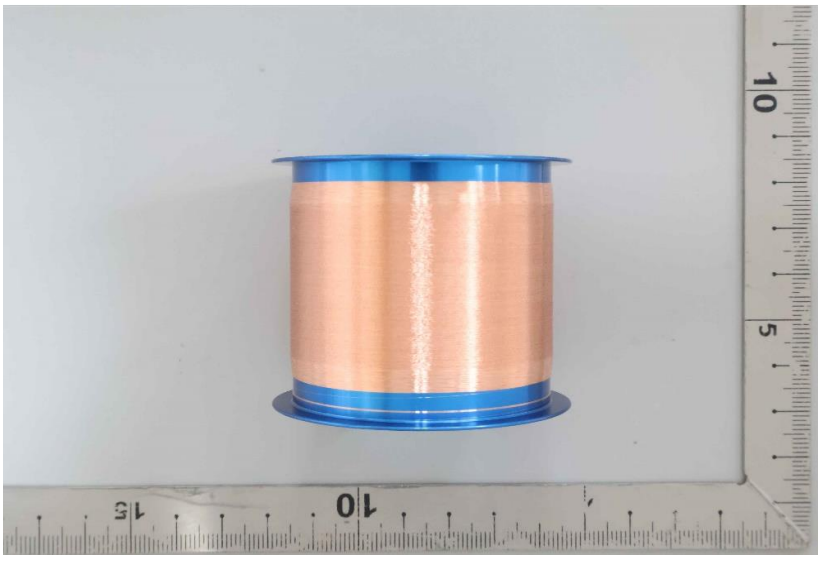
Analytical flow chart - HBCDD



[redacted]

* The tested sample / part is marked by an arrow if it's shown on the photo. *

[redacted]



** End of Report **

TI Report Number : 74957909

Component : Lead Frame Plating

Analysis Type : Other-2011/65/EU

Analysis Date : 05/09/2024

[redacted]

Test Report

No.: [redacted] Date: 21-May-2024

[redacted]

The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]
Sample Name : Pd PLATING LAYER

==========

Sample Receiving Date : 09-May-2024
Testing Period : 09-May-2024 to 20-May-2024

Test Requested :
(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion :
(1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

Test Part Description

No.1 : PLATING LAYER OF SILVER COLORED METAL
No.2 : COPPER/SILVER COLORED METAL (INCLUDING THE PLATING LAYER)

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Cadmium (Cd) (CAS No.: 7440-43-9)	IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	100
Lead (Pb) (CAS No.: 7439-92-1)		mg/kg	2	n.d.	---	1000
Mercury (Hg) (CAS No.: 7439-97-6)	IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	μg/cm²	0.1	n.d.	---	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Dibromobiphenyl		mg/kg	5	---	n.d.	-
Tribromobiphenyl		mg/kg	5	---	n.d.	-
Tetrabromobiphenyl		mg/kg	5	---	n.d.	-
Pentabromobiphenyl		mg/kg	5	---	n.d.	-
Hexabromobiphenyl		mg/kg	5	---	n.d.	-
Heptabromobiphenyl		mg/kg	5	---	n.d.	-
Octabromobiphenyl		mg/kg	5	---	n.d.	-
Nonabromobiphenyl		mg/kg	5	---	n.d.	-
Decabromobiphenyl		mg/kg	5	---	n.d.	-
Sum of PBBs		mg/kg	-	---	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	---	n.d.	-
Dibromodiphenyl ether		mg/kg	5	---	n.d.	-
Tribromodiphenyl ether		mg/kg	5	---	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	---	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	---	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	---	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	---	n.d.	-
Octabromodiphenyl ether		mg/kg	5	---	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	---	n.d.	-
Decabromodiphenyl ether		mg/kg	5	---	n.d.	-
Sum of PBDEs		mg/kg	-	---	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Antimony trioxide (Sb_2O_3) (CAS No.: 1309-64-4)	Calculated from the result of Antimony.	mg/kg	2▲	---	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	---	n.d.	-
Polychlorinated naphthalene (PCNs)		mg/kg	5	---	n.d.	-
Polychlorinated terphenyls (PCTs)		mg/kg	0.5	---	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Medium Chain Chlorinated Paraffins(C14-C17) (MCCP) (CAS No.: 85535-85-9)	With reference to ISO 18219-2: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	With reference to RSTS-E&E-121, analysis was performed by LC/MS.	mg/kg	10	---	n.d.	-
Bisphenol A (CAS No.: 80-05-7)	With reference to RSTS-CHEM-239-1, analysis was performed by LC/MS/MS.	mg/kg	1	---	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	---	Negative	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	---	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	---	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	---	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	---	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	---	n.d.	-
Triphenyl tin (TPT)		mg/kg	0.03	---	n.d.	-
Dibutyl tin (DBT)		mg/kg	0.03	---	n.d.	-
Dioctyl tin (DOT)		mg/kg	0.03	---	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	---	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Perfluorooctanoic acid (PFOA) and it's salt (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	1000
Butyl benzyl phthalate (BBP)		mg/kg	50	---	n.d.	1000
Diisobutyl phthalate (DIBP)		mg/kg	50	---	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)		mg/kg	50	---	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	---	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)		mg/kg	50	---	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)		mg/kg	50	---	n.d.	-
Di-n-pentyl phthalate (DNPP) (CAS No.: 131-18-0)		mg/kg	50	---	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)		mg/kg	50	---	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)		mg/kg	50	---	n.d.	-
N-pentyl iso-pentyl phthalate (NPIPP) (CAS No.: 776297-69-9)		mg/kg	50	---	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Diisopentyl phthalate (DIPP) (CAS No.: 605-50-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Phosphorus (P) (CAS No.: 7723-14-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	6.79	-

Note：

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. "---" = Not Conducted
6. **= Qualitative analysis (No Unit)
7. Negative = Undetectable ; Positive = Detectable
8. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI).
   b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
9. ▲ : The MDL was evaluated for element / tested substance.
   Conversion Formula：AX = A × F

AX	A	F
Antimony trioxide (Sb_2O_3)	Antimony	1.1971
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

Parameter Conversion Table：https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others

[redacted]

10. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

[redacted]

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	TetrabutylAmmonium perfluorooctanesulfonate (PFOS-$N(C_4H_9)_4$)	111873-33-7
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5
	Cobalt perfluorooctanoate (PFOA-Co)	35965-01-6

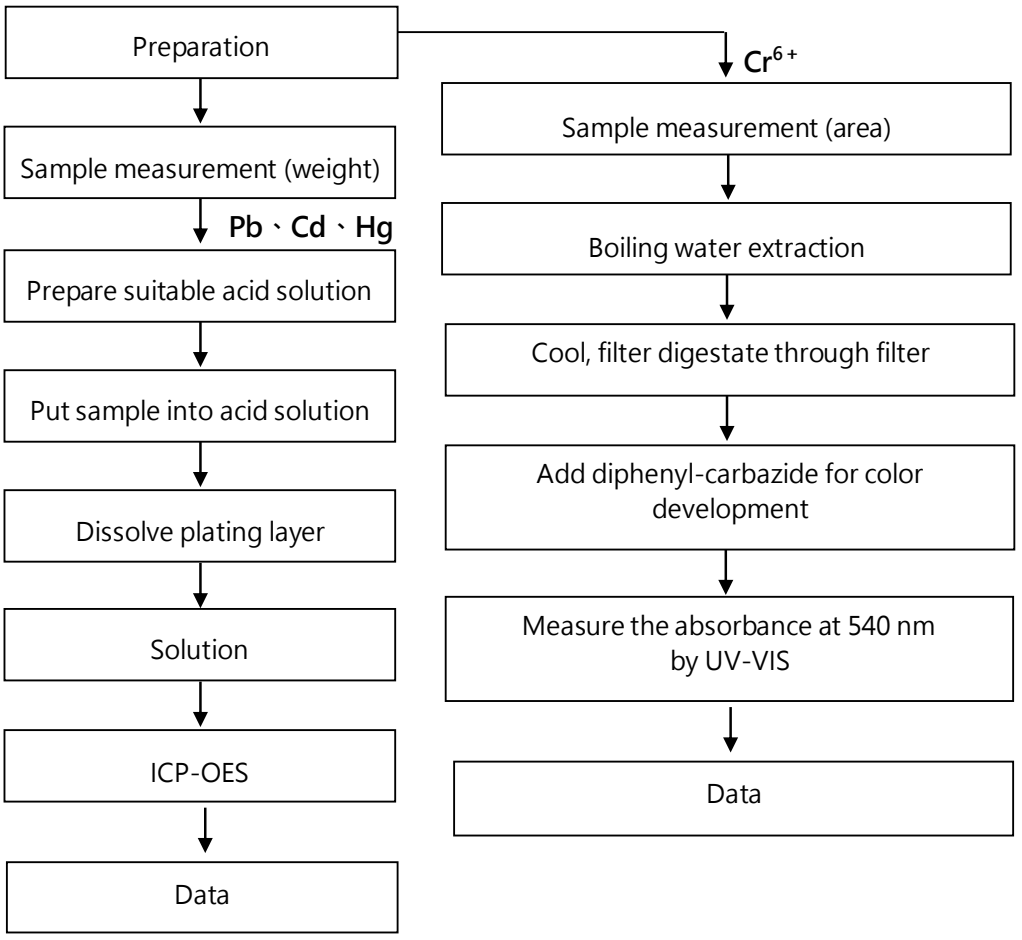
[redacted]

Group Name	Substance Name	CAS No.
PFOA, its salts & derivatives	Cesium perfluorooctanoate (PFOA-Cs)	17125-60-9
	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) (PFOA-Cr(3^{+}))	68141-02-6
	Pentadecafluorooctanoic acid--piperazine (2/1)PFOA-NH($C_4H_{10}N$)	423-52-9
	Pentadecafluorooctanoate (anion)	45285-51-6
	Perfluorooctanoic Anhydride	33496-48-9

[redacted]

Flow Chart of Stripping method for metal analysis

The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



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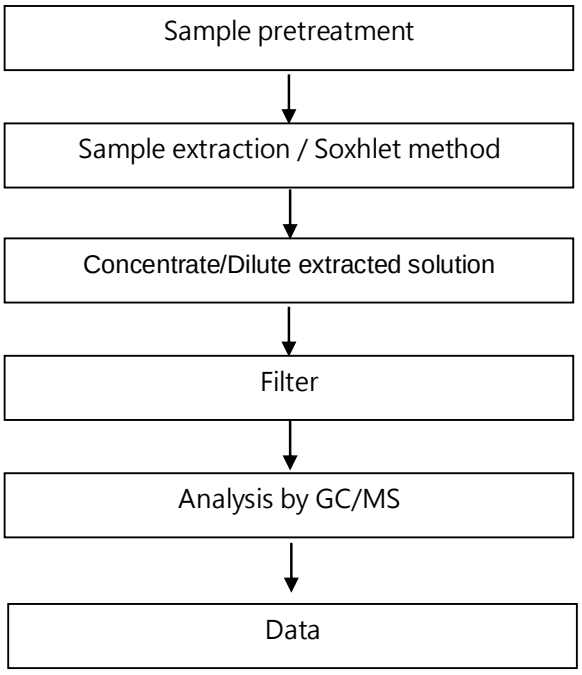
PBB/PBDE analytical FLOW CHART



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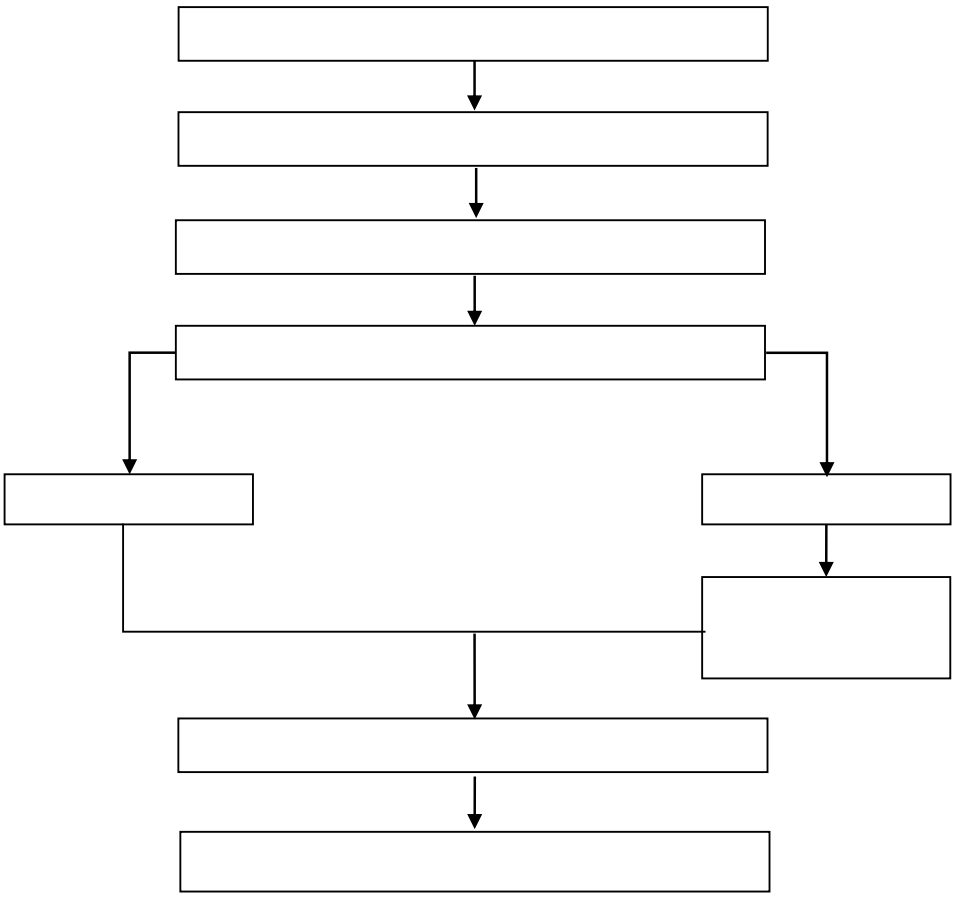

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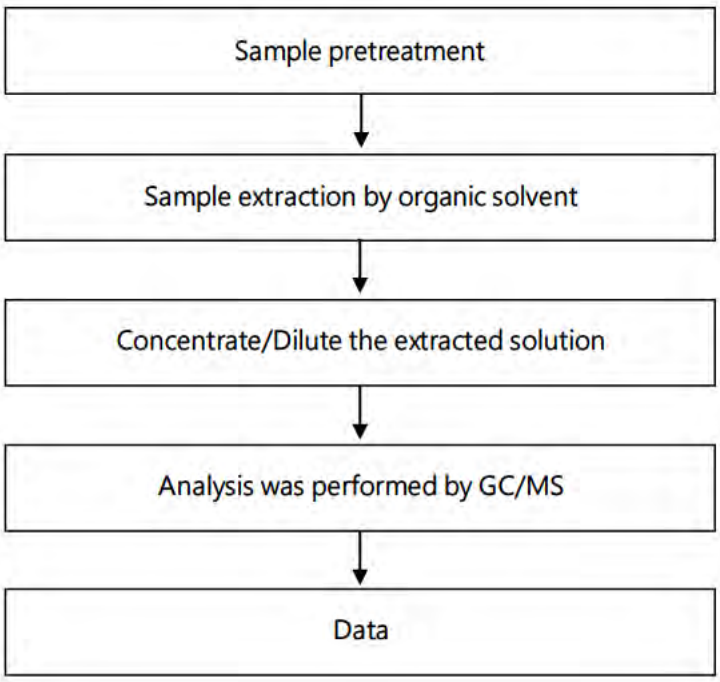
Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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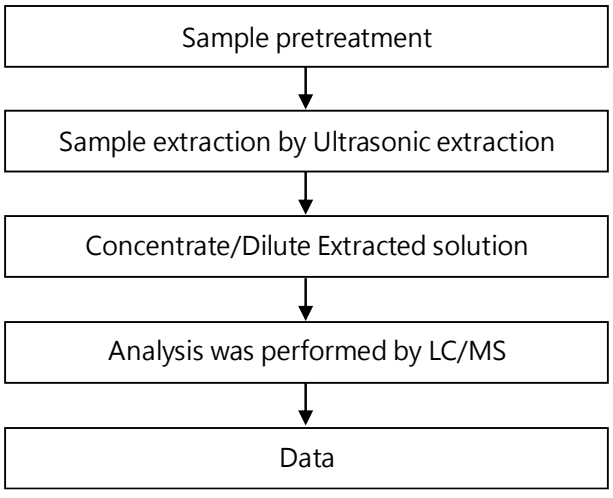
TBBP-A analytical flow chart



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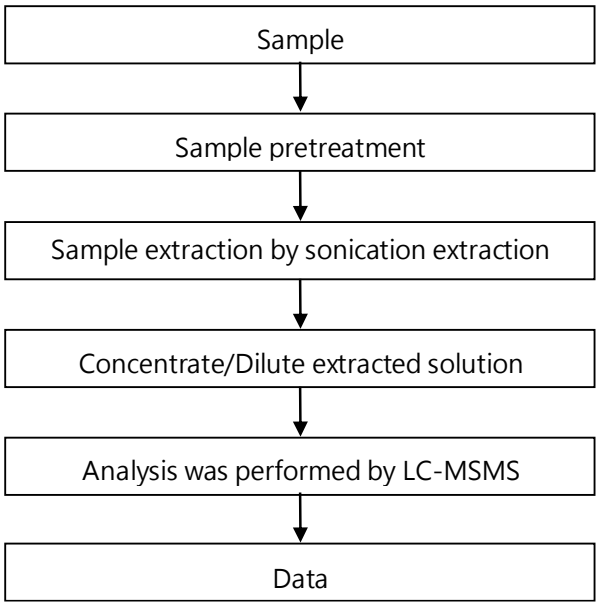
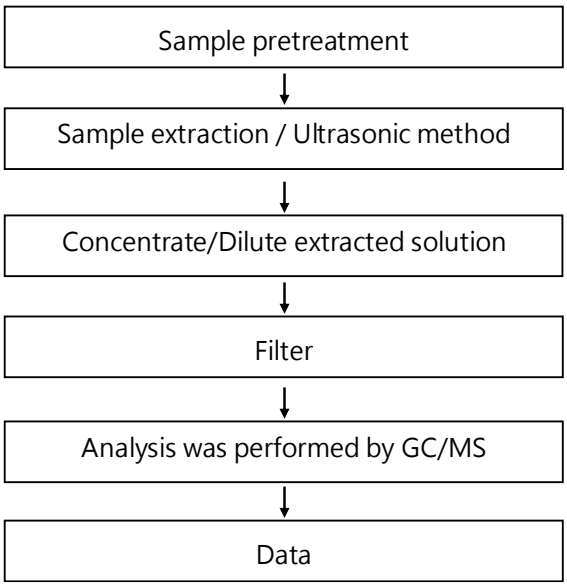
BPA analytical flow chart



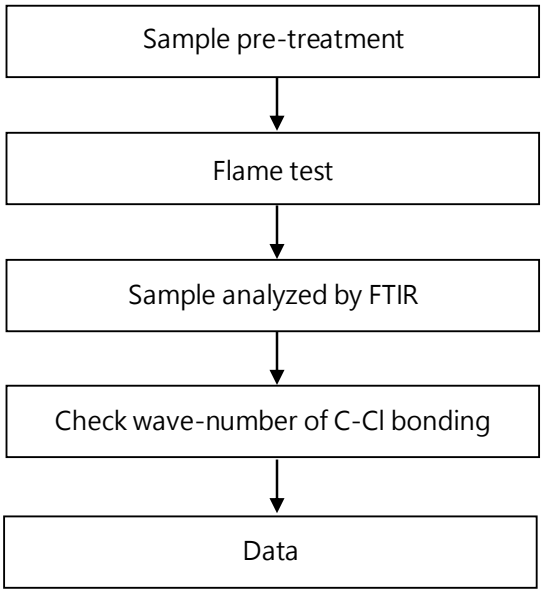
[redacted]

Analytical flow chart - HBCDD



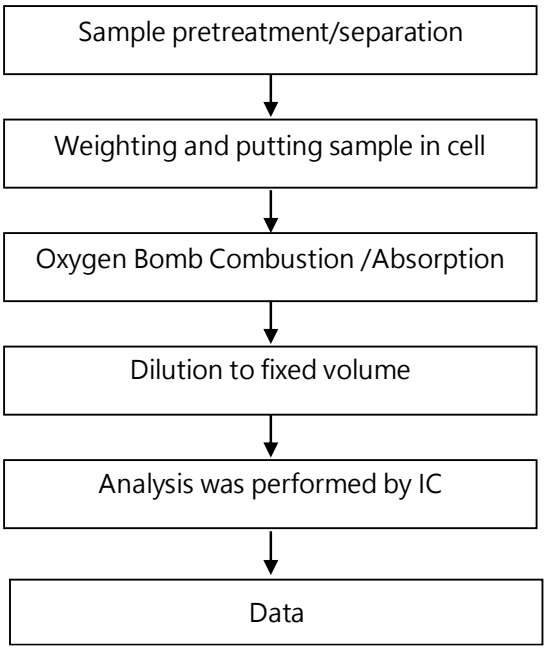
[redacted]

Analysis flow chart - PVC



[redacted]

Analytical flow chart of Halogen



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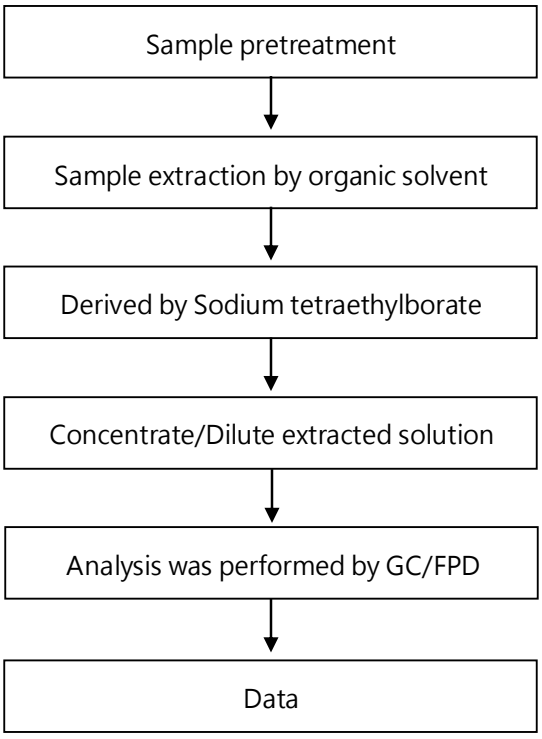
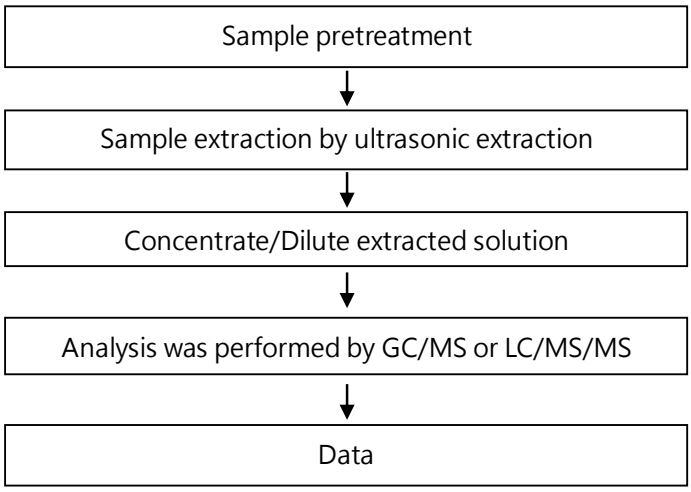
Analytical flow chart - Organic-Tin



[redacted]

Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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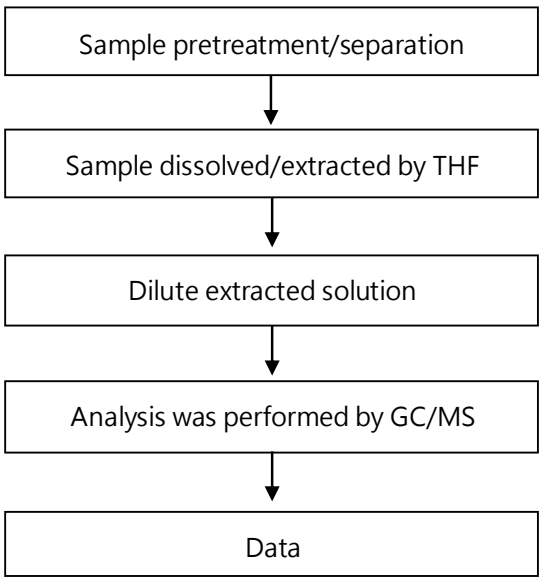
Analytical flow chart of phthalate content

【Test method: IEC 62321-8】



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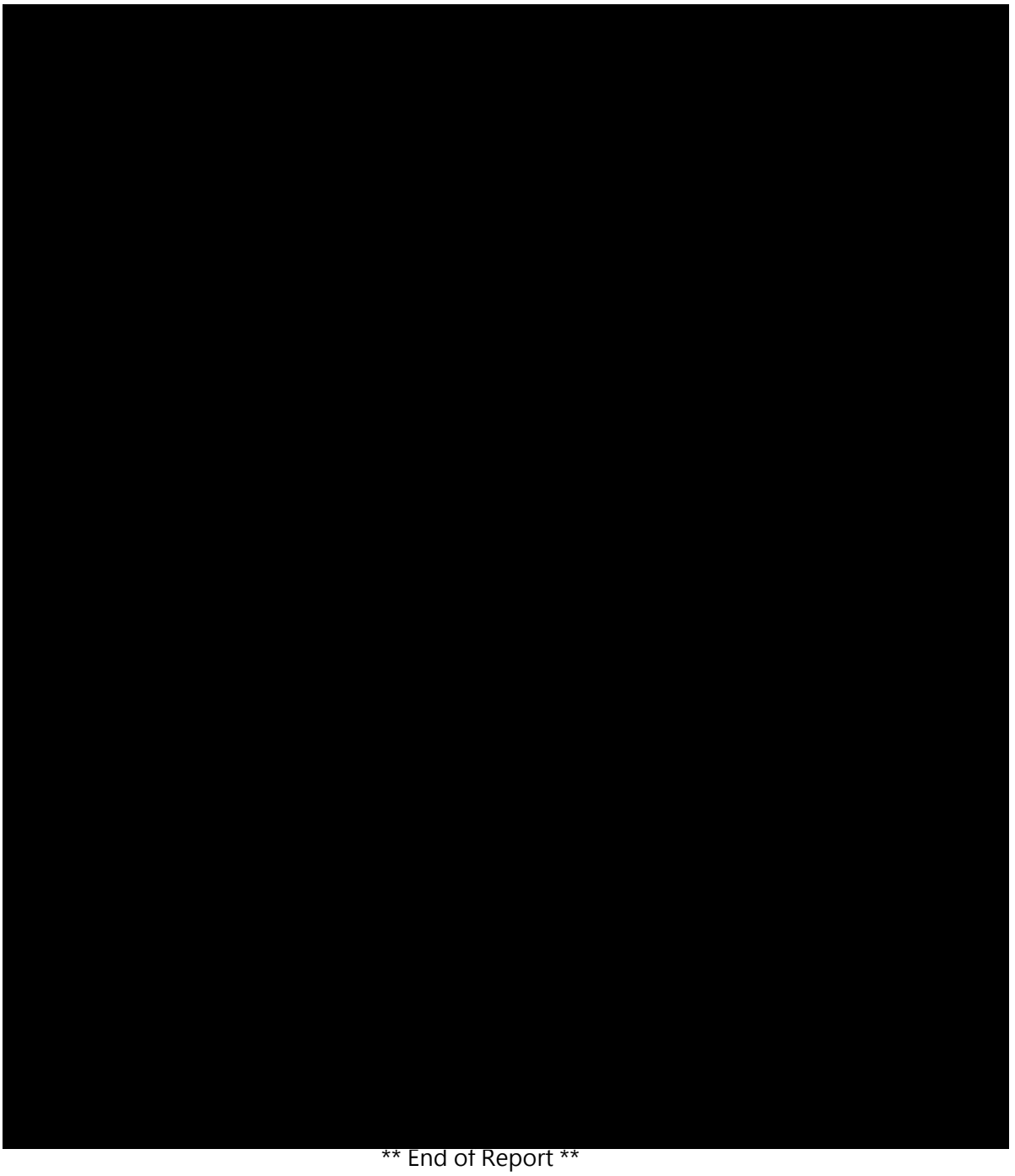


** End of Report **

TI Report Number : 74886581

Component : Lead Frame

Analysis Type : Other-2011/65/EU

Analysis Date : 05/09/2024

[redacted]

Test Report

No.: [redacted] Date: 21-May-2024

[redacted]

The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]
Sample Name : A194/C194 Cu ALLOY(AFTER ETCHING PROCESS)

==========

Sample Receiving Date : 09-May-2024
Testing Period : 09-May-2024 to 20-May-2024

Test Requested :
(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion :
(1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

Test Part Description

No.1 : COPPER COLORED METAL SHEET

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb)		mg/kg	2	n.d.	1000
Mercury (Hg)	With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	μg/cm²	0.1	n.d.	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	-
Decabromodiphenyl ether		mg/kg	5	n.d.	-
Sum of PBDEs		mg/kg	-	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Antimony trioxide (Sb_2O_3) (CAS No.: 1309-64-4)	Calculated from the result of Antimony.	mg/kg	2▲	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Phosphorus (P) (CAS No.: 7723-14-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	239	-
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Polychlorinated naphthalene (PCNs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Polychlorinated terphenyls (PCTs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Medium Chain Chlorinated Paraffins(C14-C17) (MCCP) (CAS No.: 85535-85-9)	With reference to ISO 18219-2: 2021, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	With reference to RSTS-E&E-121, analysis was performed by LC/MS.	mg/kg	10	n.d.	-
Bisphenol A (CAS No.: 80-05-7)	With reference to RSTS-CHEM-239-1, analysis was performed by LC/MS/MS.	mg/kg	1	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α- HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	Negative	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Triphenyl tin (TPT)		mg/kg	0.03	n.d.	-
Dibutyl tin (DBT)		mg/kg	0.03	n.d.	-
Dioctyl tin (DOT)		mg/kg	0.03	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Perfluorooctanoic acid (PFOA) and it's salt (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Butyl benzyl phthalate (BBP)		mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP)		mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)		mg/kg	50	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)		mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)		mg/kg	50	n.d.	-
Di-n-pentyl phthalate (DNPP) (CAS No.: 131-18-0)		mg/kg	50	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)		mg/kg	50	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)		mg/kg	50	n.d.	-
N-pentyl iso-pentyl phthalate (NPIPP) (CAS No.: 776297-69-9)		mg/kg	50	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Diisopentyl phthalate (DIPP) (CAS No.: 605-50-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)		mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)		mg/kg	50	n.d.	-

Note：

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. **= Qualitative analysis (No Unit)
6. Negative = Undetectable ; Positive = Detectable
7. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI).
   b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
8. ▲：The MDL was evaluated for element / tested substance.
   Conversion Formula：AX = A × F

AX	A	F
Antimony trioxide (Sb_2O_3)	Antimony	1.1971
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

   Parameter Conversion Table： https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others
9. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

[redacted]

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	TetrabutylAmmonium perfluorooctanesulfonate (PFOS-$N(C_4H_9)_4$)	111873-33-7
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5
	Cobalt perfluorooctanoate (PFOA-Co)	35965-01-6

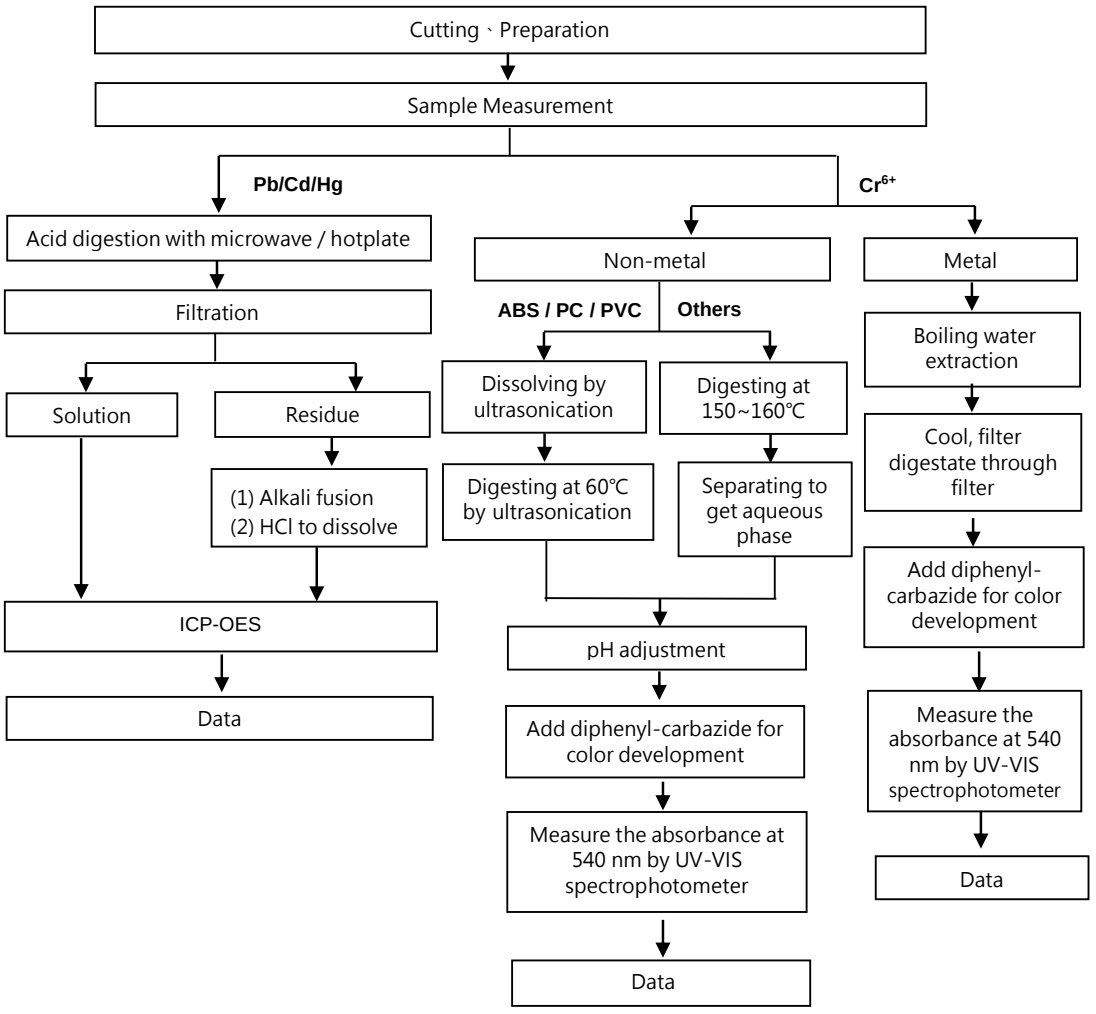
[redacted]

Group Name	Substance Name	CAS No.
PFOA, its salts & derivatives	Cesium perfluorooctanoate (PFOA-Cs)	17125-60-9
	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) (PFOA-Cr(3^+))	68141-02-6
	Pentadecafluorooctanoic acid--piperazine (2/1)PFOA-NH($C_4H_{10}N$)	423-52-9
	Pentadecafluorooctanoate (anion)	45285-51-6
	Perfluorooctanoic Anhydride	33496-48-9

[redacted]

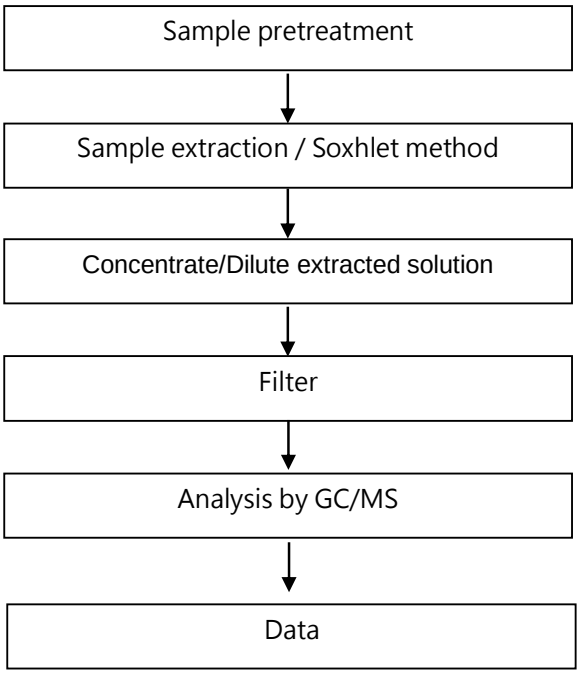
Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.
(Cr^{6+} test method excluded)



[redacted]

PBB/PBDE analytical FLOW CHART

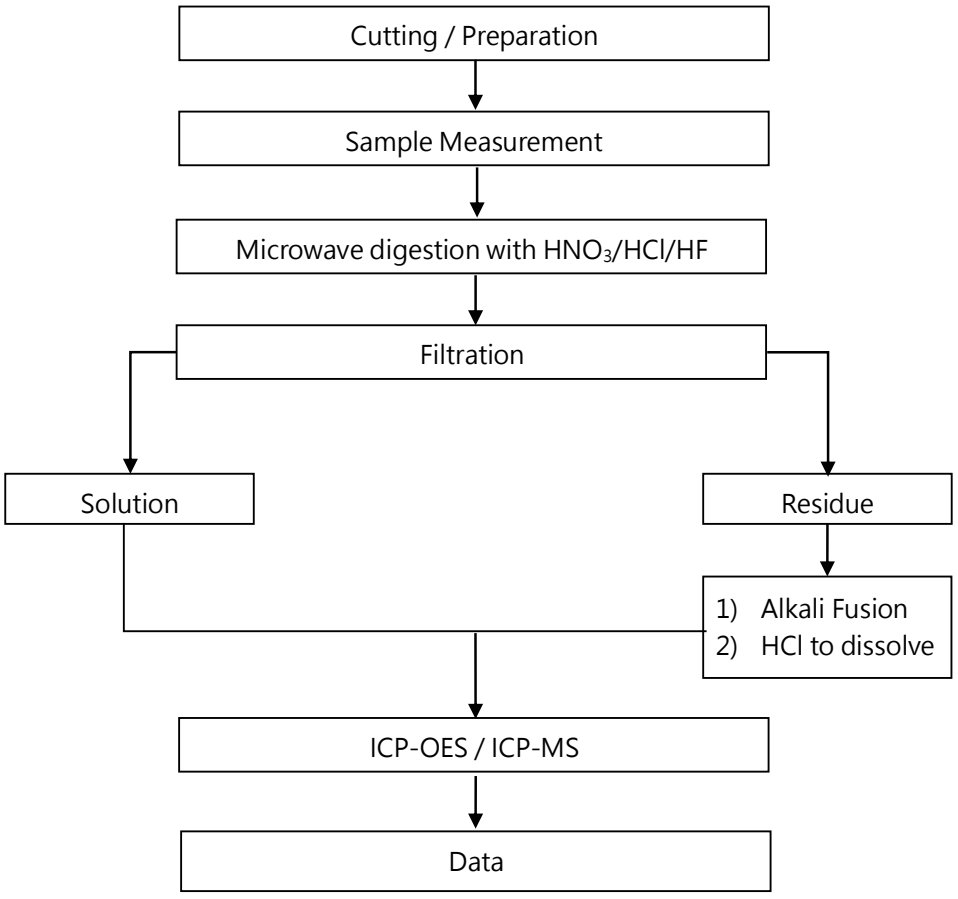


[redacted]

Analytical flow chart of Elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

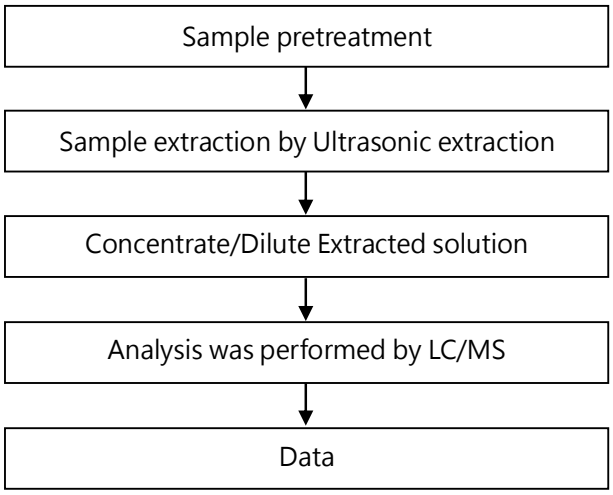
【Reference method：US EPA 3051、US EPA 3052】



* US EPA 3051 method does not add HF.

[redacted]

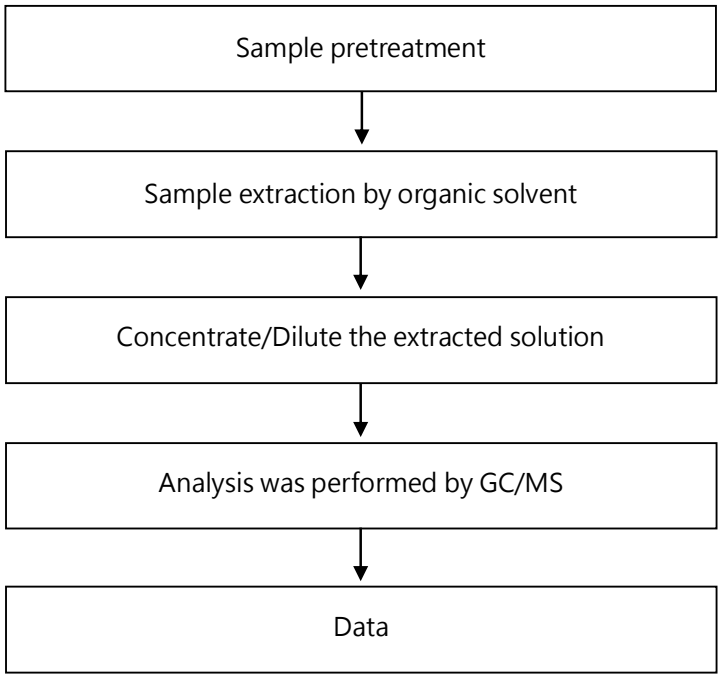
TBBP-A analytical flow chart



[redacted]

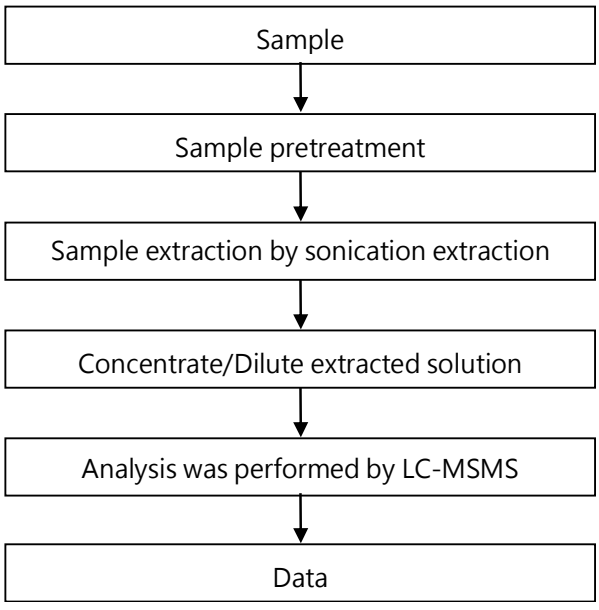
Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



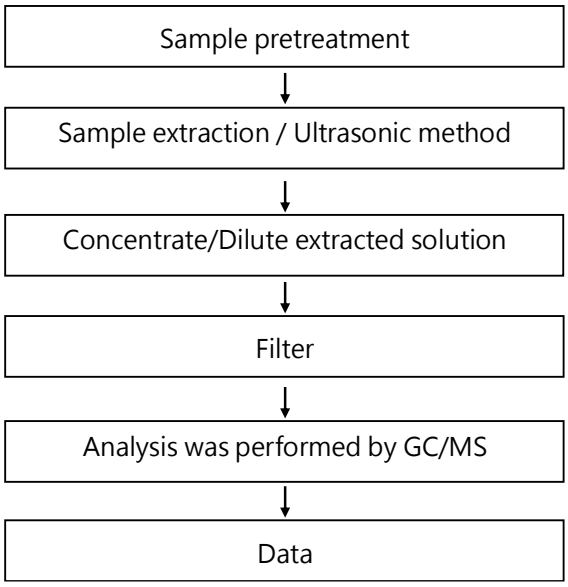
[redacted]

BPA analytical flow chart



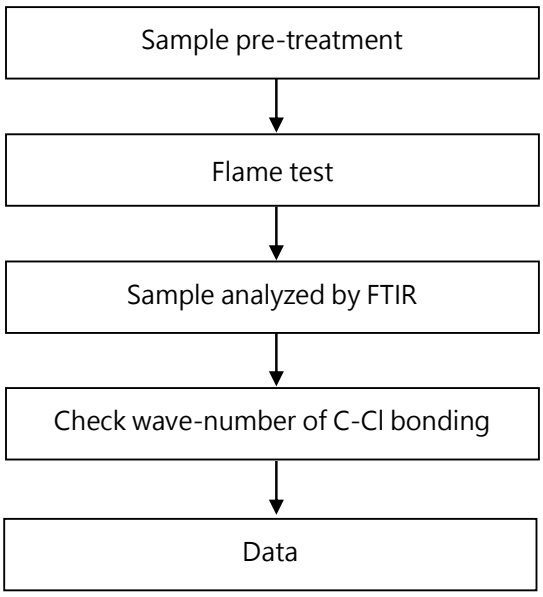
[redacted]

Analytical flow chart - HBCDD



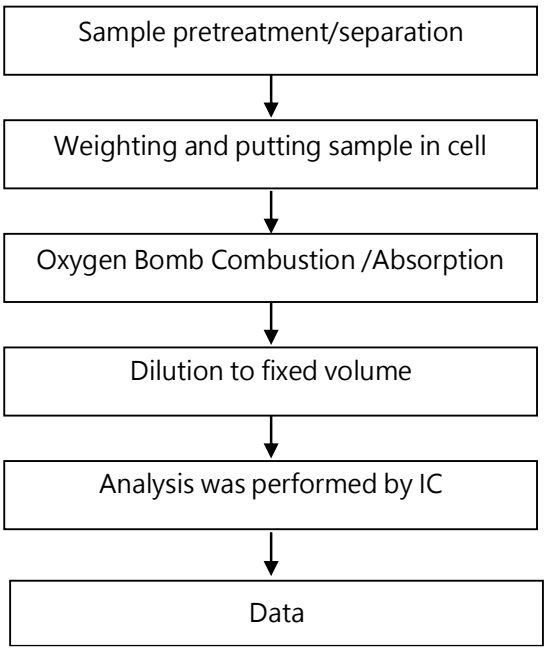
[redacted]

Analysis flow chart - PVC



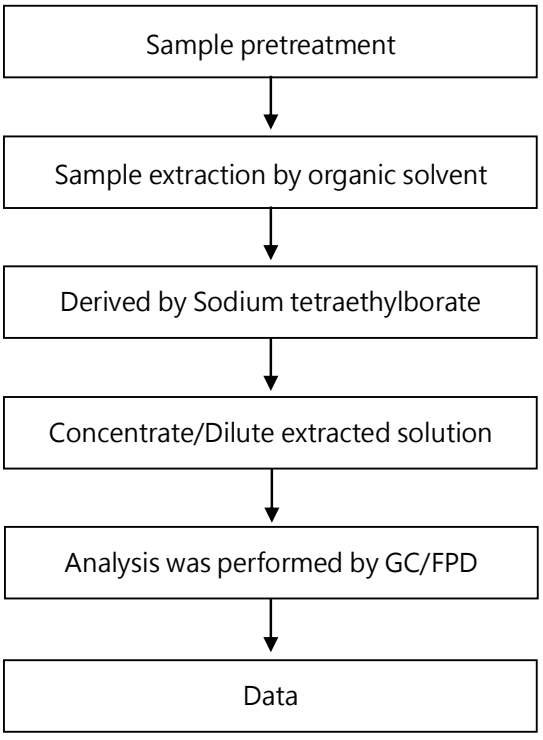
[redacted]

Analytical flow chart of Halogen



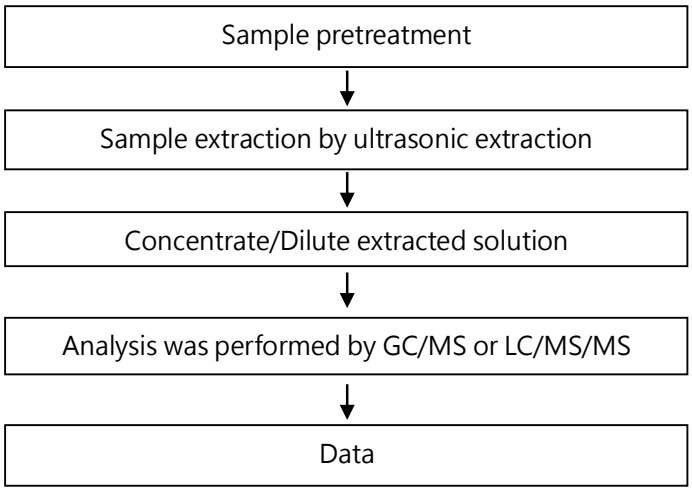
[redacted]

Analytical flow chart - Organic-Tin



[redacted]

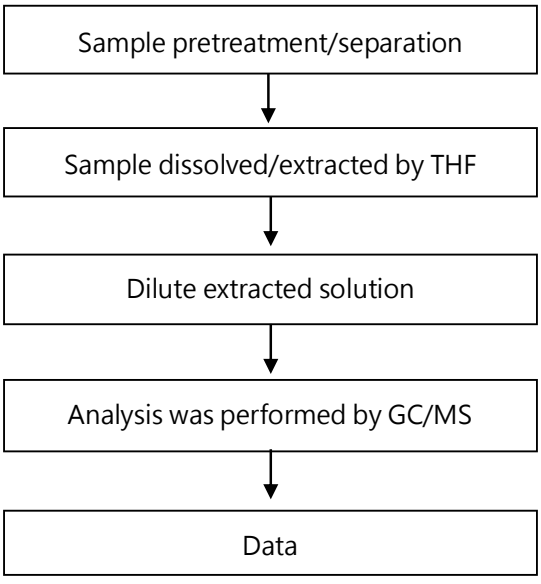
Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



[redacted]

Analytical flow chart of phthalate content

【Test method: IEC 62321-8】



[redacted]

[redacted]

** End of Report **

TI Report Number : 74957911

Component : Lead Frame Plating

Analysis Type : Other-2011/65/EU

Analysis Date : 05/09/2024

[redacted]

Test Report

No.: [redacted] Date: 21-May-2024

[redacted]

The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]
Sample Name : Au PLATING LAYER

==========

Sample Receiving Date : 09-May-2024
Testing Period : 09-May-2024 to 20-May-2024

Test Requested :
(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion :
(1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

Test Part Description

No.1 : PLATING LAYER OF COPPER COLORED METAL
No.2 : COPPER COLORED METAL (INCLUDING THE PLATING LAYER)

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Cadmium (Cd) (CAS No.: 7440-43-9)	IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	100
Lead (Pb) (CAS No.: 7439-92-1)		mg/kg	2	n.d.	---	1000
Mercury (Hg) (CAS No.: 7439-97-6)	IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	μg/cm²	0.1	n.d.	---	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Dibromobiphenyl		mg/kg	5	---	n.d.	-
Tribromobiphenyl		mg/kg	5	---	n.d.	-
Tetrabromobiphenyl		mg/kg	5	---	n.d.	-
Pentabromobiphenyl		mg/kg	5	---	n.d.	-
Hexabromobiphenyl		mg/kg	5	---	n.d.	-
Heptabromobiphenyl		mg/kg	5	---	n.d.	-
Octabromobiphenyl		mg/kg	5	---	n.d.	-
Nonabromobiphenyl		mg/kg	5	---	n.d.	-
Decabromobiphenyl		mg/kg	5	---	n.d.	-
Sum of PBBs		mg/kg	-	---	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	---	n.d.	-
Dibromodiphenyl ether		mg/kg	5	---	n.d.	-
Tribromodiphenyl ether		mg/kg	5	---	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	---	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	---	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	---	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	---	n.d.	-
Octabromodiphenyl ether		mg/kg	5	---	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	---	n.d.	-
Decabromodiphenyl ether		mg/kg	5	---	n.d.	-
Sum of PBDEs		mg/kg	-	---	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Antimony trioxide (Sb_2O_3) (CAS No.: 1309-64-4)	Calculated from the result of Antimony.	mg/kg	2▲	---	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	---	n.d.	-
Polychlorinated naphthalene (PCNs)		mg/kg	5	---	n.d.	-
Polychlorinated terphenyls (PCTs)		mg/kg	0.5	---	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Medium Chain Chlorinated Paraffins(C14-C17) (MCCP) (CAS No.: 85535-85-9)	With reference to ISO 18219-2: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	With reference to RSTS-E&E-121, analysis was performed by LC/MS.	mg/kg	10	---	n.d.	-
Bisphenol A (CAS No.: 80-05-7)	With reference to RSTS-CHEM-239-1, analysis was performed by LC/MS/MS.	mg/kg	1	---	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	---	Negative	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	---	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	---	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	---	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	---	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	---	n.d.	-
Triphenyl tin (TPT)		mg/kg	0.03	---	n.d.	-
Dibutyl tin (DBT)		mg/kg	0.03	---	n.d.	-
Dioctyl tin (DOT)		mg/kg	0.03	---	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	---	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Perfluorooctanoic acid (PFOA) and it's salt (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	1000
Butyl benzyl phthalate (BBP)		mg/kg	50	---	n.d.	1000
Diisobutyl phthalate (DIBP)		mg/kg	50	---	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)		mg/kg	50	---	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	---	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)		mg/kg	50	---	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)		mg/kg	50	---	n.d.	-
Di-n-pentyl phthalate (DNPP) (CAS No.: 131-18-0)		mg/kg	50	---	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)		mg/kg	50	---	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)		mg/kg	50	---	n.d.	-
N-pentyl iso-pentyl phthalate (NPIPP) (CAS No.: 776297-69-9)		mg/kg	50	---	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Diisopentyl phthalate (DIPP) (CAS No.: 605-50-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Phosphorus (P) (CAS No.: 7723-14-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	7.09	-

Note：

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. "---" = Not Conducted
6. **= Qualitative analysis (No Unit)
7. Negative = Undetectable ; Positive = Detectable
8. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI).
   b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
9. ▲ : The MDL was evaluated for element / tested substance.
   Conversion Formula：AX = A × F

AX	A	F
Antimony trioxide (Sb_2O_3)	Antimony	1.1971
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

Parameter Conversion Table：https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others

[redacted]

10. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

[redacted]

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	TetrabutylAmmonium perfluorooctanesulfonate (PFOS-$N(C_4H_9)_4$)	111873-33-7
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5
	Cobalt perfluorooctanoate (PFOA-Co)	35965-01-6

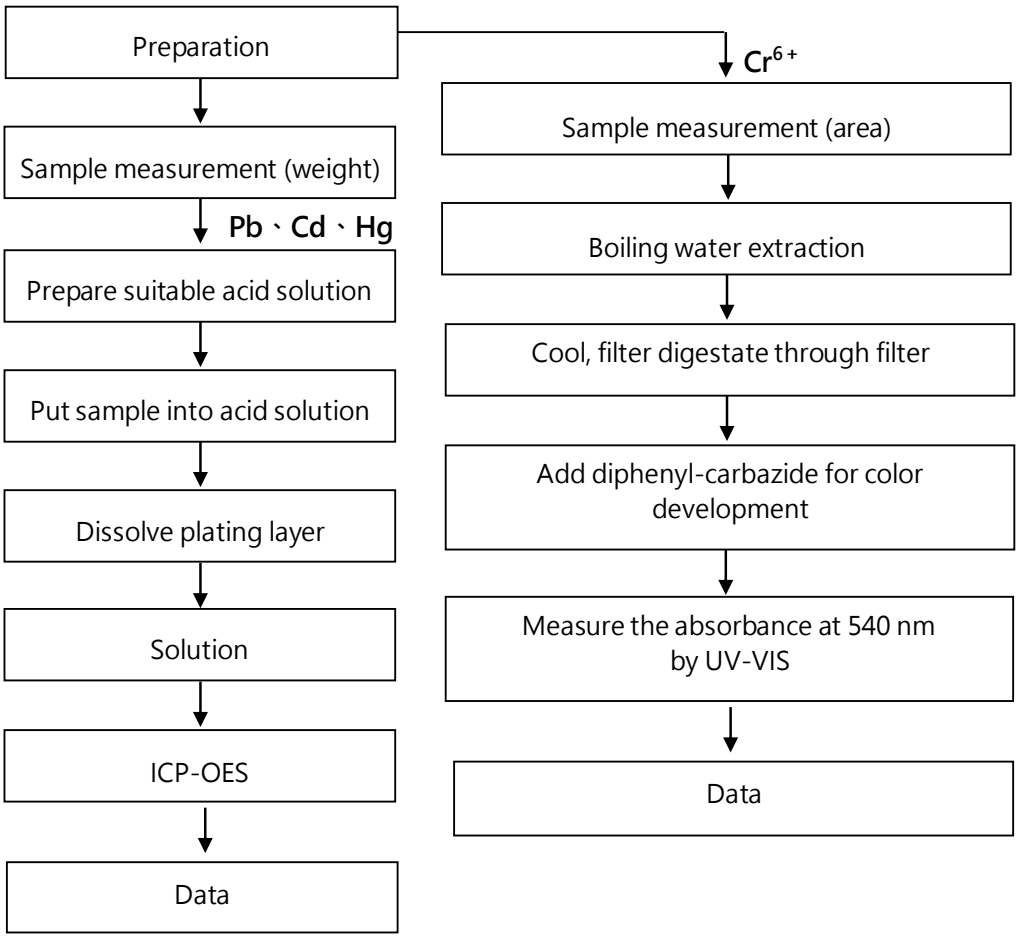
[redacted]

Group Name	Substance Name	CAS No.
PFOA, its salts & derivatives	Cesium perfluorooctanoate (PFOA-Cs)	17125-60-9
	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) (PFOA-Cr(3^{+}))	68141-02-6
	Pentadecafluorooctanoic acid--piperazine (2/1)PFOA-NH($C_4H_{10}N$)	423-52-9
	Pentadecafluorooctanoate (anion)	45285-51-6
	Perfluorooctanoic Anhydride	33496-48-9

[redacted]

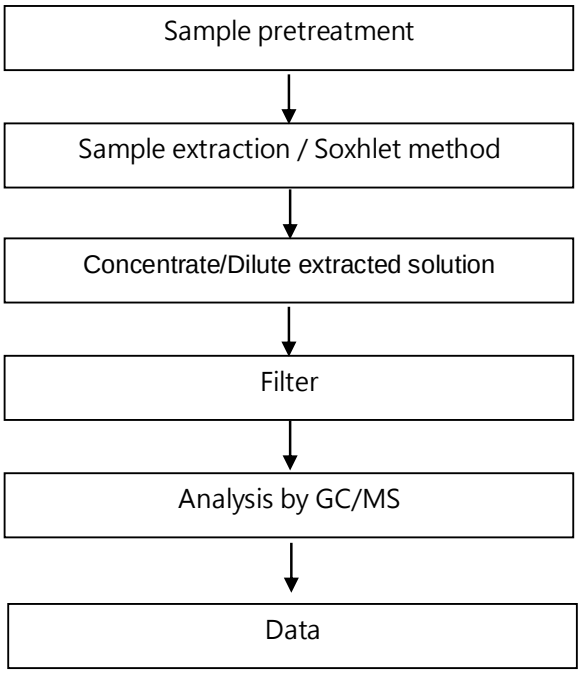
Flow Chart of Stripping method for metal analysis

The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



[redacted]

PBB/PBDE analytical FLOW CHART

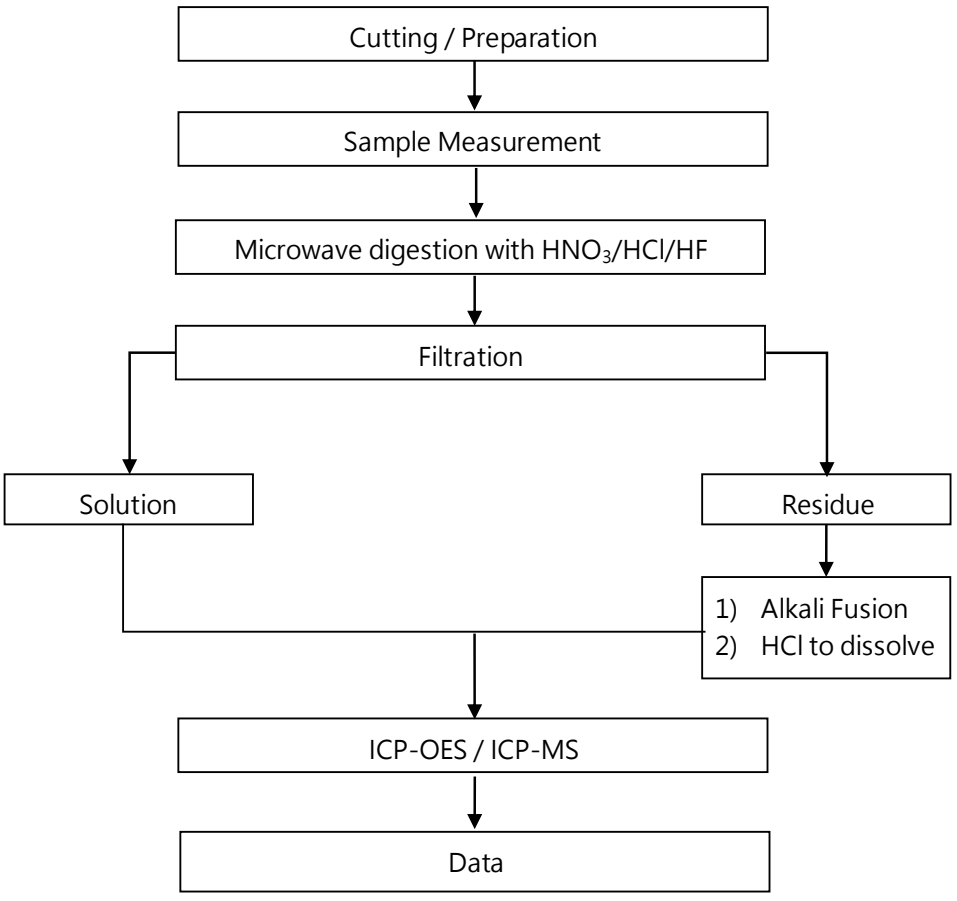


[redacted]

Analytical flow chart of Elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

【Reference method：US EPA 3051、US EPA 3052】

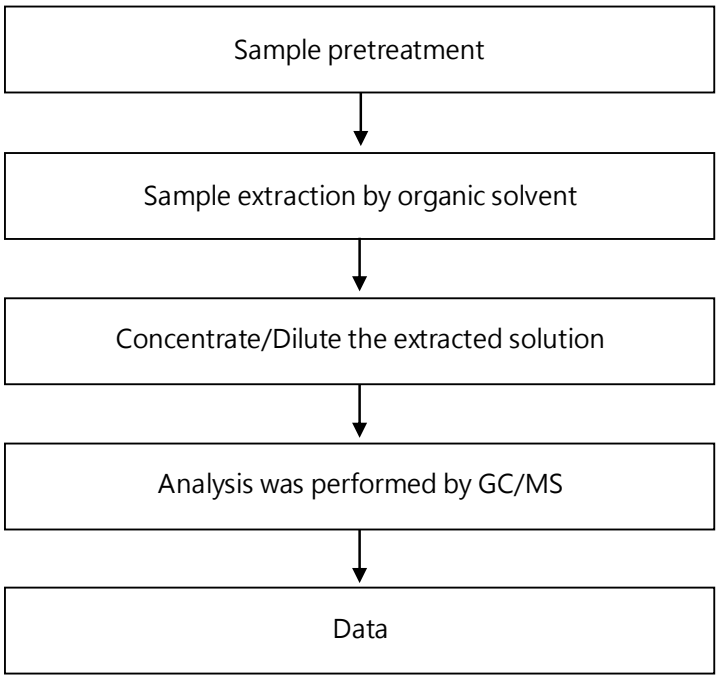


* US EPA 3051 method does not add HF.

[redacted]

Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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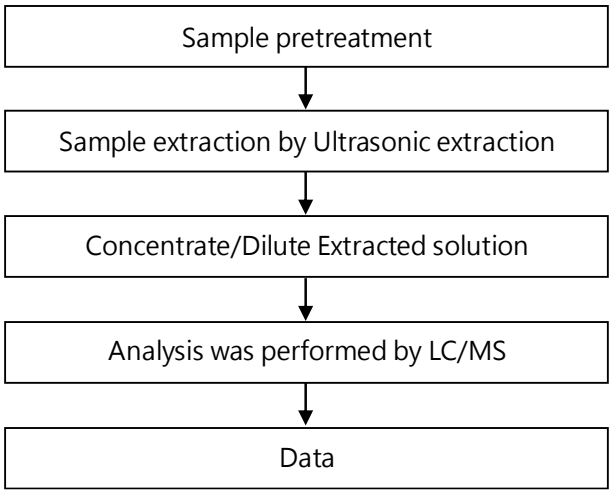
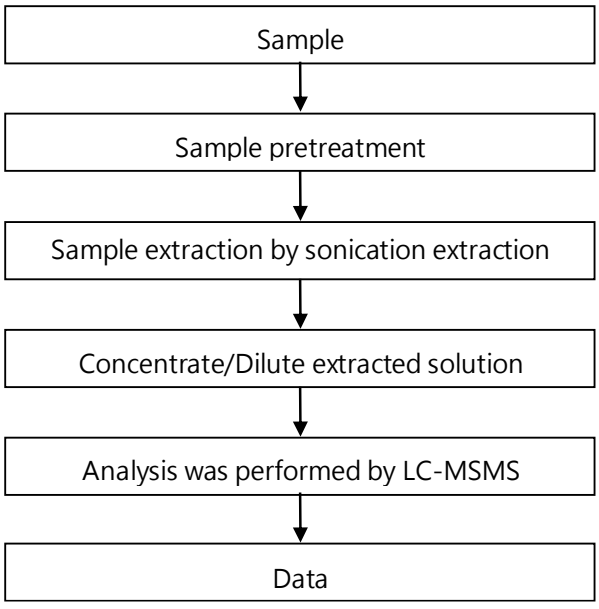
TBBP-A analytical flow chart



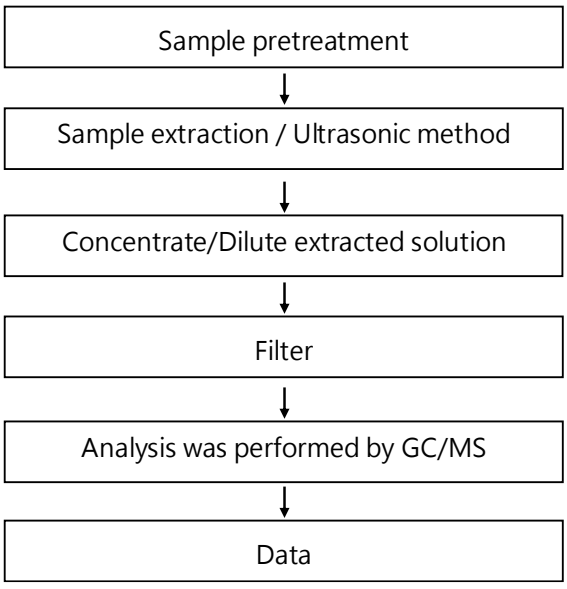
[redacted]

BPA analytical flow chart



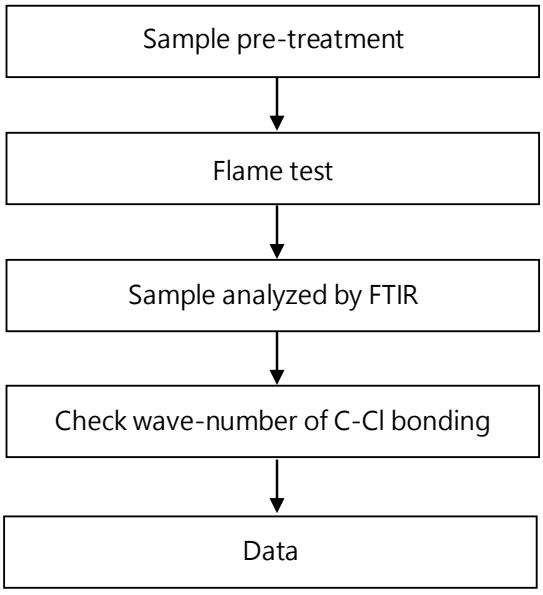
[redacted]

Analytical flow chart - HBCDD



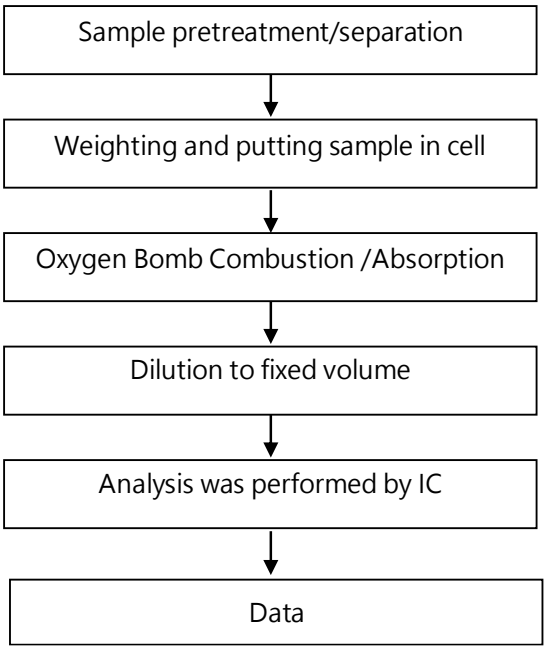
[redacted]

Analysis flow chart - PVC



[redacted]

Analytical flow chart of Halogen



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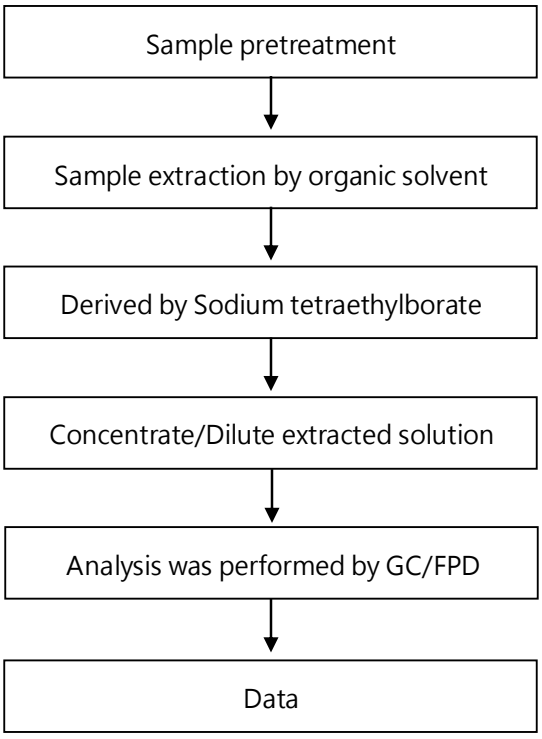
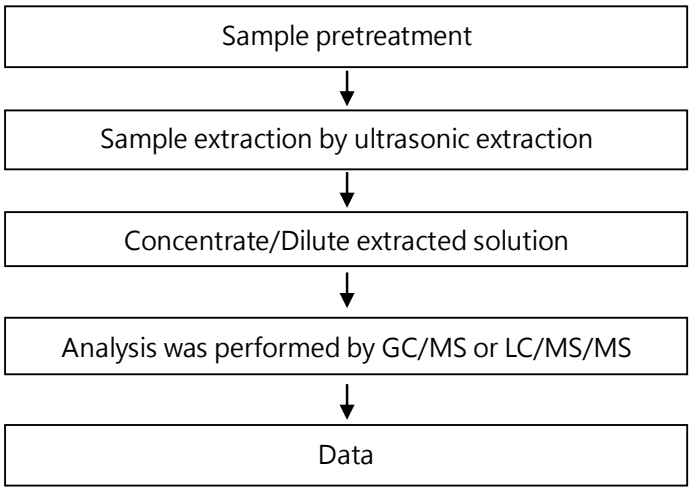
Analytical flow chart - Organic-Tin



[redacted]

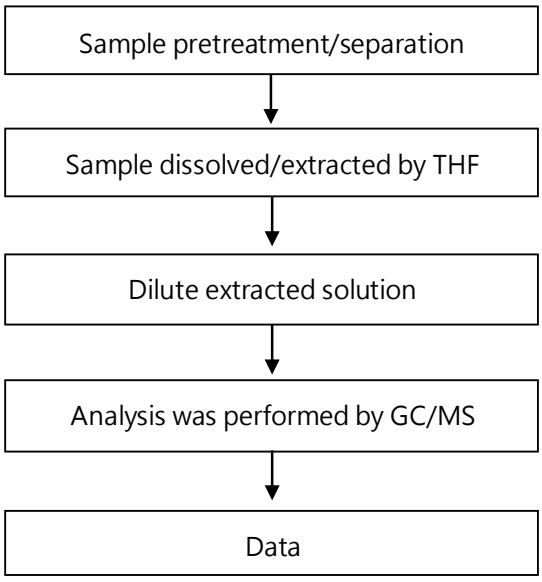
Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



[redacted]

Analytical flow chart of phthalate content

【Test method: IEC 62321-8】



[redacted]

[redacted]

** End of Report **

TI Report Number : 74957913

Component : Lead Frame Plating

Analysis Type : Other-2011/65/EU

Analysis Date : 05/09/2024

[redacted]

Test Report

No.: [redacted] Date: 21-May-2024

[redacted]

The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]
Sample Name : Ni PLATING LAYER

==========

Sample Receiving Date : 09-May-2024
Testing Period : 09-May-2024 to 20-May-2024

Test Requested :
(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion :
(1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

Test Part Description

No.1 : PLATING LAYER OF SILVER COLORED METAL
No.2 : COPPER/SILVER COLORED METAL (INCLUDING THE PLATING LAYER)

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Cadmium (Cd) (CAS No.: 7440-43-9)	IEC 62321-5: 2013 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	100
Lead (Pb) (CAS No.: 7439-92-1)		mg/kg	2	n.d.	---	1000
Mercury (Hg) (CAS No.: 7439-97-6)	IEC 62321-4: 2013+AMD1: 2017 application of modified digestion by surface etching, analysis was performed by ICP-OES.	mg/kg	2	n.d.	---	1000
Hexavalent Chromium Cr(VI) (#2)	With reference to IEC 62321-7-1: 2015, analysis was performed by UV-VIS.	μg/cm²	0.1	n.d.	---	-
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Dibromobiphenyl		mg/kg	5	---	n.d.	-
Tribromobiphenyl		mg/kg	5	---	n.d.	-
Tetrabromobiphenyl		mg/kg	5	---	n.d.	-
Pentabromobiphenyl		mg/kg	5	---	n.d.	-
Hexabromobiphenyl		mg/kg	5	---	n.d.	-
Heptabromobiphenyl		mg/kg	5	---	n.d.	-
Octabromobiphenyl		mg/kg	5	---	n.d.	-
Nonabromobiphenyl		mg/kg	5	---	n.d.	-
Decabromobiphenyl		mg/kg	5	---	n.d.	-
Sum of PBBs		mg/kg	-	---	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	---	n.d.	-
Dibromodiphenyl ether		mg/kg	5	---	n.d.	-
Tribromodiphenyl ether		mg/kg	5	---	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	---	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	---	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	---	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	---	n.d.	-
Octabromodiphenyl ether		mg/kg	5	---	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	---	n.d.	-
Decabromodiphenyl ether		mg/kg	5	---	n.d.	-
Sum of PBDEs		mg/kg	-	---	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Antimony trioxide (Sb_2O_3) (CAS No.: 1309-64-4)	Calculated from the result of Antimony.	mg/kg	2▲	---	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	n.d.	-
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	---	n.d.	-
Polychlorinated naphthalene (PCNs)		mg/kg	5	---	n.d.	-
Polychlorinated terphenyls (PCTs)		mg/kg	0.5	---	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Medium Chain Chlorinated Paraffins(C14-C17) (MCCP) (CAS No.: 85535-85-9)	With reference to ISO 18219-2: 2021, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	With reference to RSTS-E&E-121, analysis was performed by LC/MS.	mg/kg	10	---	n.d.	-
Bisphenol A (CAS No.: 80-05-7)	With reference to RSTS-CHEM-239-1, analysis was performed by LC/MS/MS.	mg/kg	1	---	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	---	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	---	Negative	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	---	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	---	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	---	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	---	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	---	n.d.	-
Triphenyl tin (TPT)		mg/kg	0.03	---	n.d.	-
Dibutyl tin (DBT)		mg/kg	0.03	---	n.d.	-
Dioctyl tin (DOT)		mg/kg	0.03	---	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	---	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Perfluorooctanoic acid (PFOA) and it's salt (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	---	n.d.	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	1000
Butyl benzyl phthalate (BBP)		mg/kg	50	---	n.d.	1000
Diisobutyl phthalate (DIBP)		mg/kg	50	---	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)		mg/kg	50	---	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)		mg/kg	50	---	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)		mg/kg	50	---	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)		mg/kg	50	---	n.d.	-
Di-n-pentyl phthalate (DNPP) (CAS No.: 131-18-0)		mg/kg	50	---	n.d.	-
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)		mg/kg	50	---	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)		mg/kg	50	---	n.d.	-
N-pentyl iso-pentyl phthalate (NPIPP) (CAS No.: 776297-69-9)		mg/kg	50	---	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result		Limit
				No.1	No.2	
Diisopentyl phthalate (DIPP) (CAS No.: 605-50-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	---	n.d.	-
Phosphorus (P) (CAS No.: 7723-14-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	---	6.53	-

Note：

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. "---" = Not Conducted
6. **= Qualitative analysis (No Unit)
7. Negative = Undetectable ; Positive = Detectable
8. (#2) =
   a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 μg/cm². The sample coating is considered to contain Cr(VI).
   b. The sample is negative for Cr(VI) if Cr(VI) is n.d. (concentration less than 0.10 μg/cm²). The coating is considered a non-Cr(VI) based coating
   c. The result between 0.10 μg/cm² and 0.13 μg/cm² is considered to be inconclusive - unavoidable coating variations may influence the determination.
9. ▲ : The MDL was evaluated for element / tested substance.
   Conversion Formula：AX = A × F

AX	A	F
Antimony trioxide (Sb_2O_3)	Antimony	1.1971
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

Parameter Conversion Table：https://eecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others

[redacted]

10. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

[redacted]

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt (PFOS-NH_4)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt (PFOS-$NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt (PFOS-$N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	TetrabutylAmmonium perfluorooctanesulfonate (PFOS-$N(C_4H_9)_4$)	111873-33-7
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5
	Cobalt perfluorooctanoate (PFOA-Co)	35965-01-6

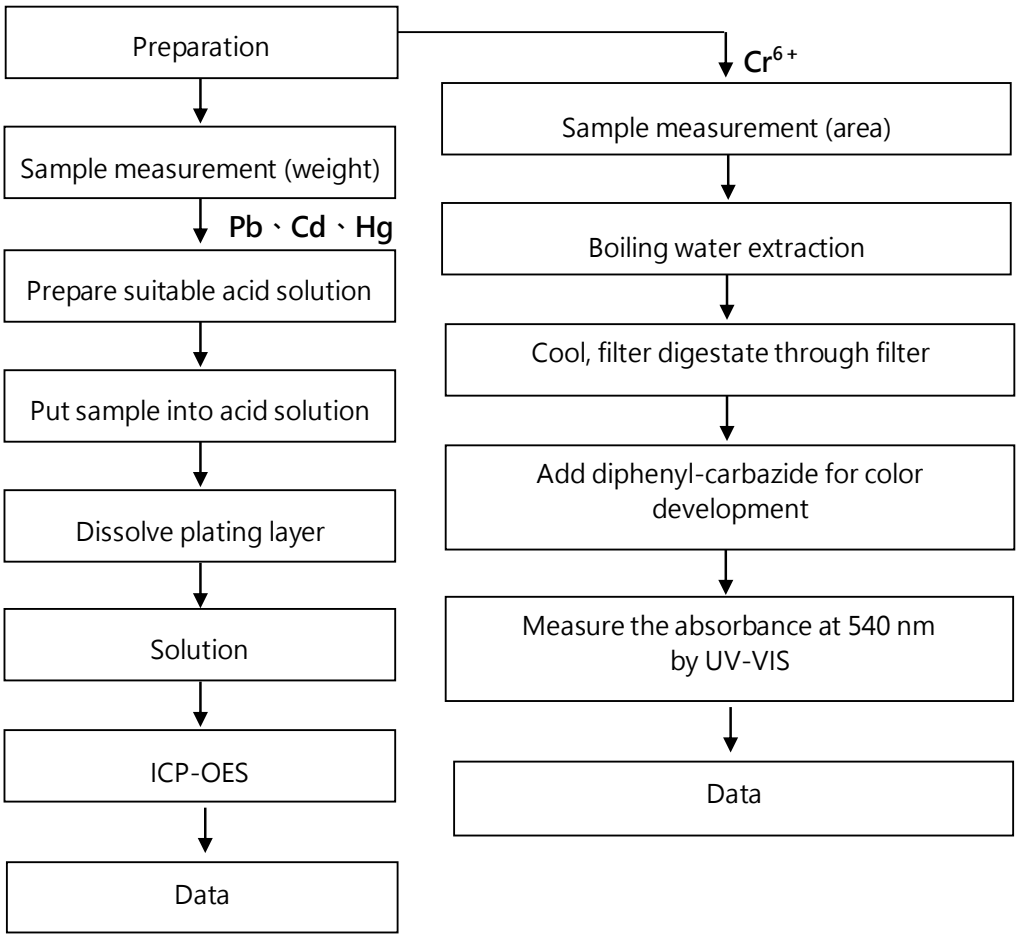
[redacted]

Group Name	Substance Name	CAS No.
PFOA, its salts & derivatives	Cesium perfluorooctanoate (PFOA-Cs)	17125-60-9
	Octanoic acid, 2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-pentadecafluoro-, chromium(3+) (PFOA-Cr(3^{+}))	68141-02-6
	Pentadecafluorooctanoic acid--piperazine (2/1)PFOA-NH($C_4H_{10}N$)	423-52-9
	Pentadecafluorooctanoate (anion)	45285-51-6
	Perfluorooctanoic Anhydride	33496-48-9

[redacted]

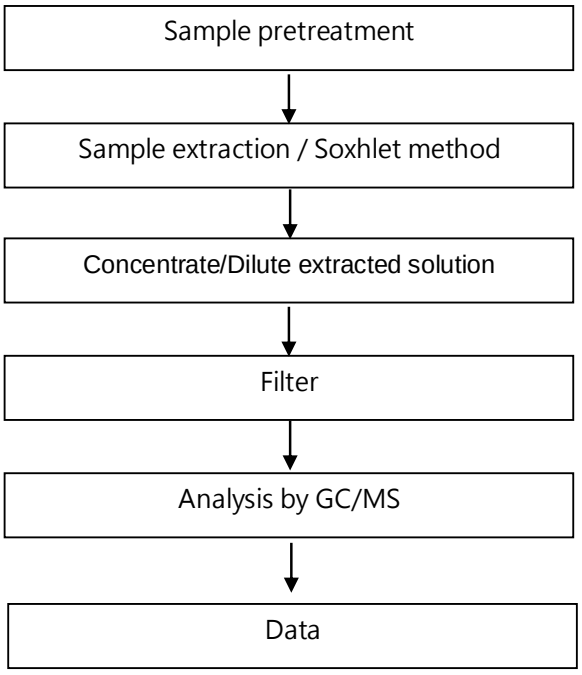
Flow Chart of Stripping method for metal analysis

The plating layer of samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr^{6+} test method excluded)



[redacted]

PBB/PBDE analytical FLOW CHART

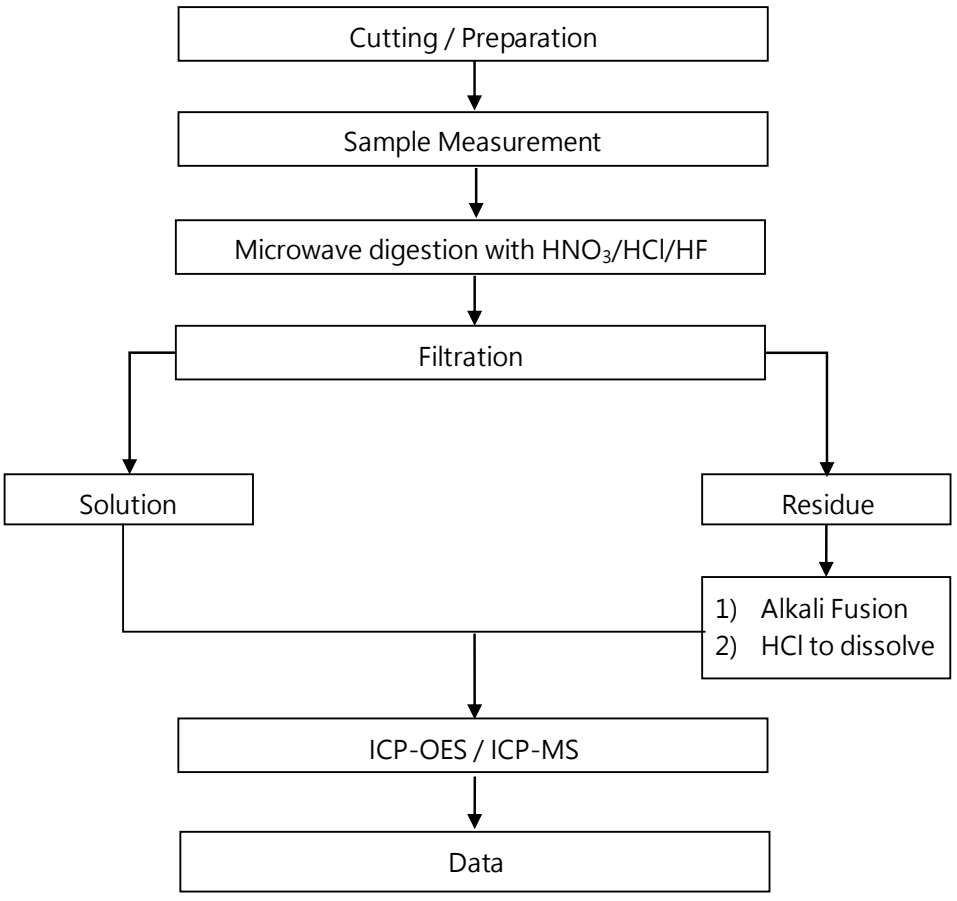


[redacted]

Analytical flow chart of Elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

【Reference method：US EPA 3051、US EPA 3052】

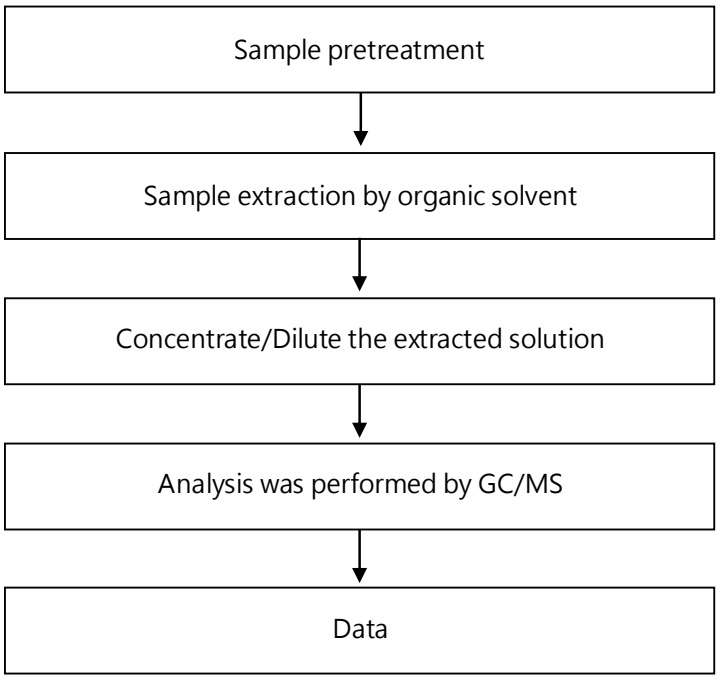


* US EPA 3051 method does not add HF.

[redacted]

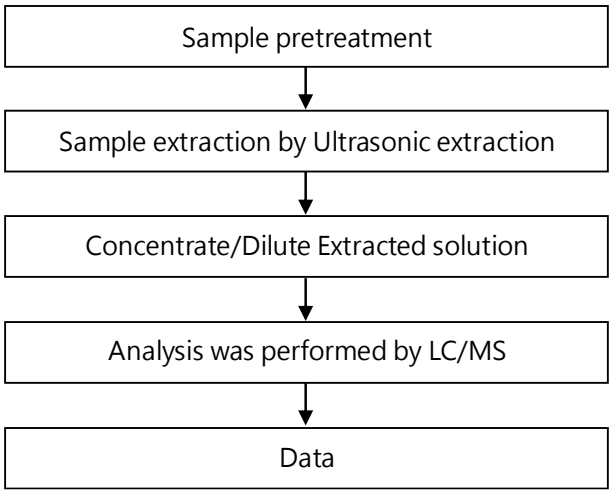
Analytical flow chart

* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



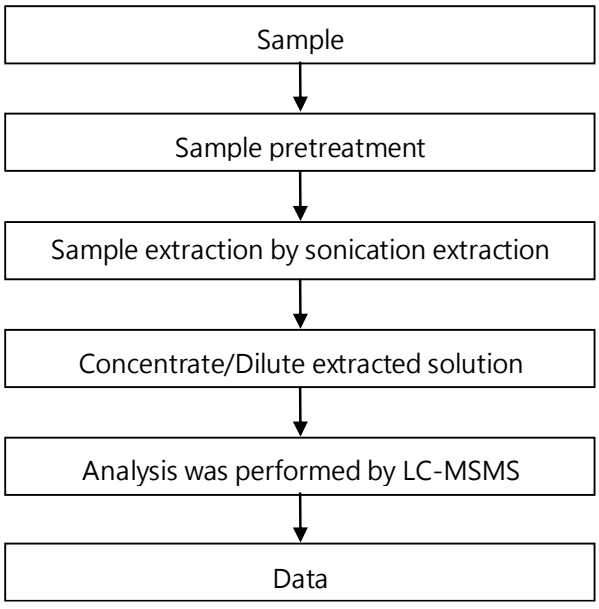
[redacted]

TBBP-A analytical flow chart



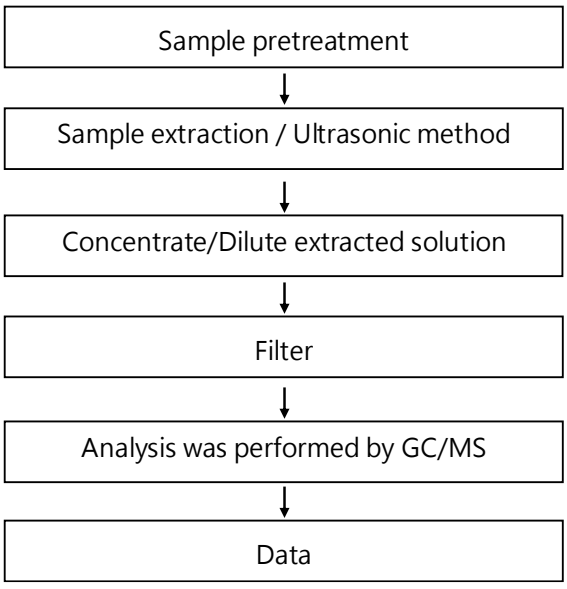
[redacted]

BPA analytical flow chart



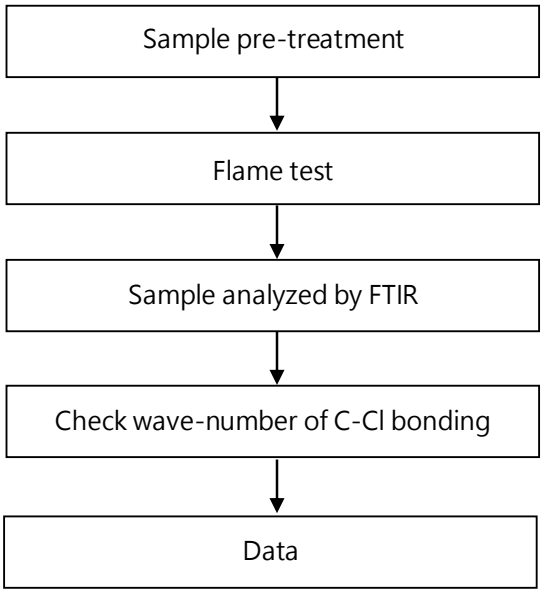
[redacted]

Analytical flow chart - HBCDD



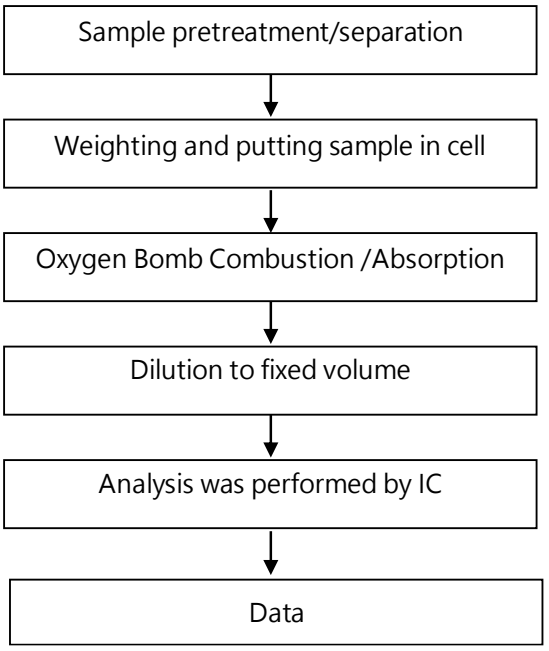
[redacted]

Analysis flow chart - PVC



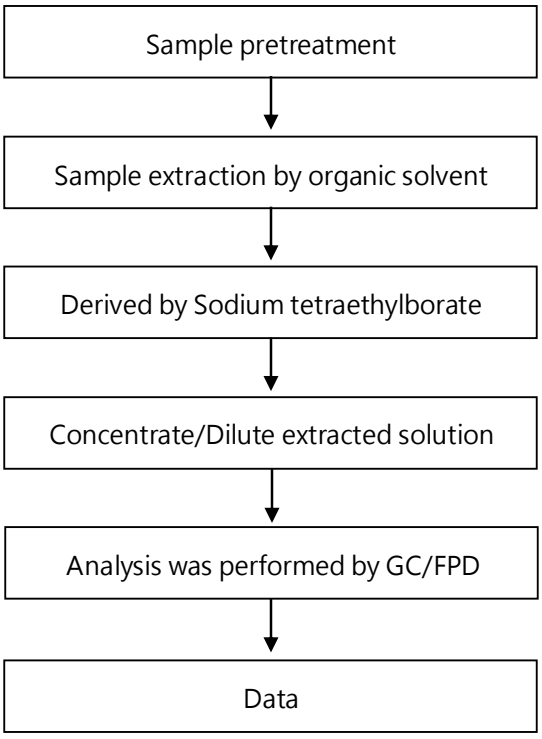
[redacted]

Analytical flow chart of Halogen



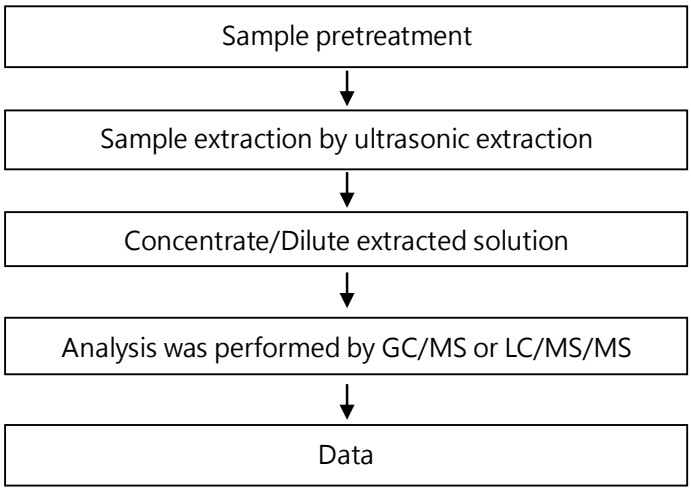
[redacted]

Analytical flow chart - Organic-Tin



[redacted]

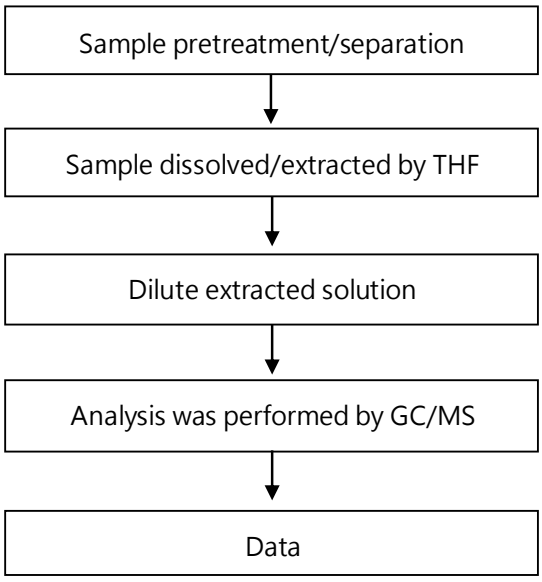
Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



[redacted]

Analytical flow chart of phthalate content

【Test method: IEC 62321-8】



[redacted]

[redacted]

** End of Report **

TI Report Number : 76624012

Component : Die Attach Adhesive

Analysis Type : Halogens

Analysis Date : 04/18/2024

Test Report

No.: [redacted] **Date:** Apr 18, 2024

Client Name: [redacted]

Client Address: [redacted]

Sample Name: [redacted]

Style/Item No.: [redacted]

Sample Description: Adhesive

The above sample(s) and information were provided by the client.

SGS Job No.: SHP24-010526

Sample Receiving Date: Apr 11, 2024

Testing Period: Apr 11, 2024 ~ Apr 18, 2024

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requested	Conclusion
Other items : - Antimony (Sb)	See Results

[redacted]

[redacted]

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A11	SHA24-0070636-0001.C011	Gray paste

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

Test Item(s)	Method	Unit	MDL	Result	Limit
				A11	
Antimony (Sb)	With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.	mg/kg	2	ND	-

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (*w*=0) stated in ILAC-G8:09/2019.

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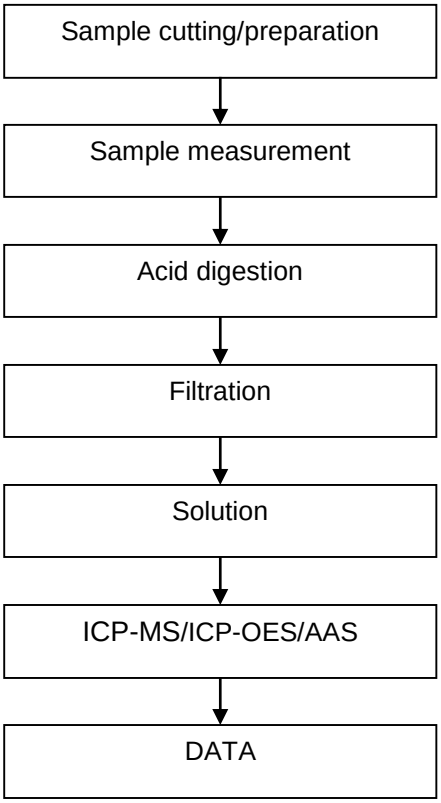
Elements Testing Flow Chart



[redacted]

*** End of Report ***

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TI Report Number : 76624010

Component : Die Attach Adhesive

Analysis Type : Halogens

Analysis Date : 04/18/2024

Test Report

No.: [redacted] **Date:** Apr 18, 2024

Client Name: [redacted]

Client Address: [redacted]

Sample Name: [redacted]

Style/Item No.: [redacted]

Sample Description: Adhesive

The above sample(s) and information were provided by the client.

SGS Job No.: SHP24-010526

Sample Receiving Date: Apr 11, 2024

Testing Period: Apr 11, 2024 ~ Apr 18, 2024

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requested	Conclusion
Other items : - Phosphorus (P)	See Results

[redacted]

[redacted]

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A11	SHA24-0070636-0001.C011	Gray paste

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

Test Item(s)	Method	Unit	MDL	Result	Limit
				A11	
Phosphorus (P)	With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.	mg/kg	2	ND	-

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (*w*=0) stated in ILAC-G8:09/2019.

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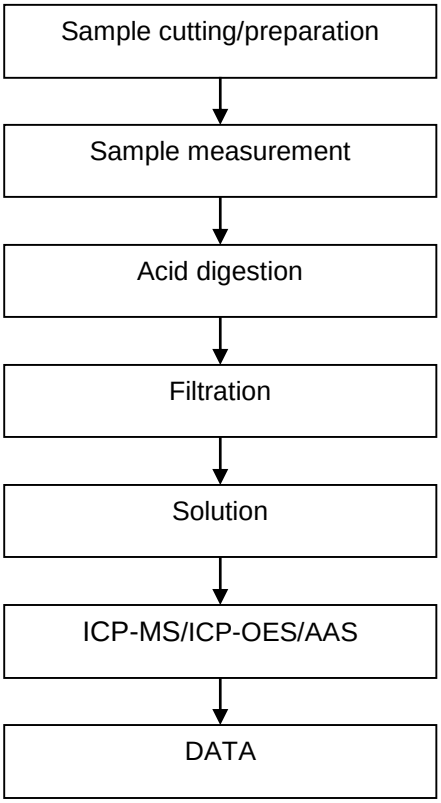
Elements Testing Flow Chart



[redacted]

*** End of Report ***

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TI Report Number : 76624008

Component : Die Attach Adhesive

Analysis Type : RoHS 10

Analysis Date : 04/18/2024

Test Report

No.: [redacted] **Date:** Apr 18, 2024

Client Name: [redacted]

Client Address: [redacted]

Sample Name: [redacted]

Style/Item No.: [redacted]

Sample Description: Adhesive

The above sample(s) and information were provided by the client.

SGS Job No.: SHP24-010526

Sample Receiving Date: Apr 11, 2024

Testing Period: Apr 11, 2024 ~ Apr 18, 2024

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requested	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
Other items : - Hexabromocyclododecane (HBCDD) - Beryllium (Be) - Phthalates Content	See Results

[redacted]

[redacted]

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Test Result(s):

Test Part Description：

SN ID	Sample No.	SGS Sample ID	Description
SN1	A11	SHA24-0070636-0001.C011	Gray paste

Remarks:

(1) 1 mg/kg = 1 ppm = 0.0001%
(2) MDL = Method Detection Limit
(3) ND = Not Detected (< MDL)
(4) "-" = Not Regulated

Test Item(s)	Method	Unit	MDL	Result	Limit
				A11	
Cadmium(Cd)	With reference to IEC 62321-5:2013, analysis was performed by ICP-OES.	mg/kg	2	ND	100
Lead(Pb)	With reference to IEC 62321-5:2013, analysis was performed by ICP-OES.	mg/kg	2	ND	1000
Mercury(Hg)	With reference to IEC 62321-4:2013+AMD1:2017, analysis was performed by ICP-OES.	mg/kg	2	ND	1000
Hexavalent Chromium(Cr(VI))	With reference to IEC 62321-7-2:2017, analysis was performed by UV-Vis.	mg/kg	8	ND	1000
Sum of PBBs	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	-	ND	1000
Monobromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Dibromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Tribromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Tetrabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Pentabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Hexabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Heptabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-

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Test Item(s)	Method	Unit	MDL	Result A11	Limit
Octabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Nonabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Decabromobiphenyl	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Sum of PBDEs	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	-	ND	1000
Monobromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Dibromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Tribromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Tetrabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Pentabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Hexabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Heptabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Octabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Nonabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Decabromodiphenyl ether	With reference to IEC 62321-6:2015, analysis was performed by GC-MS.	mg/kg	5	ND	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	1000
Butyl benzyl phthalate (BBP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	1000

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Test Item(s)	Method	Unit	MDL	Result A11	Limit
Bis (2-ethylhexyl) phthalate (DEHP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	1000
Diisobutyl Phthalates (DIBP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	1000

Test Item(s)	Method	Unit	MDL	Result A11	Limit
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β-HBCDD, γ-HBCDD)	With reference to IEC 62321-9:2021, analysis was performed by GC-MS.	mg/kg	20	ND	-
Beryllium (Be)	With reference to US EPA 3052:1996, analysis was performed by ICP-OES/AAS.	mg/kg	2	ND	-
Diisononyl Phthalate (DINP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	-
Di-n-octyl Phthalate (DNOP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	-
Diisodecyl Phthalate (DIDP)	With reference to IEC 62321-8:2017, analysis was performed by GC-MS.	mg/kg	50	ND	-

Notes:
(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
(2) IEC 62321 series is equivalent to EN 62321 series.
(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (*w*=0) stated in ILAC-G8:09/2019.

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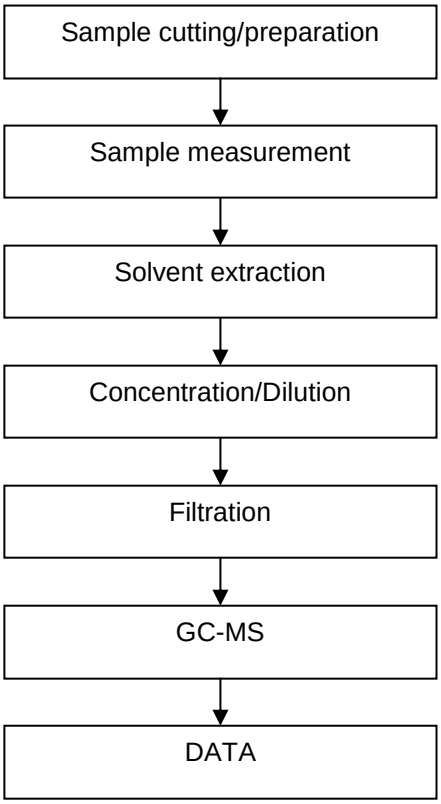
HBCDD Testing Flow Chart



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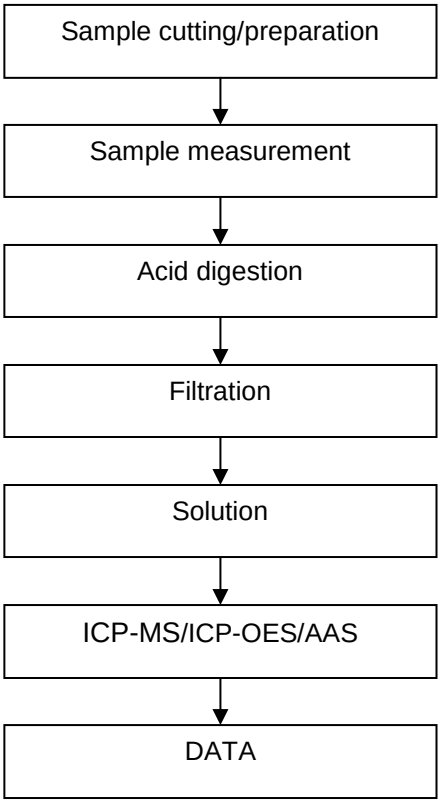
Elements Testing Flow Chart



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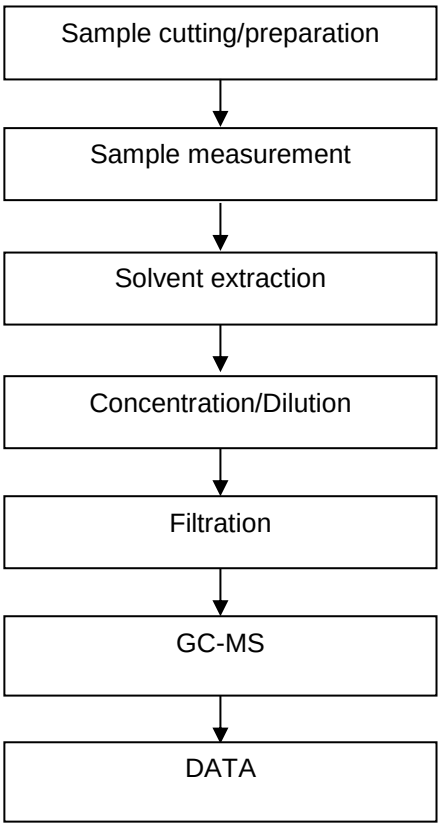
Phthalates Testing Flow Chart



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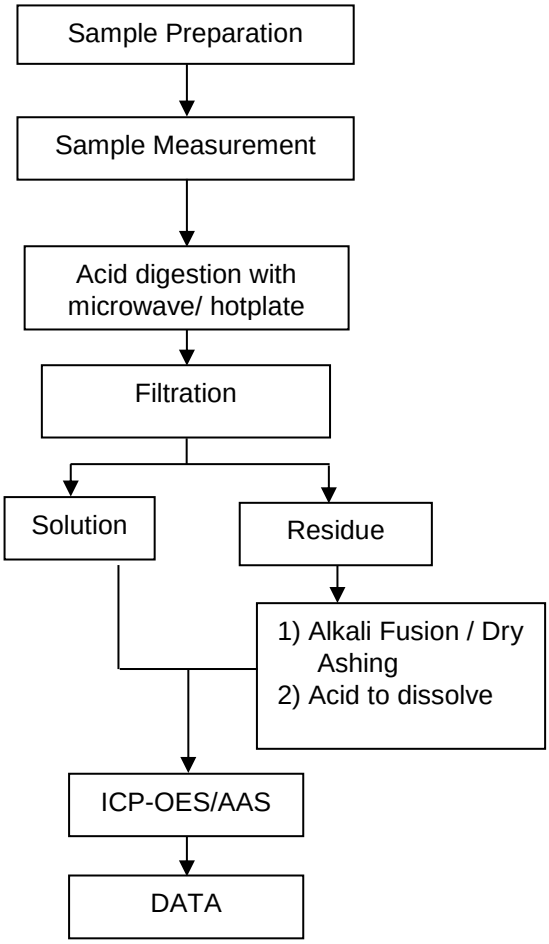
中国·上海·徐汇区宜山路889号3号楼 邮编: 200233 t HL (86–21) 61402594 f HL (86–21)61156899 e sgs.china@sgs.com

ATTACHMENTS

Elements Testing Flow Chart

These samples were dissolved totally by pre-conditioning method according to below flow chart.



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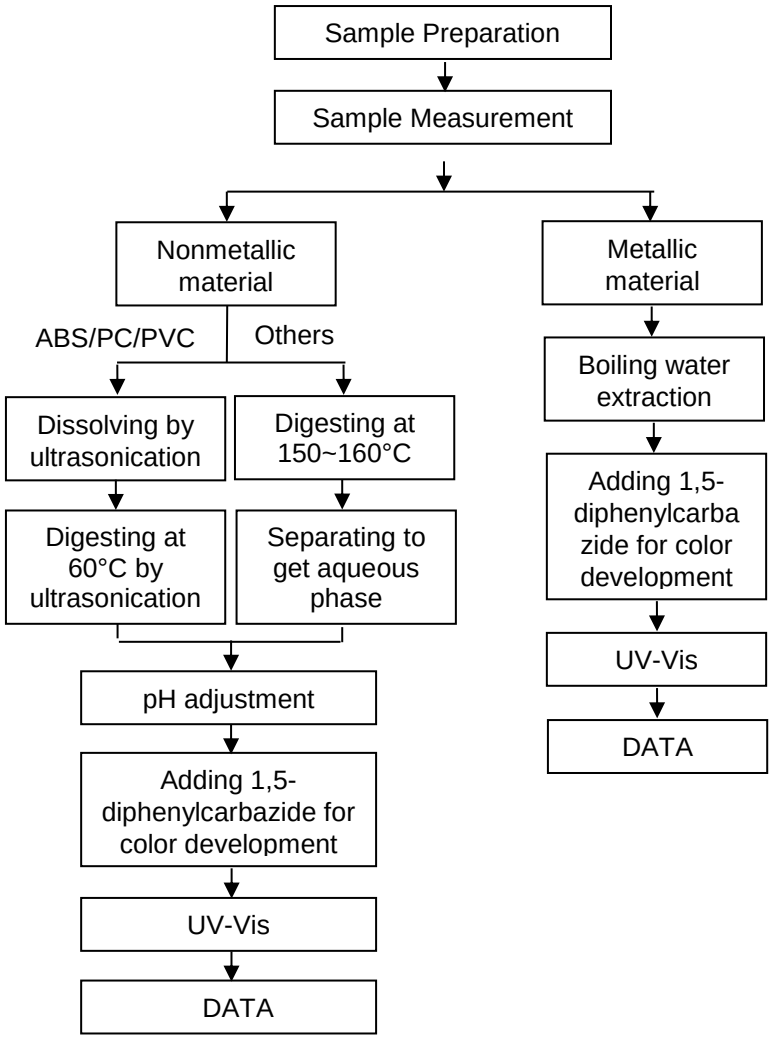
ATTACHMENTS

Hexavalent Chromium (Cr(VI)) Testing Flow Chart



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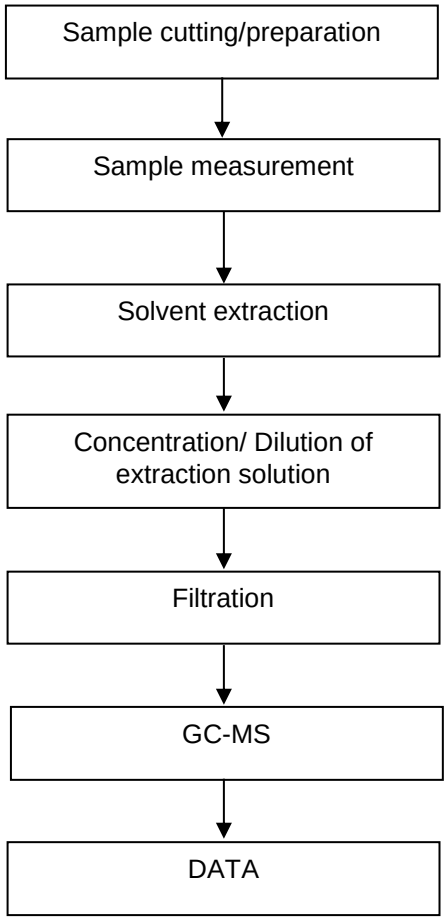
ATTACHMENTS

PBB/PBDE Testing Flow Chart



[redacted]

*** End of Report ***

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TI Report Number : 72102542

Component : Mold Compound

Analysis Type : RoHS 10 & Halogens

Analysis Date : 04/08/2024

[redacted]

Test Report

No.: [redacted] Date: 08-Apr-2024

[redacted]

The following sample(s) was/were submitted and identified by the applicant as:

Sample Submitted By : [redacted]
Sample Name : EPOXY MOLDING COMPOUND
Style/Item No. : [redacted]

==========

Sample Receiving Date : 29-Mar-2024
Testing Period : 29-Mar-2024 to 08-Apr-2024

Test Requested :
(1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion :
(1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

[redacted]

[redacted]

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No.61, Kai-Fa Road, Nanzih Dist., Kaohsiung, Taiwan

[redacted]

TEST PART DESCRIPTION

No.1 : BLACK EPOXY MOLDING COMPOUND

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Cadmium (Cd)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Mercury (Hg)	With reference to IEC 62321-4: 2013+ AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI)	With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.	mg/kg	8	n.d.	1000
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	1000
Monobromodiphenyl ether	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	-
Decabromodiphenyl ether		mg/kg	5	n.d.	-
Sum of PBDEs		mg/kg	-	n.d.	1000

[redacted]

Test Item(s)	Method	Unit	MDL	Result No.1	Limit
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α-HBCDD, β- HBCDD, γ- HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Perfluorooctanoic acid (PFOA) and it's salt (CAS No.: 335-67-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)		mg/kg	50	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)		mg/kg	50	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)		mg/kg	50	n.d.	-
Dibutyl phthalate (DBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Butyl benzyl phthalate (BBP)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisopentyl phthalate (DIPP) (CAS No.: 605-50-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-

[redacted]

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Di-n-hexyl phthalate (DNHP) (CAS No.: 84-75-3)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-pentyl phthalate (DPP) (CAS No.: 131-18-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-

Note：

1. mg/kg = ppm；0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. Unless otherwise stated , the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

[redacted]

PFAS Remark：

The quantitative technology of PFAS is to analyze the specific structure of PFAS substances. However, PFAS acid and its salts with the same carbon number group have the same specific structure that can be identified. The tested results of the analyzed specific structure cannot be distinguished to identify the contribution from PFAS acid or its salts. Therefore, the tested results display the sum of concentrations of PFAS acids and its salts with the same carbon number group. The concentration of PFAS substances in the below table have been included in the tested results, please refer to the table for relevant information: (The listed PFAS substances are examples only, it do not include all PFAS salts with the same carbon number group.)

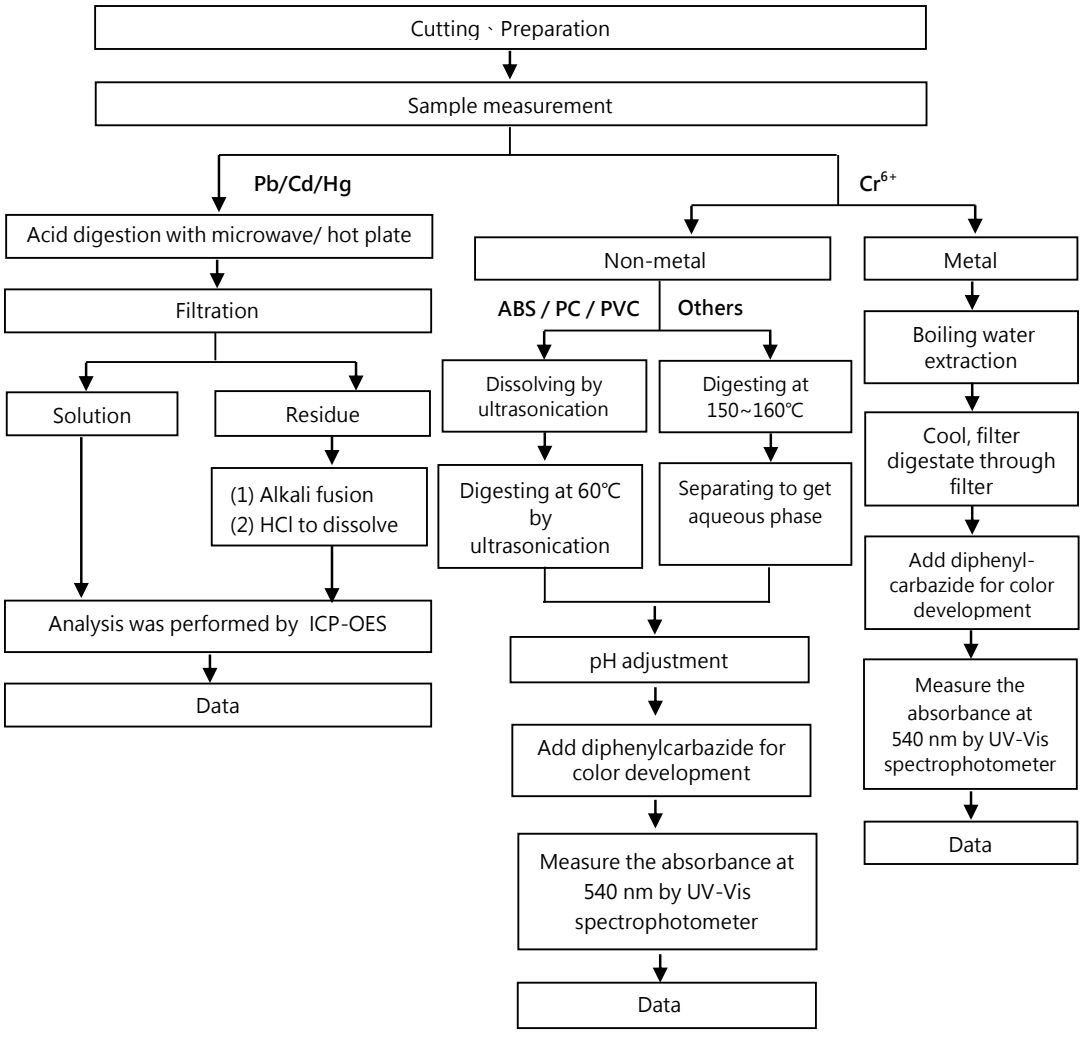
Group Name	Substance Name	CAS No.
PFOS, its salts & derivatives	Perfluorooctane sulfonates (PFOS)	1763-23-1
	Potassium perfluorooctanesulfonate (PFOS-K)	2795-39-3
	Perfluorooctanesulfonic acid, lithium salt (PFOS-Li)	29457-72-5
	Perfluorooctanesulfonic acid, ammonium salt ($PFOS\text{-}NH_4$)	29081-56-9
	Perfluorooctane sulfonate diethanolamine salt ($PFOS\text{-}NH(OH)_2$)	70225-14-8
	Perfluorooctanesulfonic acid,tetraethylammonium salt ($PFOS\text{-}N(C_2H_5)_4$)	56773-42-3
	N-decyl-N,N-dimethyldecan-1-aminium 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonate (PFOS-DDA)	251099-16-8
	Perfluorooctane sulfonyl fluoride (POSF)	307-35-7
	Perfluorooctanesulfonic acid, magnesium salt (PFOS-Mg)	91036-71-4
	Perfluorooctanesulfonic acid, sodium salt (PFOS-Na)	4021-47-0
	Piperidine 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctanesulfonate	71463-74-6
PFOA, its salts & derivatives	Perfluorooctanoic acid (PFOA)	335-67-1
	Sodium perfluorooctanoate (PFOA-Na)	335-95-5
	Potassium perfluorooctanoate (PFOA-K)	2395-00-8
	Silver perfluorooctanote (PFOA-Ag)	335-93-3
	Perfluorooctanoyl fluoride (PFOA-F)	335-66-0
	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1
	Lithium perfluorooctanoate (PFOA-Li)	17125-58-5

[redacted]

Analytical flow chart of heavy metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.

(Cr^{6+} test method excluded)



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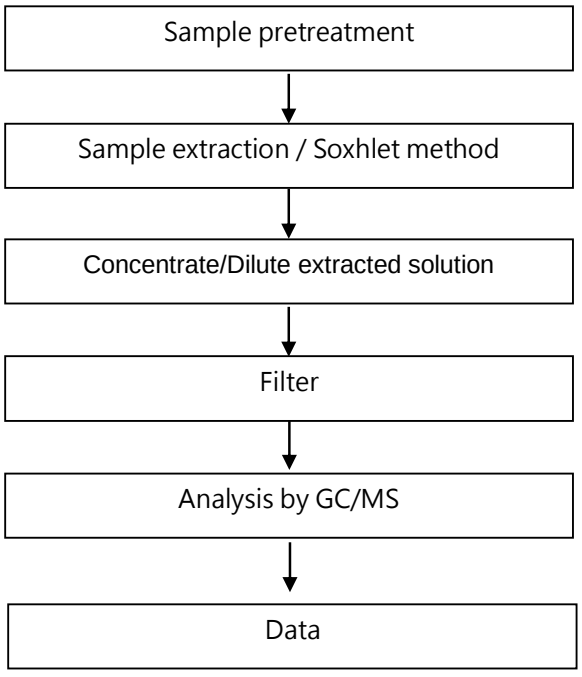
PBB/PBDE analytical FLOW CHART

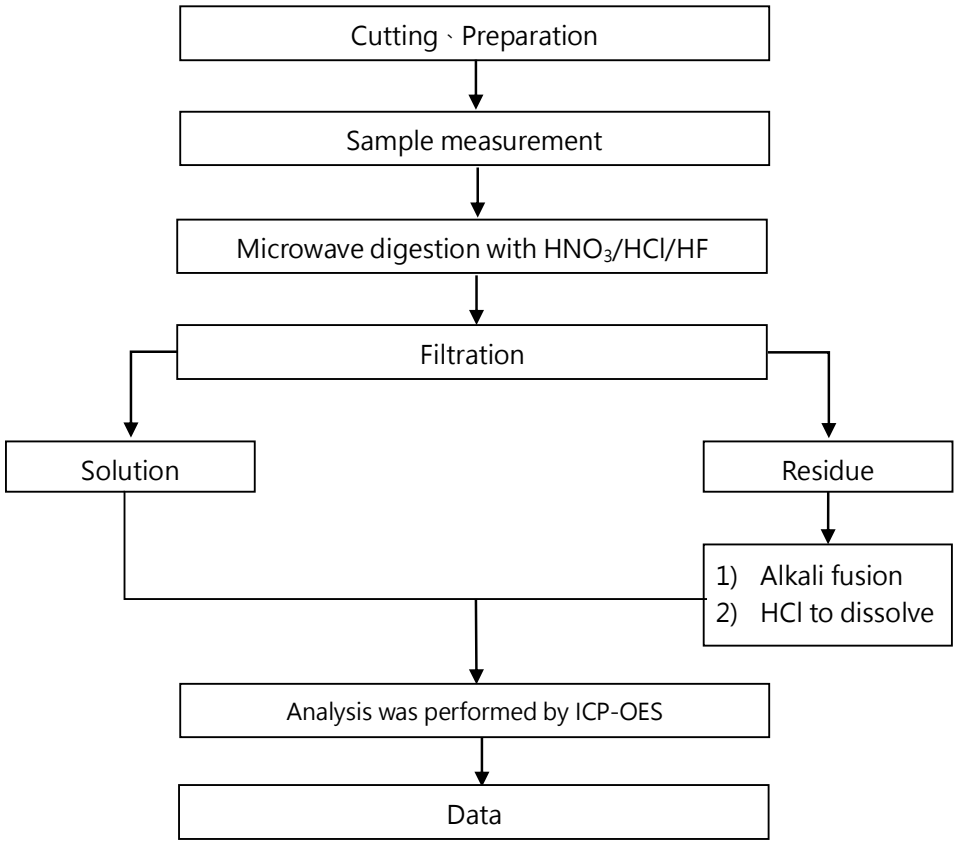


[redacted]

Analytical flow chart of elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

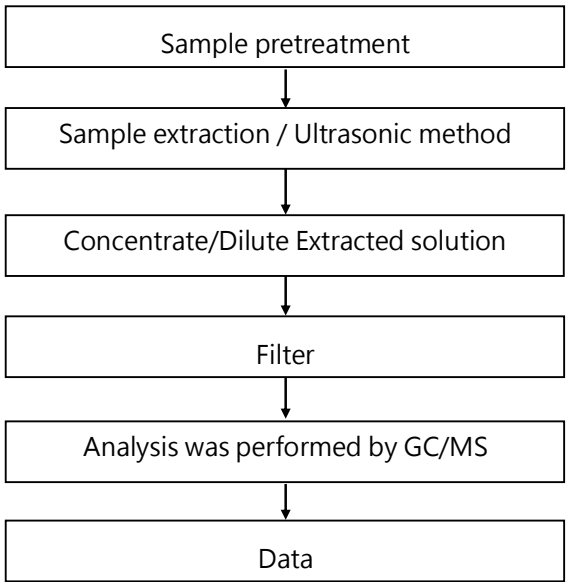
【Reference method：US EPA 3051A、US EPA 3052】



* US EPA 3051A method does not add HF.

[redacted]

Analytical flow chart - HBCDD



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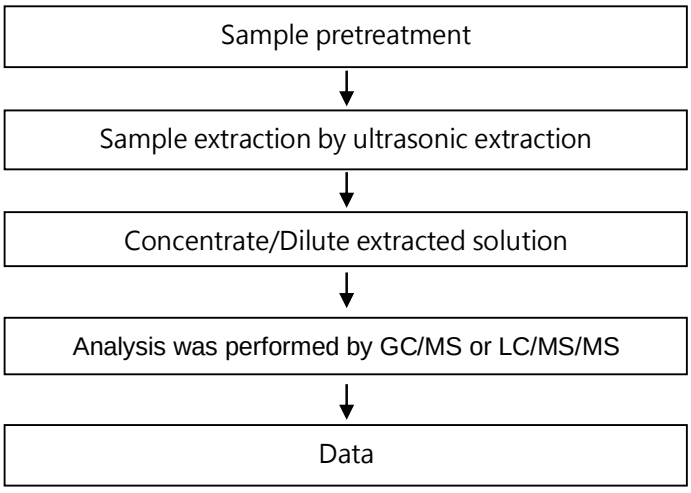
Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



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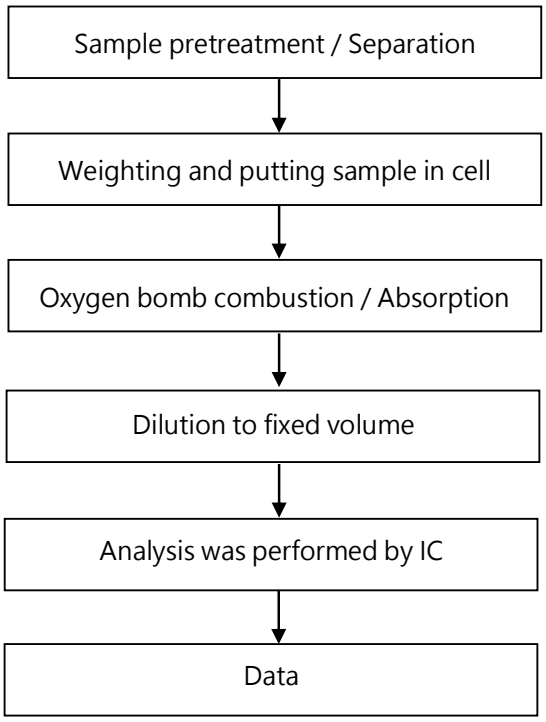
Analytical flow chart - Halogen



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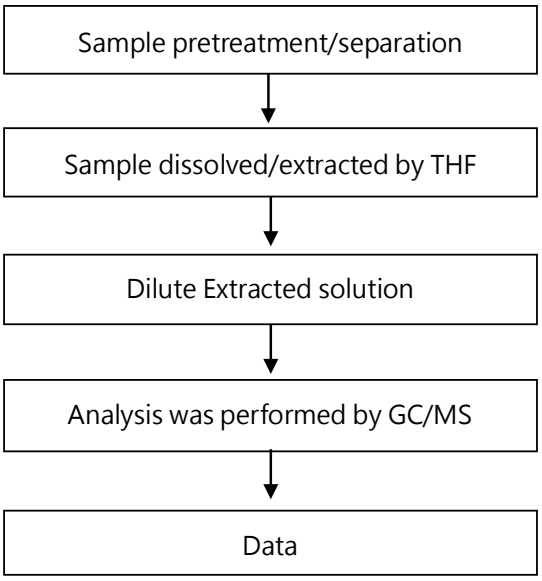
Analytical flow chart of phthalate content

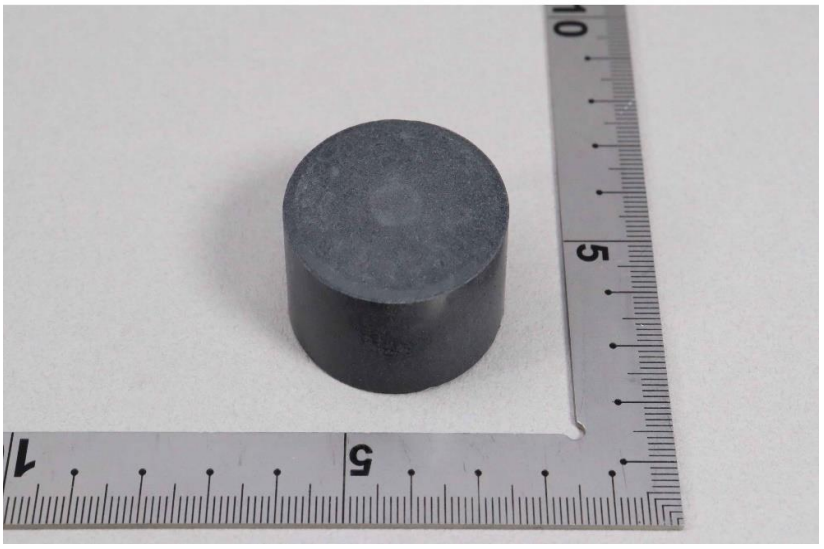
【Test method: IEC 62321-8】



[redacted]

* The tested sample / part is marked by an arrow if it's shown on the photo. *

[redacted]



** End of Report **