Test Report No. F690101/LF-CTSAYAA16-61993

Issued Date : 2016. 11. 25

SAMSUNG ELECTRO-MECHANICS CO., LTD.
150 Maeyoung-ro, Yeongtong-gu
Suwon-si, Gyeonggi-do
Korea

The following sample(s) was/were submitted and identified by/on behalf of the client as:-

SGS File No.	:	AYAA16-61993
Product Name	:	MLCC C0G Ni TYPE
Item No./Part No.	:	N/A
Received Date	:	2016. 11. 15
Test Period	:	2016. 11. 15 to 2016. 11. 25
Test Comments	:	By the applicant's specific request, the sampling and testing was performed only for the part indicated in the photo without disassembly.
Test Results	:	For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Jeff Jang / Chemical Lab Mgr

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Sample No. : AYAA16-61993.001
Sample Description : MLCC C0G Ni TYPE
Item No./Part No. : N/A
Materials : N/A

Heavy Metals

Test Items	Unit	Test Method	MDL	Results
Antimony (Sb)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Arsenic (As)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	10	N.D.
Beryllium (Be)	mg/kg	With reference to EPA 3052(1996), US EPA 6010B(1996), ICP	0.5	N.D.
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cadmium by ICP-OES)	0.5	N.D.
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Lead by ICP-OES)	5	N.D.
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Mercury by ICP-OES)	2	N.D.
Hexavalent Chromium (Cr VI)	mg/kg	With reference to IEC 62321:2008 (Determination of Hexavalent Chromium by spot test/Colorimetric Method using UV-Vis)	1	N.D.

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

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Sample No. : AYAA16-61993.001
Sample Description : MLCC C0G Ni TYPE
Item No./Part No. : N/A
Materials : N/A

Flame Retardants-PBBs/PBDEs

Test Items	Unit	Test Method	MDL	Results
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBBs and PBDEs by GC-MS)	5	N.D.

Phthalates

Test Items	Unit	Test Method	MDL	Results
Benzyl butyl phthalate (BBP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-butyl phthalate (DBP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-(2-ethylhexyl) phthalate (DEHP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-isodecyl phthalate (DIDP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-isononyl phthalate (DINP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-n-octyl phthalate (DNOP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-isobutyl phthalate (DIBP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-ethyl phthalate(DEP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-methyl phthalate (DMP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
[di(C7-C11 alkyl)phthalate] linear and branched (DHNUP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.

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Sample No. : AYAA16-61993.001
Sample Description : MLCC C0G Ni TYPE
Item No./Part No. : N/A
Materials : N/A

Phthalates

Test Items	Unit	Test Method	MDL	Results
[di(C6-C8 alkyl)phthalate] branched (DIHP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Bis(2-methoxyethyl) phthalate (BMP, BMEP, DMEP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-iso-pentyl phthalate(DIPP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-n-hexyl phthalate (DNHP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.
Di-n-pentyl phthalate(DPP, DnPP)	mg/kg	With reference to IEC 62321-8 , GC/MS	50	N.D.

Chlorinated Paraffin

Test Items	Unit	Test Method	MDL	Results
Alkanes, C10~13, Short Chain Chlorinated Paraffins(SCCP)	mg/kg	With reference to ISO 18219	50	N.D.

Chlorinated Organic Substances

Test Items	Unit	Test Method	MDL	Results
Polychlorinated Biphenyls (PCBs)	mg/kg	With reference to US EPA 8082,(US EPA 3550C), by GC/MS	3	N.D.
Polychlorinated terphenyls (PCTs)	mg/kg	With reference to US EPA 8082,(US EPA 3550C), by GC/MS	3	N.D.
Polychlorinated Naphthalene (PCN)	mg/kg	With reference to US EPA 8081 A(US EPA 3550C), by GC/MS	5	N.D.

Polymer Identification

Test Items	Unit	Test Method	MDL	Results
PVC	**	FT-IR	-	Negative

Halogen Content

Test Items	Unit	Test Method	MDL	Results
Bromine(Br)	mg/kg	With reference to EN 14582, IC	30	N.D.
Chlorine(Cl)	mg/kg	With reference to EN 14582, IC	30	N.D.

Flame Retardants

Test Items	Unit	Test Method	MDL	Results

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Sample No. : AYAA16-61993.001
Sample Description : MLCC C0G Ni TYPE
Item No./Part No. : N/A
Materials : N/A

Flame Retardants

Test Items	Unit	Test Method	MDL	Results
Hexabromocyclododecane (HBCDD)	mg/kg	USEPA 3540C, LC/MS	5	N.D.

Other(s)

Test Items	Unit	Test Method	MDL	Results
PCP (Pentachlorophenol)	mg/kg	with reference to 64 LFGB, B 82.02.8-2001 and ISO 17070, GC/MS	0.05	N.D.

Other(s)

Test Items	Unit	Test Method	MDL	Results
PFOA (Perfluorooctanoic acid)	mg/kg	US EPA 3540C/3550C, LC/MS	1	N.D.
PFOS (Perfluorooctane Sulfonates-Acid/Metal Salt/Amide)	mg/kg	US EPA 3540C/3550C, LC/MS	1	N.D.

NOTE:
(1) N.D. = Not detected.(<MDL)
(2) mg/kg = ppm
(3) MDL = Method Detection Limit
(4) - = No regulation
(5) Negative = Undetectable / Positive = Detectable
(6) ** = Qualitative analysis (No Unit)
(7) * = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 ug/cm2. The sample coating is considered to contain CrVI.
b. The sample is negative for CrVI if CrVI is n.d. (concentration less than 0.10 ug/cm2). The coating is considered a non-CrVI based coating.
c. The result between 0.10 ug/cm2 and 0.13 ug/cm2 is considered to be inconclusive - unavoidable coating variations may influence the determination.

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Picture of Sample as Received:

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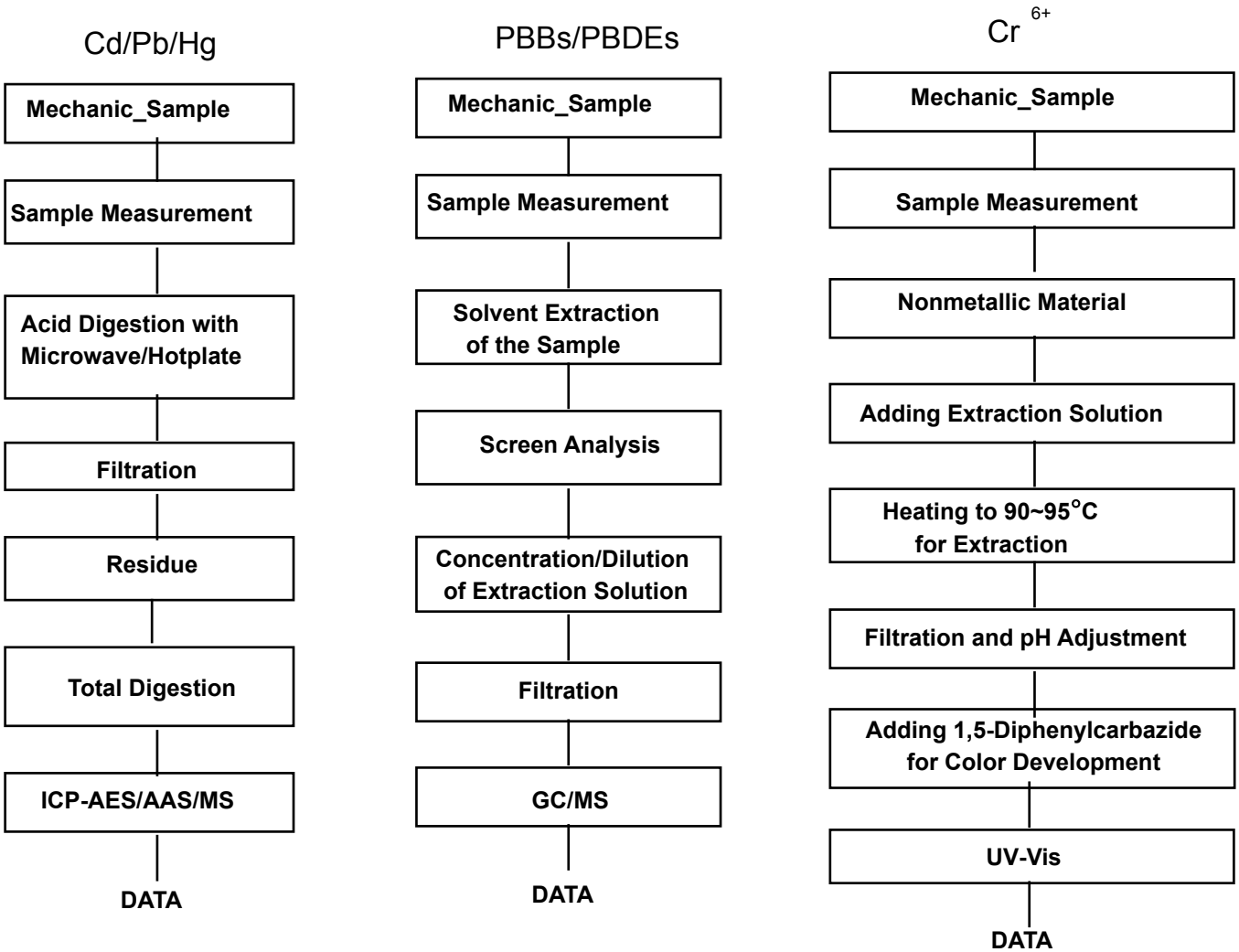
Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr^{6+} /PBBs&PBDEs Testing



The samples were dissolved totally by pre-conditioning method according to above flow chart for Cd,Pb,Hg.

Section Chief : Gilsae Yi

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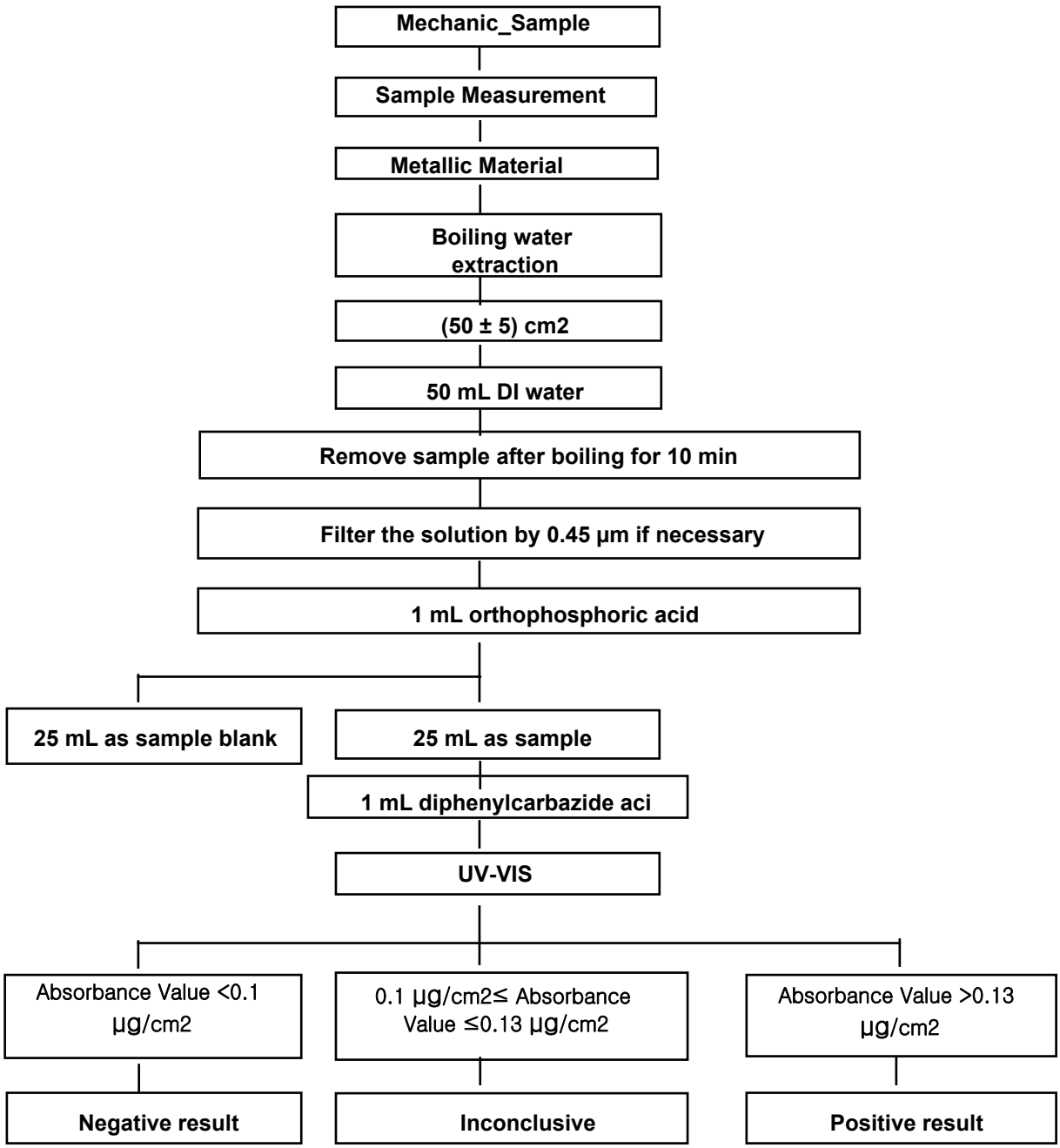
Cr^{6+}



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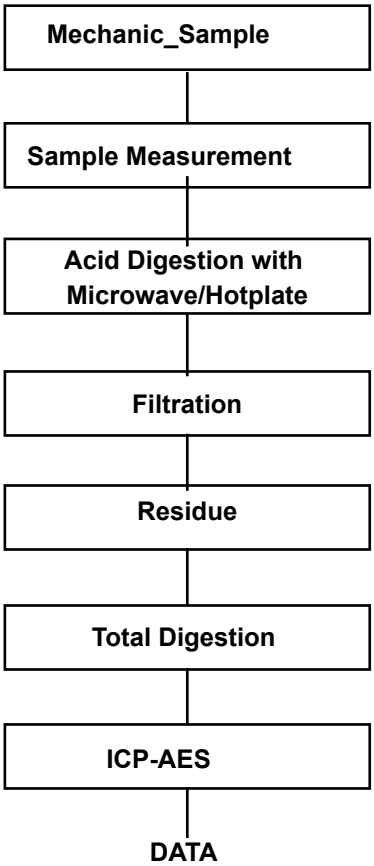
Flow Chart for Inorganic Elements Testing

Inorganic Elements



Major Inorganic Heavy Metals	Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc.

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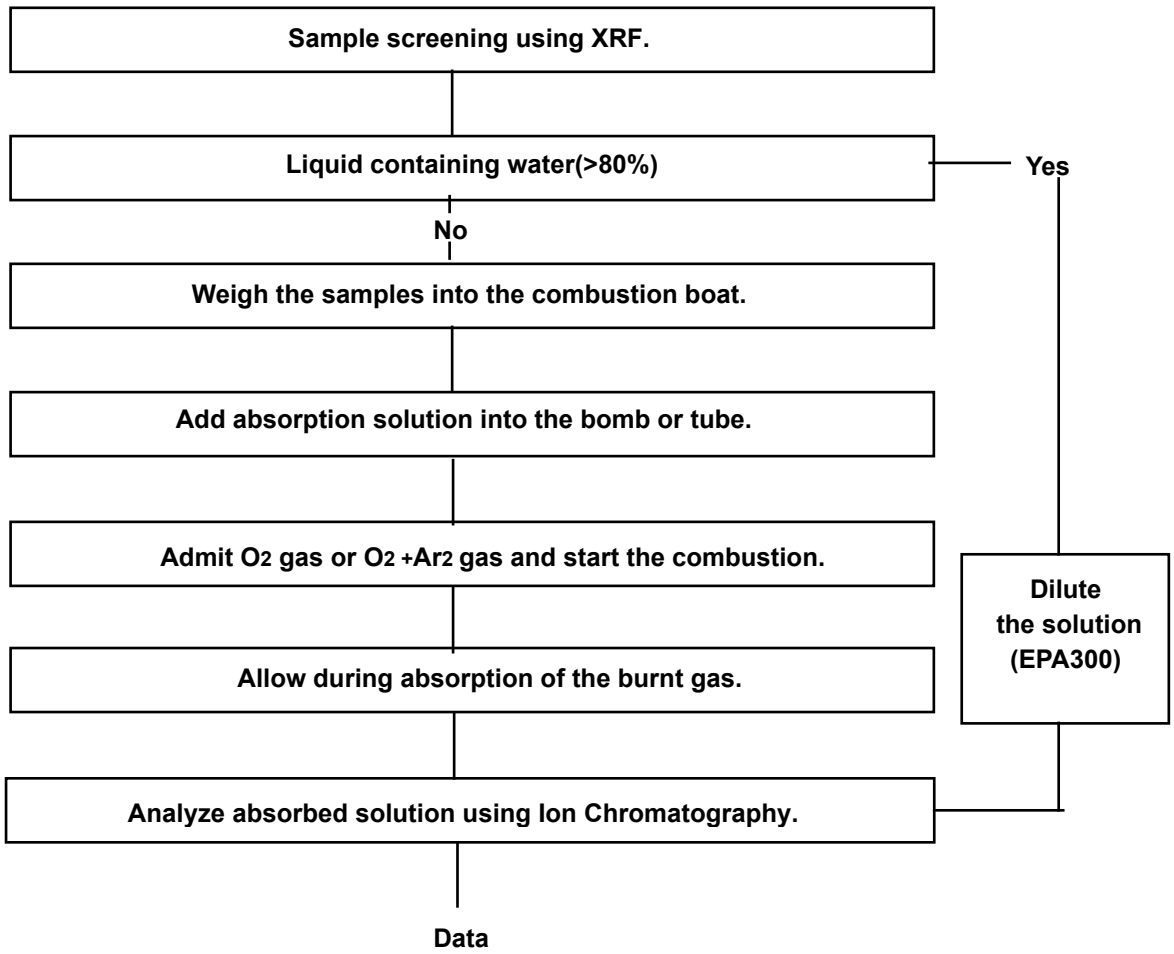
Flow Chart for Halogen Test



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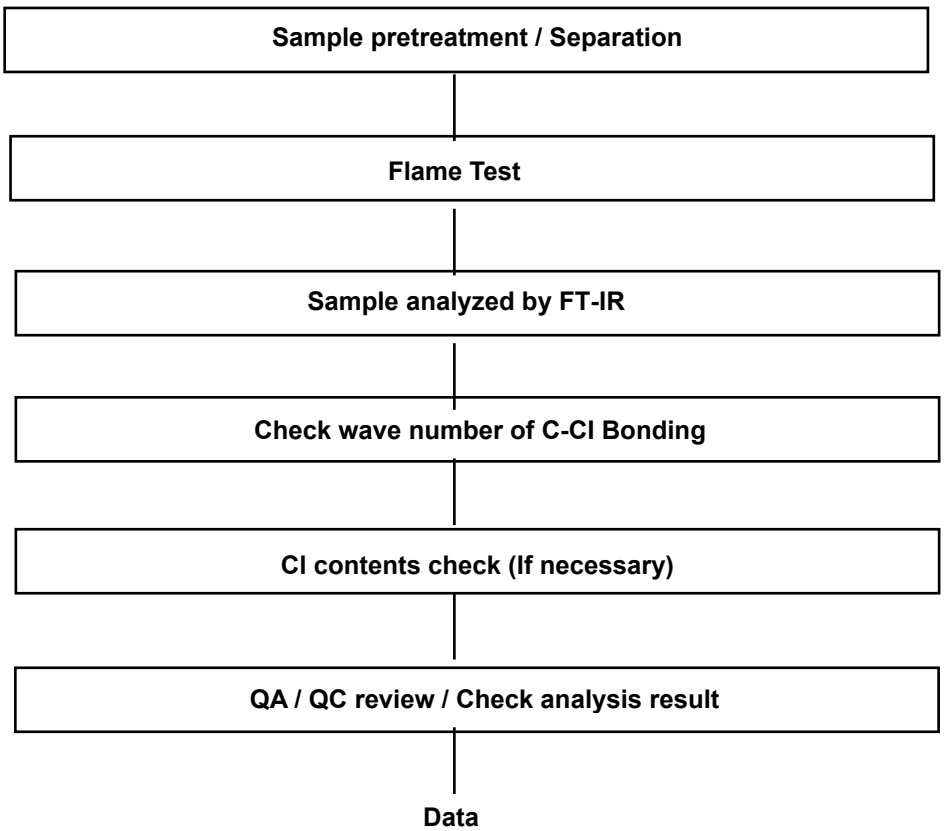
Flow Chart for PVC Test



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Flow Chart for PFOS/PFOA Test

Sample pretreatment / Separation

↓

Sample extraction

↓

Concentrate/Dilute Extracted solution

↓

Analysis was performed by HPLC/MS

↓

QA / QC review / Check analysis result

↓

Data

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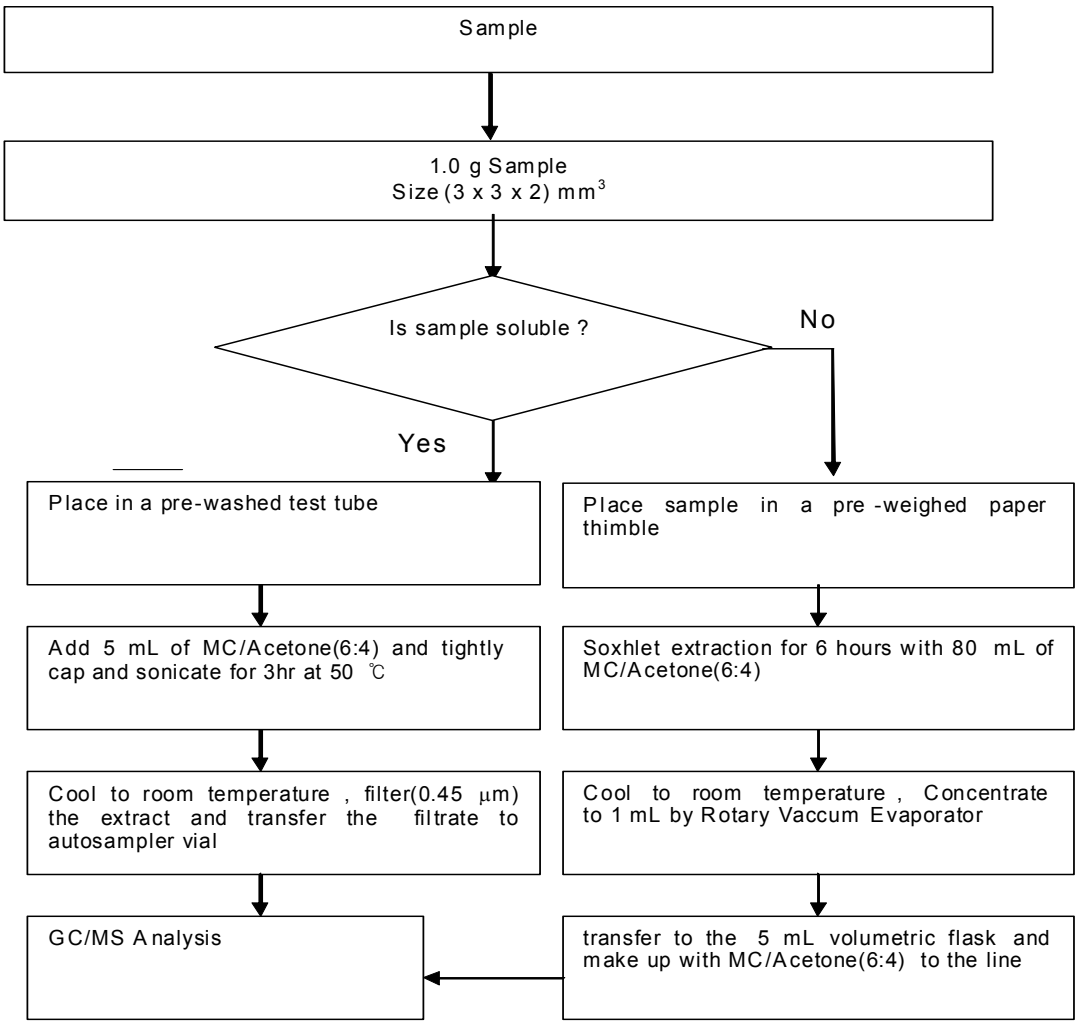
PCBs,PCTs,PCNs Flow Chart



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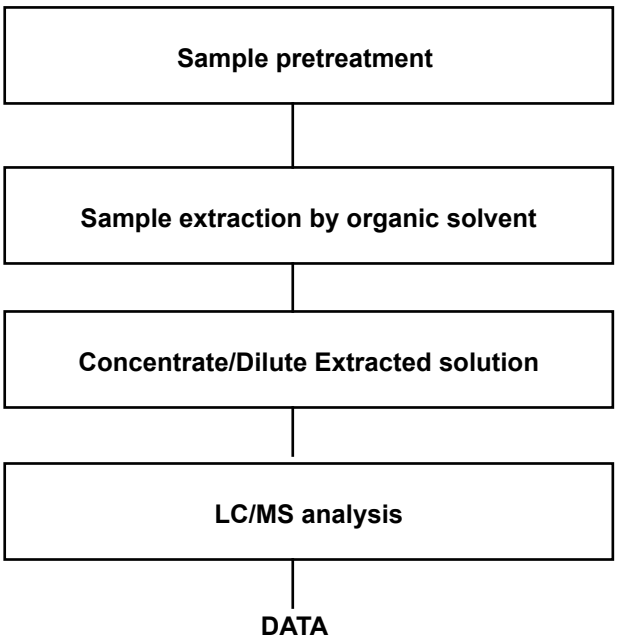
Testing Flow Chart for HBCD



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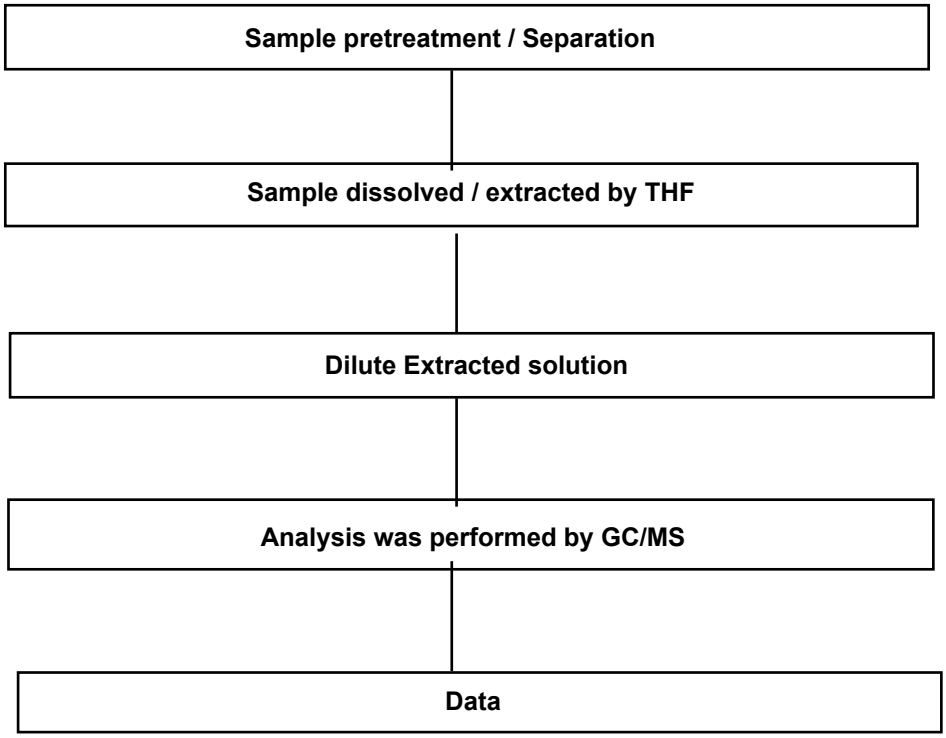
Flow Chart for Phthalate Test



*** End of Report ***

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