

TEST REPORT

KOTITI NO. : 1414001985 R3
APPLICANT : Samsung Electro-mechanics Co., Ltd.
ADDRESS : 314, Metan3-Dong, Yeongtong-Gu, Suwon-Si, Gyunggi-Do 443-743

DATE IN : December 08, 2014
DATE OUT : January 27, 2015


Sample Description	MLCC COG Ni TYPE
Style Number	CLxxCxxxxxxxxxx
Buyer	N/S
Test Result	For further details, please refer to the following page(s).
Test Method	For further details, please refer to the following page(s).

* N/S : Not Submitted

PREPARED and CHECKED by :


Dr. SANG RAG LEE
 VICE PRESIDENT – KOTITI

AUTHORIZED by :


Dr. YOUNG RYUL KIM
 PRESIDENT – KOTITI

REMARK: SEE ENCLOSED WORKSHEET(S) RESULT

Contact information for technical questions and general inquiries.
 · Prepared by : Jong hyun Woo (822) 3451 7375 jh_woo@kotiti.re.kr
 · Primary contact : Jung hyun Lee (822) 3451 7113 jhlee@kotiti.re.kr
 · Back-up : Jae hak Jung (822) 3451 7194 jh_jung@kotiti.re.kr

KOTITI No. : 1414001985 R3

Sample Description : MLCC COG Ni TYPE / CLxxCxxxxxxxxxxx

Test Item	Unit	Test Method	Reporting Limit	Result
Pb (Lead)	mg/kg	IEC 62321-5:2013 (Acid digestion and determined by ICP-OES)	5	N.D.
Cd (Cadmium)	mg/kg		0.5	N.D.
Hg (Mercury)	mg/kg	IEC 62321-4:2013 (Acid digestion and determined by ICP-OES)	2	N.D.
Cr⁶⁺ (Hexavalent Chromium)	mg/kg	IEC 62321:2008 Annex C (Alkaline digestion and determined by UV-VIS)	1	N.D.
Sum of PBBs/PBDEs	mg/kg	IEC 62321:2008 Annex A (Solvent extraction and determined by GC-MS)	-	N.D.
Bromobiphenyls	mg/kg		5	N.D.
Dibromobiphenyls			5	N.D.
Tribromobiphenyls			5	N.D.
Tetrabromobiphenyls			5	N.D.
Pentabromobiphenyls			5	N.D.
Hexabromobiphenyls			5	N.D.
Heptabromobiphenyls			5	N.D.
Octabromobiphenyls			5	N.D.
Nonabromobiphenyls			5	N.D.
Decabromobiphenyl			5	N.D.
Bromodiphenyl ethers			5	N.D.
Dibromodiphenyl ethers			5	N.D.
Tribromodiphenyl ethers			5	N.D.
Tetrabromodiphenyl ethers			5	N.D.
Pentabromodiphenyl ethers			5	N.D.
Hexabromodiphenyl ethers			5	N.D.
Heptabromodiphenyl ethers			5	N.D.
Octabromodiphenyl ethers			5	N.D.
Nonabromodiphenyl ethers			5	N.D.
Decabromodiphenyl ether		5	N.D.	

Remark

- N.D. = not detected (concentration of analyte lower than the laboratory reporting limit)
- N.A. = not applicable

KOTITI No. : 1414001985 R3

Sample Description : MLCC COG Ni TYPE / CLxxCxxxxxxxxxx

Test Item	Unit	Test Method	Reporting Limit	Result
Heavy metal				
Sb (Antimony)	mg/kg	Reference to EPA 3052 (Determined by ICP-OES)	5	N.D.
Be (Beryllium)	mg/kg		5	N.D.
Halogen				
Br (Bromine)	mg/kg	Reference to EN 14582:2007, IEC 62321-3-2 Annex A (Determined by IC)	50	N.D.
Cl (Chlorine)	mg/kg		50	N.D.
Phthalates				
DBP(Dibutyl phthalate)	mg/kg	Reference to CPSC-CH-C1001-09.3 (Determined by GC-MS)	50	N.D.
BBP(Butyl benzyl phthalate)	mg/kg		50	N.D.
DEHP (Di-2-ethylhexyl phthalate)	mg/kg		50	N.D.
DNOP(Di-n-octyl phthalate)	mg/kg		50	N.D.
DINP(Di-iso-nonyl phthalate)	mg/kg		50	N.D.
DIDP (Diisodecyl phthalate)	mg/kg		50	N.D.
DIBP (Diisobutyl phthalate)	mg/kg		50	N.D.
DEP (Diethyl phthalate)	mg/kg		50	N.D.
DMP (Dimethyl phthalate)	mg/kg		50	N.D.
Perfluorooctanoic acid (PFOA)	mg/kg		Reference to ISO 25101 (Determined by LC-MS-MS)	0.05
Perfluorooctane sulfonate (PFOS)	mg/kg	0.05		N.D.
Short-chain chlorinated paraffins (SCCP)	mg/kg	Reference to US EPA 8082A (Determined by GC-MS)	30	N.D.
Polyvinyl chloride (PVC)	-	Infrared spectroscopy (IR) with or without chemical separation	-	Negative
Hexabromocyclododecane (HBCDD)	mg/kg	Reference to KS M 1072:2008 (Determined by LC-MS)	5	N.D.

Remark

- N.D. = not detected (concentration of analyte lower than the laboratory reporting limit)
- N.A. = not applicable

KOTITI No. : 1414001985 R3

Sample Description : MLCC COG Ni TYPE / CLxxCxxxxxxxxxxx

Test Item	Unit	Test Method	Reporting Limit	Result
Polychlorinated terphenyls (PCTs)	mg/kg	Reference to EPA 3540C, EPA 8082 (Solvent extraction and determined by GC-MS and/or GC-ECD)	5	N.D.
Polychlorinated naphthalenes (PCNs)	mg/kg		5	N.D.
Polychlorinated biphenyls (PCBs)	mg/kg		5	N.D.

Remark

- N.D. = not detected (concentration of analyte lower than the laboratory reporting limit)
- N.A. = not applicable

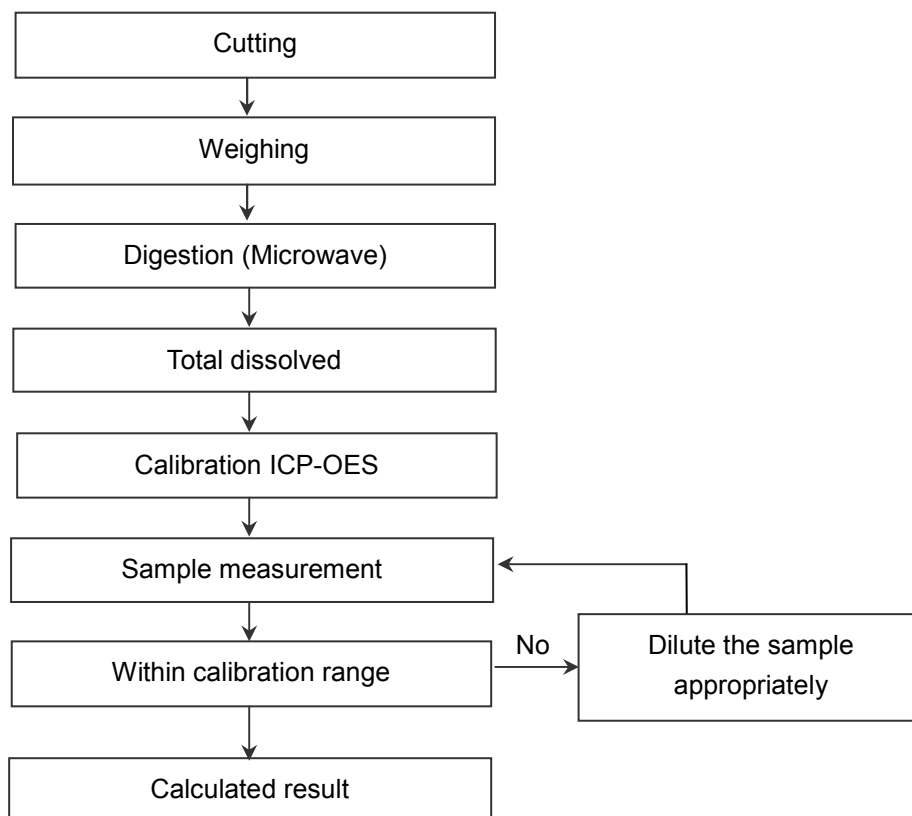
SAMPLE PICTURE



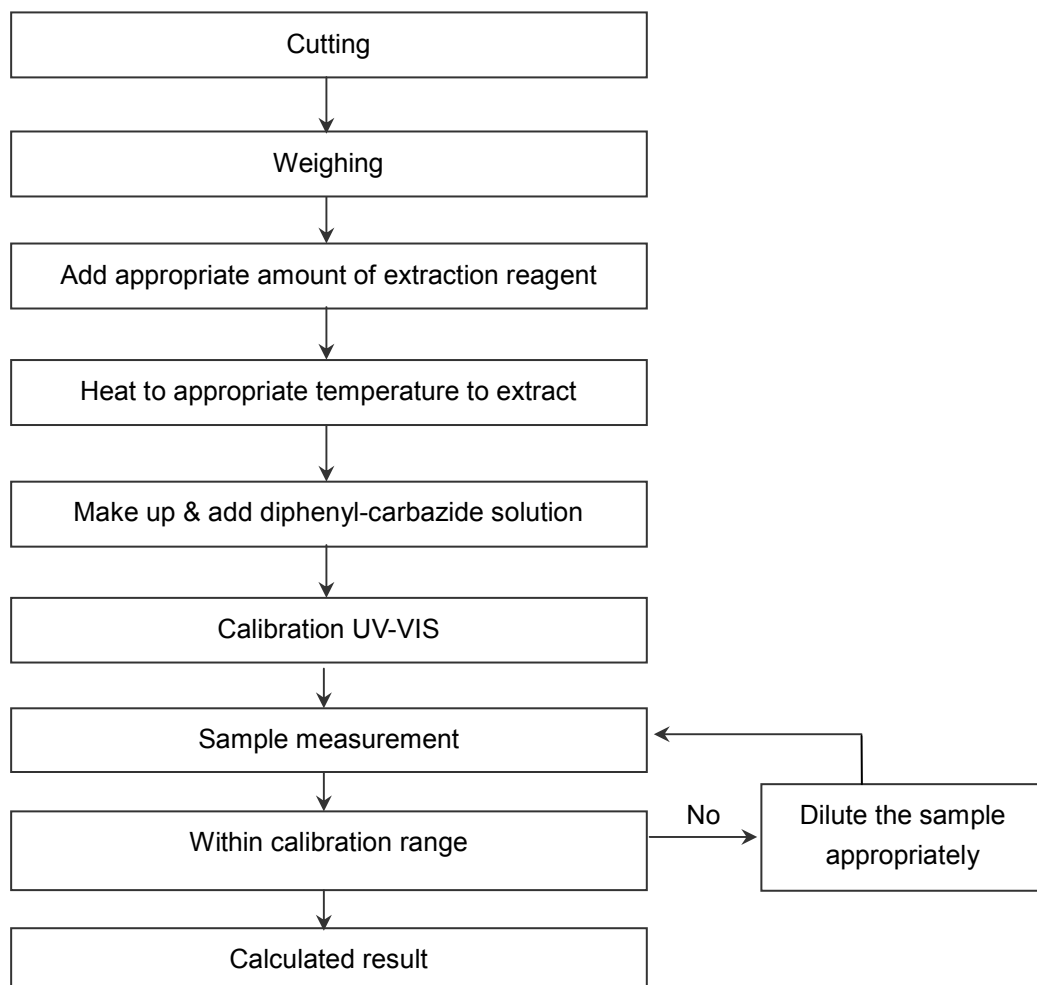
※ Due to the client's request, the sample which was mixed has been analyzed.

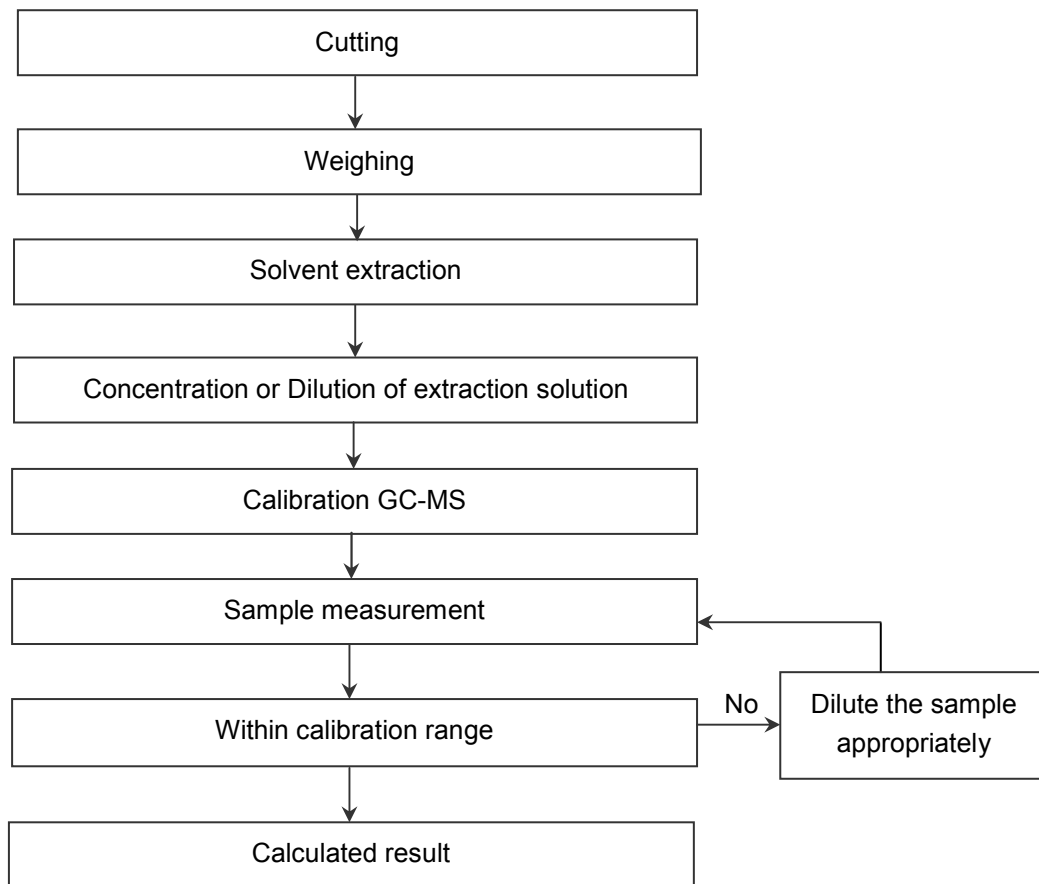
FLOW CHART

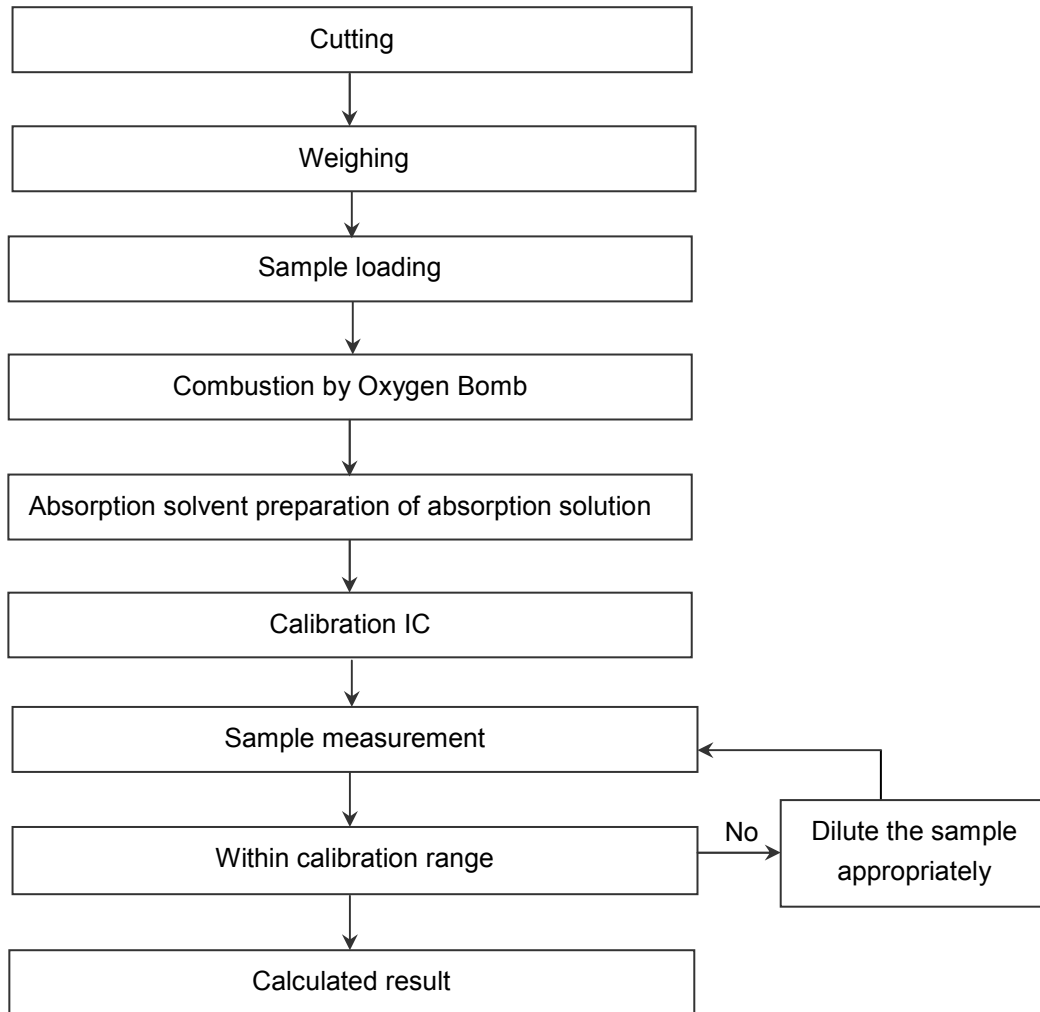
1. Heavy metal (Lead, Cadmium, Mercury)



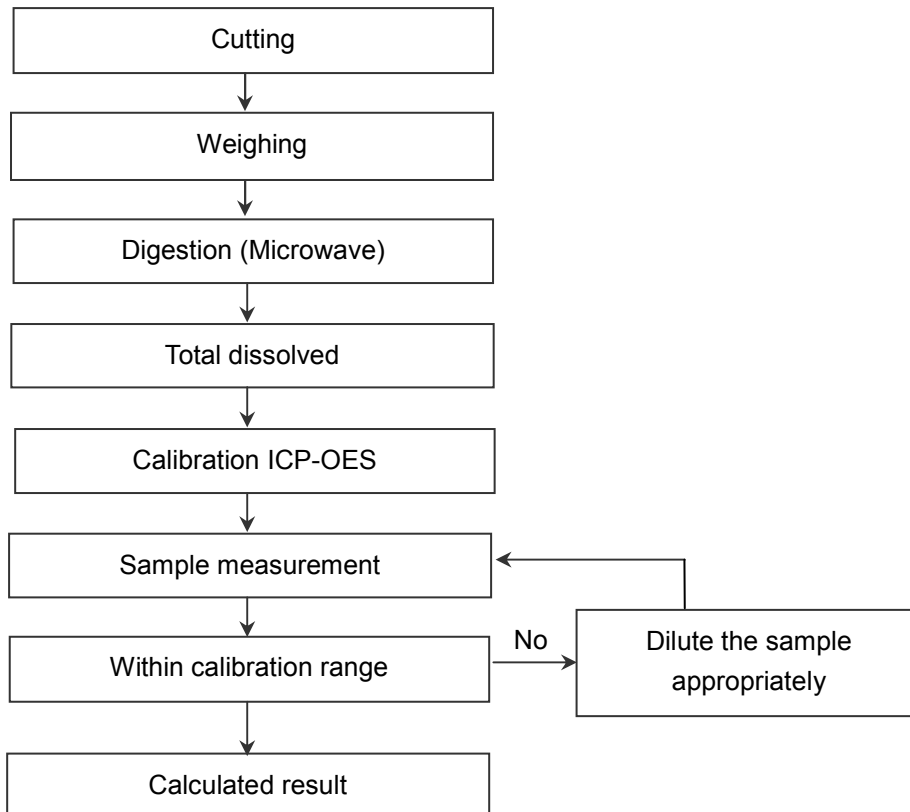
Material	Digestion Acid
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₂ SO ₄ , etc.
Metals	HNO ₃ , HCl
Electronics	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₂ SO ₄ , etc.

2. Heavy metal (Hexavalent chromium)

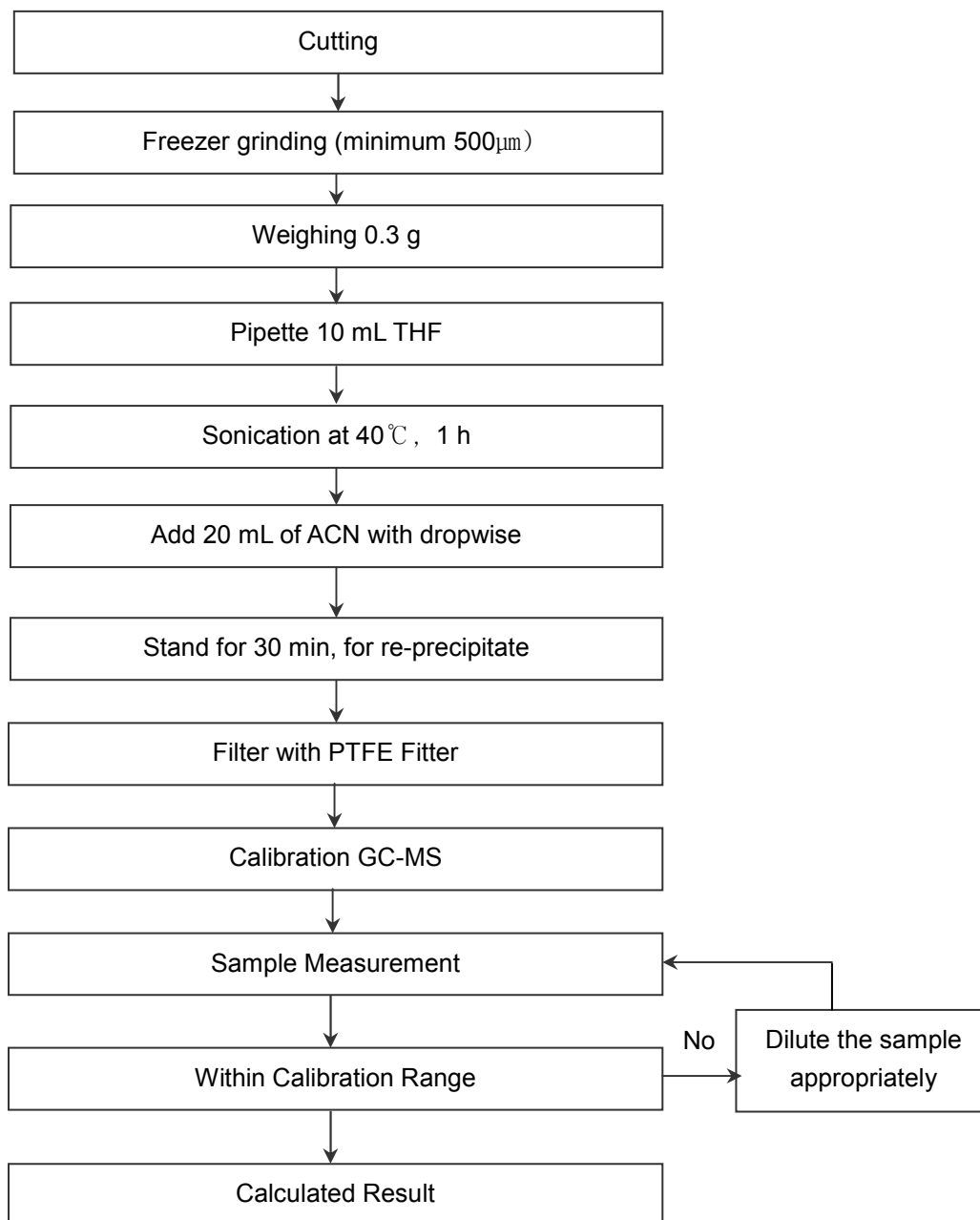
3. BFRs (PBBs, PBDEs)

4. Halogen (Bromine, Chlorine)

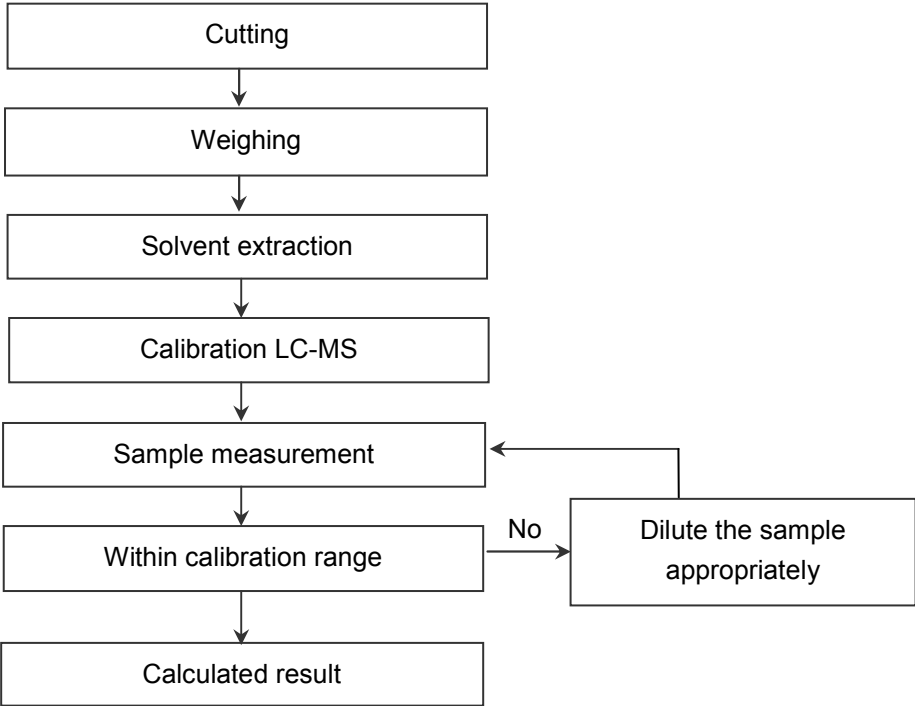
5. Heavy metal (Antimony, Beryllium)



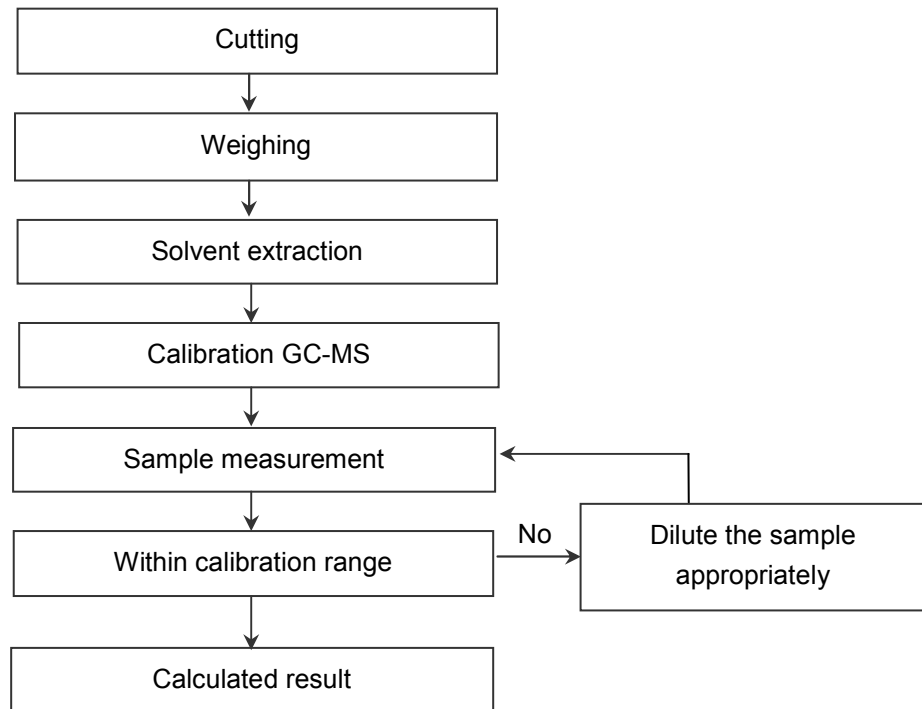
Material	Digestion Acid
Polymers	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₂ SO ₄ , etc.
Metals	HNO ₃ , HCl
Electronics	HNO ₃ , HCl, HF, H ₂ O ₂ , H ₂ SO ₄ , etc.

6. Phthalates

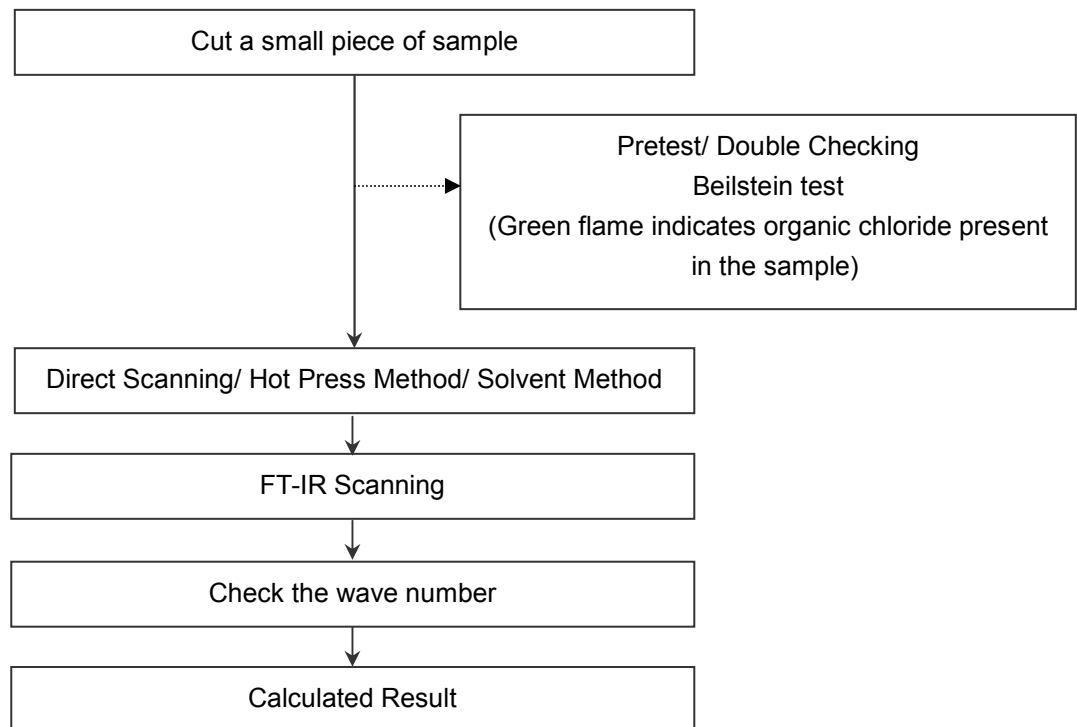
7. PFOA, PFOS

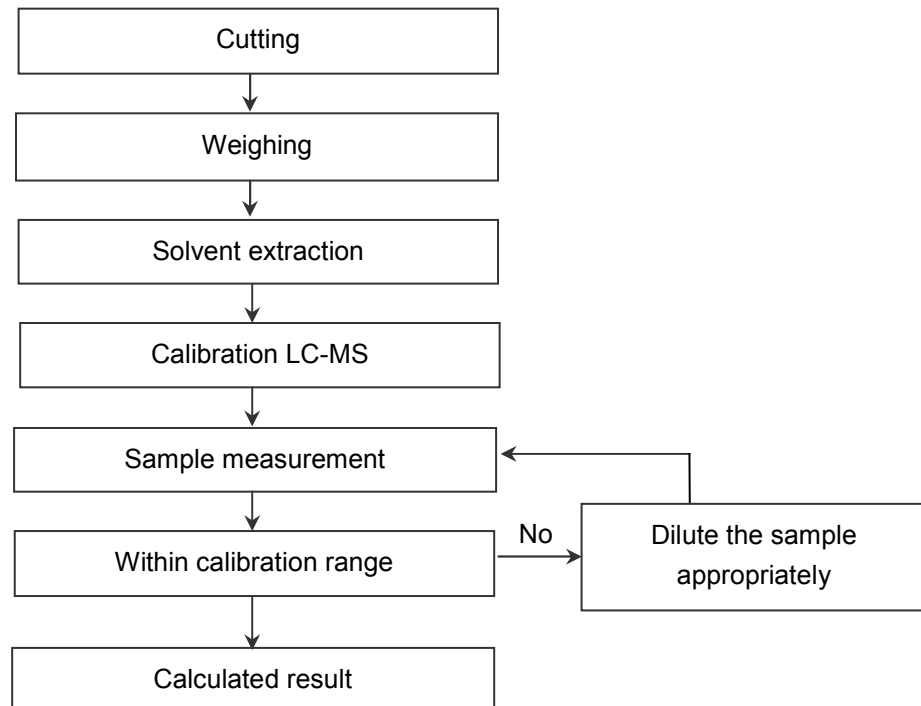


8. Short-chain chlorinated paraffins (SCCP)



9. Polyvinyl chloride (PVC)



8. Hexabromocyclododecane (HBCDD)

9. PCTs, PCNs, PCBs

