

# TEST REPORT

**KOTITI NO.** : 1414001984 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

<b>Sample Description</b>	MLCC A(X5R)TYPE, X(X6S) TYPE, J(JIS-B) TYPE
<b>Style Number</b>	CLxxAxxxxxxxxxx, CLxxXxxxxxxxxxx, CLxxJxxxxxxxxxx
<b>Buyer</b>	N/S
<b>Test Result</b>	For further details, please refer to the following page(s).
<b>Test Method</b>	For further details, please refer to the following page(s).

\* N/S : Not Submitted

PREPARED and CHECKED by :

  
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**Dr. SANG RAG LEE**  
 VICE PRESIDENT – KOTITI

AUTHORIZED by :

  
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**Dr. YOUNG RYUL KIM**  
 PRESIDENT – KOTITI

REMARK: SEE ENCLOSED WORKSHEET(S) RESULT

**Contact information for technical questions and general inquiries.**

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Sample Description : MLCC A(X5R)TYPE, X(X6S) TYPE, J(JIS-B) TYPE /

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Test Item	Unit	Test Method	Reporting Limit	Result
<b>Pb (Lead)</b>	mg/kg	IEC 62321-5:2013	5	N.D.
<b>Cd (Cadmium)</b>	mg/kg	(Acid digestion and determined by ICP-OES)	0.5	N.D.
<b>Hg (Mercury)</b>	mg/kg	IEC 62321-4:2013 (Acid digestion and determined by ICP-OES)	2	N.D.
<b>Cr<sup>6+</sup> (Hexavalent Chromium)</b>	mg/kg	IEC 62321:2008 Annex C (Alkaline digestion and determined by UV-VIS)	1	N.D.
<b>Sum of PBBs/PBDEs</b>	mg/kg		-	N.D.
Bromobiphenyls	mg/kg	IEC 62321:2008 Annex A (Solvent extraction and determined by GC-MS)	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

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Test Item	Unit	Test Method	Reporting Limit	Result
<b>Heavy metal</b>				
Sb (Antimony)	mg/kg	Reference to EPA 3052 (Determined by ICP-OES)	5	N.D.
Be (Beryllium)	mg/kg		5	N.D.
<b>Halogen</b>				
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.
<b>Phthalates</b>				
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.
<b>Perfluorooctanoic acid (PFOA)</b>	mg/kg		Reference to ISO 25101 (Determined by LC-MS-MS)	0.05
<b>Perfluorooctane sulfonate (PFOS)</b>	mg/kg	0.05		N.D.
<b>Short-chain chlorinated paraffins (SCCP)</b>	mg/kg	Reference to US EPA 8082A (Determined by GC-MS)	30	N.D.
<b>Polyvinyl chloride (PVC)</b>	-	Infrared spectroscopy (IR) with or without chemical separation	-	Negative
<b>Hexabromocyclododecane (HBCDD)</b>	mg/kg	Reference to KS M 1072:2008 (Determined by LC-MS)	5	N.D.

**Remark**

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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.

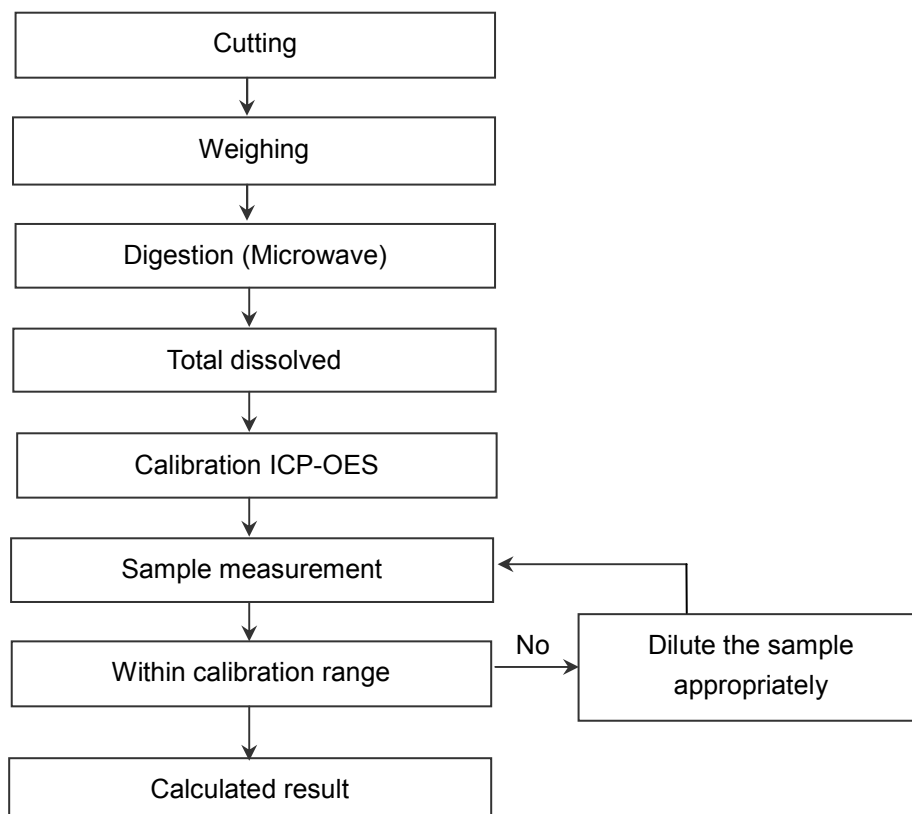
**Remark**

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

**SAMPLE PICTURE**

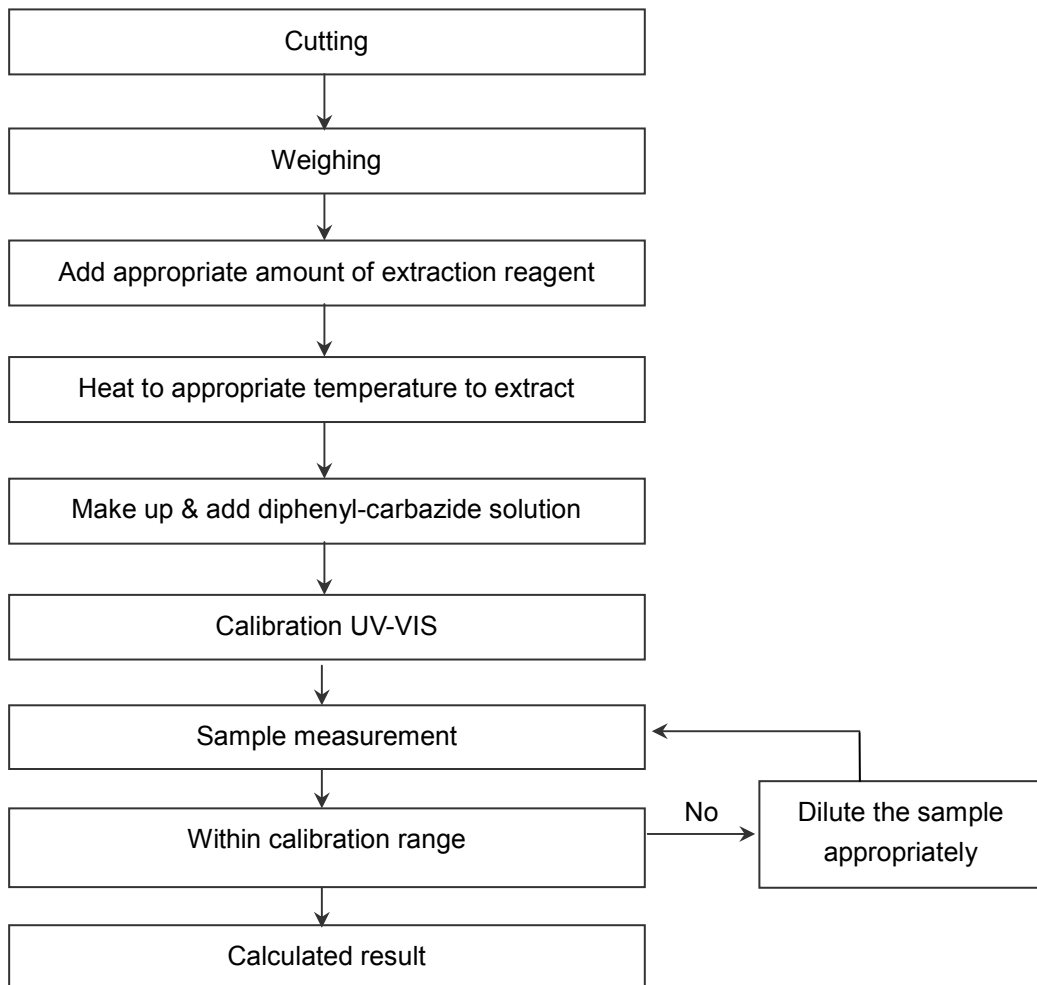


※ Due to the client's request, the sample which was mixed has been analyzed.

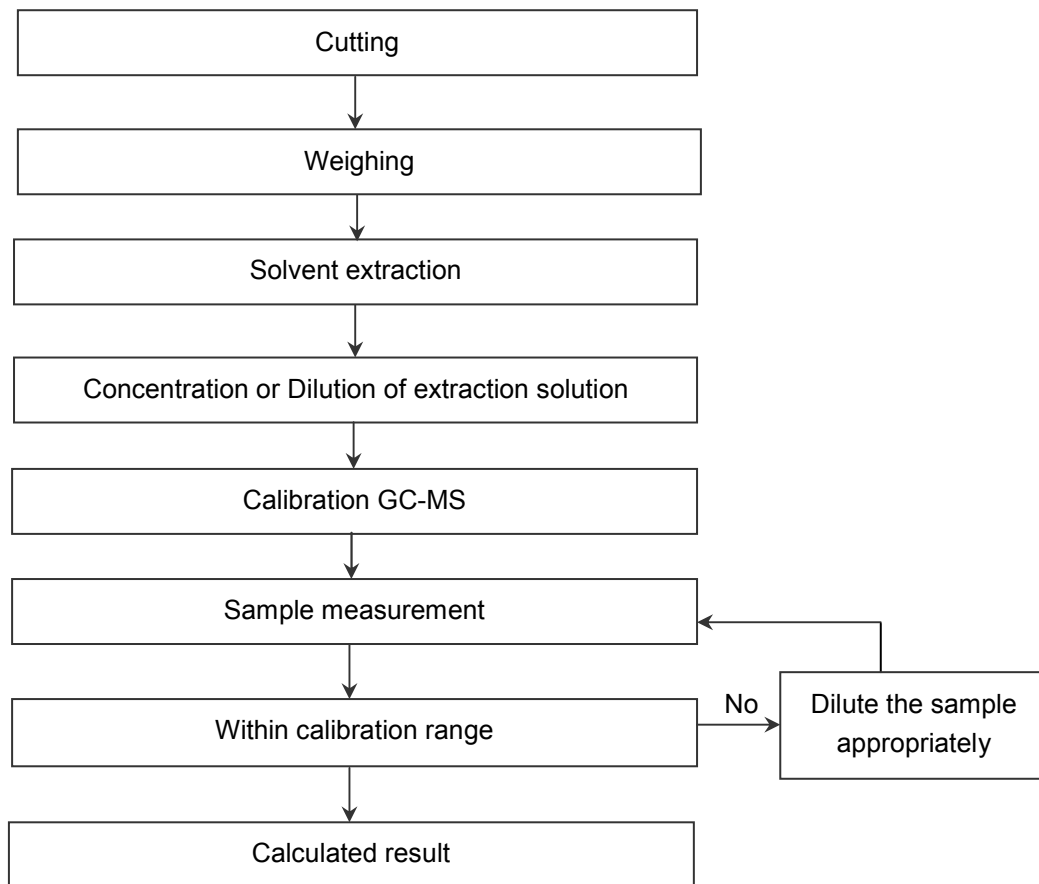
**FLOW CHART****1. Heavy metal (Lead, Cadmium, Mercury)**

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

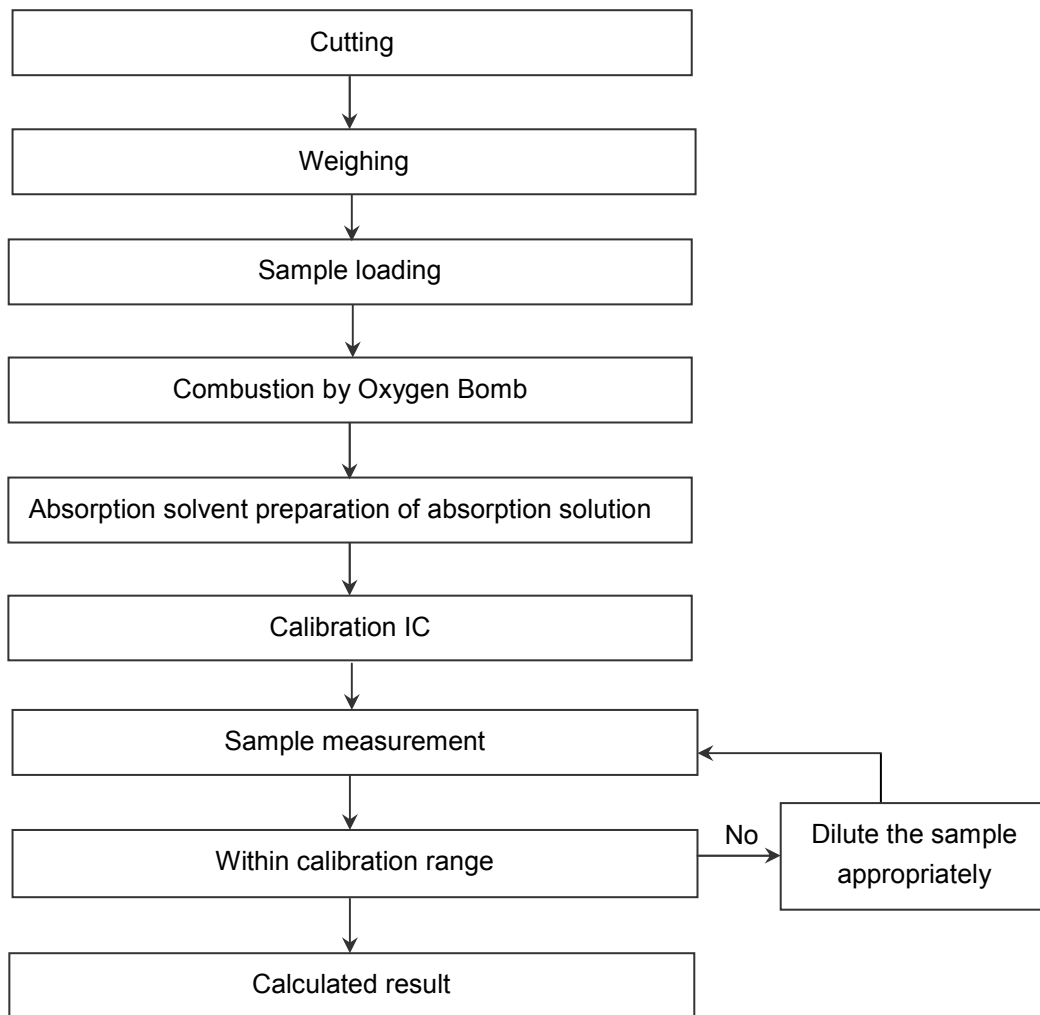
**2. Heavy metal (Hexavalent chromium)**

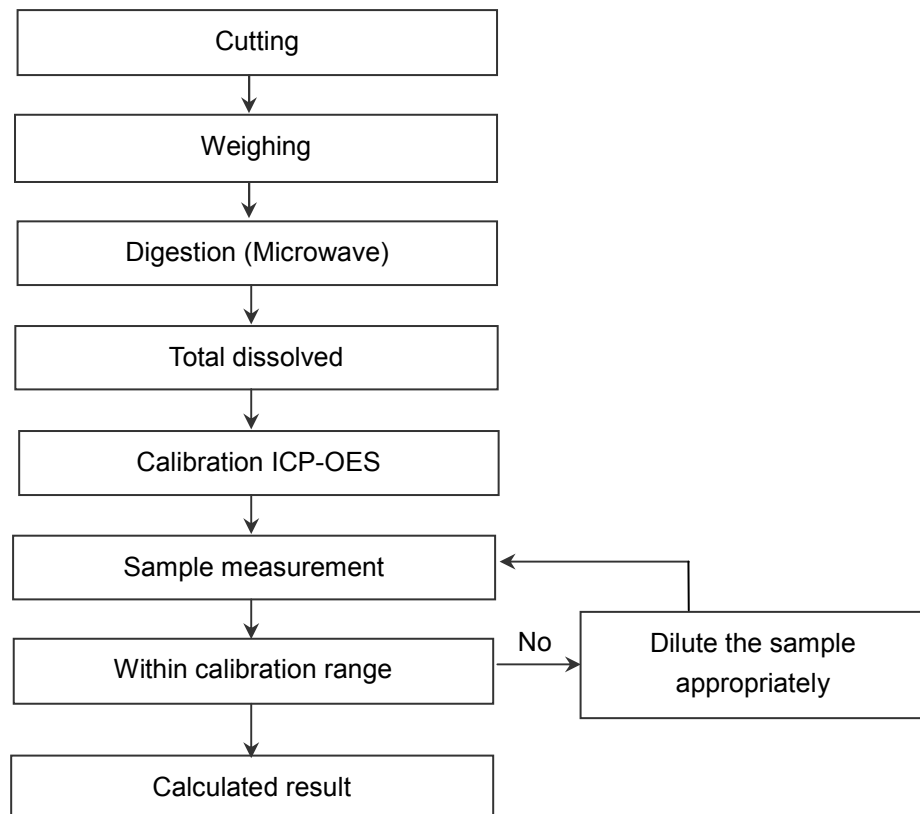


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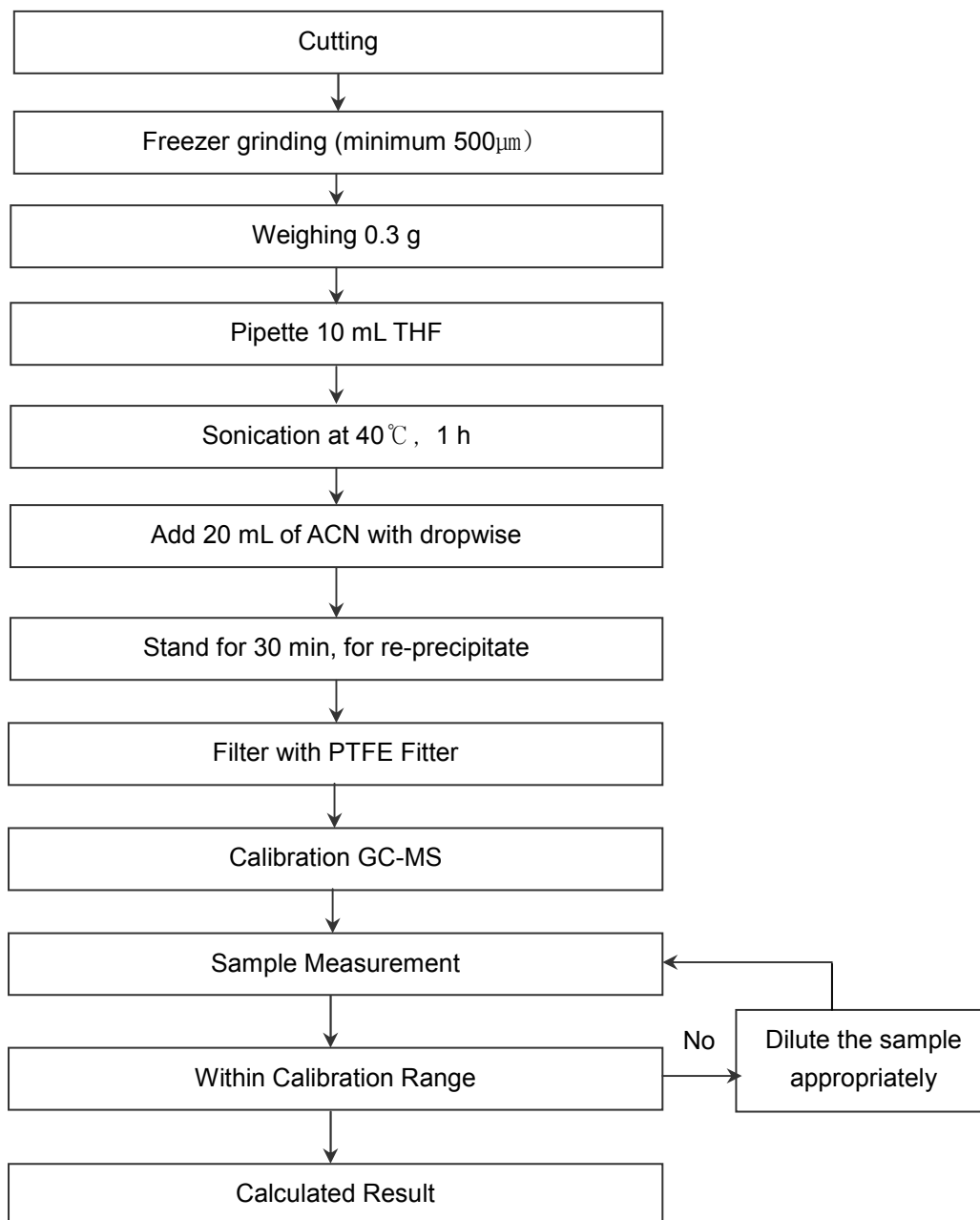
**3. BFRs (PBBs, PBDEs)**



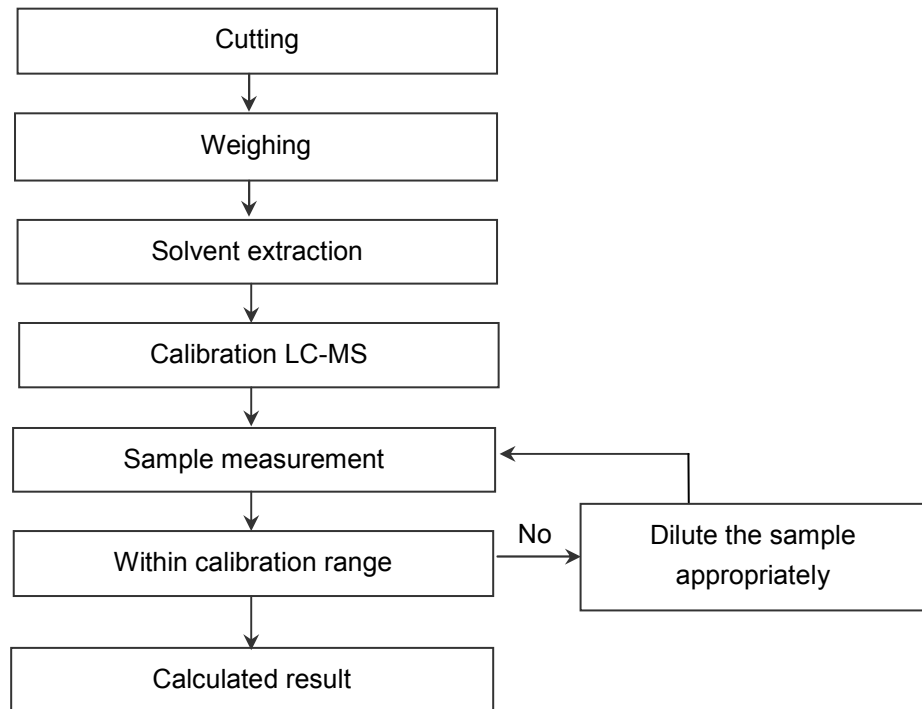
**4. Halogen (Bromine, Chlorine)**

**5. Heavy metal (Antimony, Beryllium)**

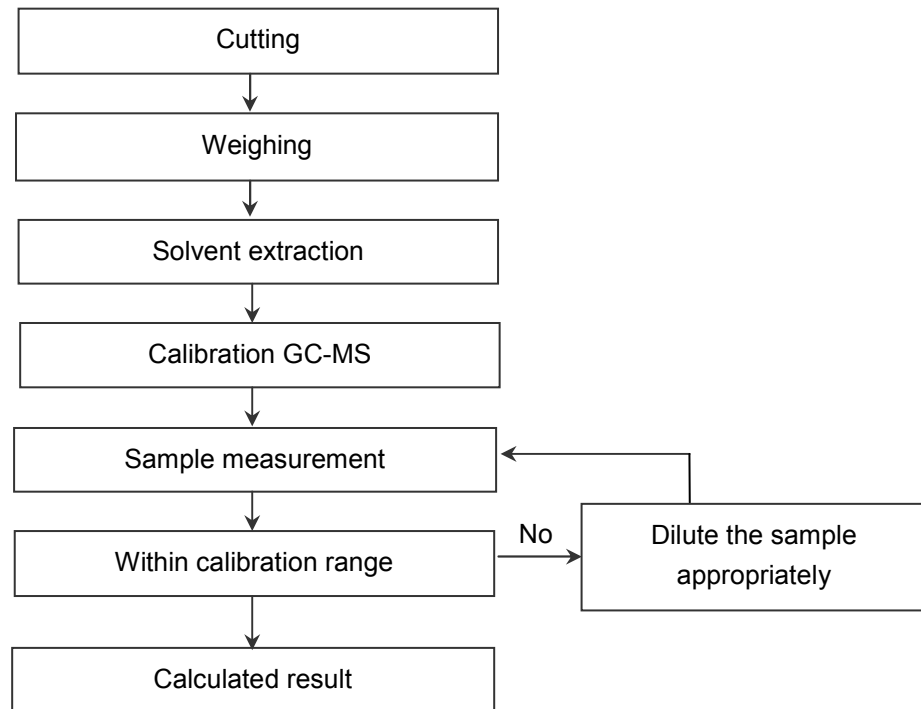
<b>Material</b>	<b>Digestion Acid</b>
Polymers	HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>2</sub> SO <sub>4</sub> , etc.
Metals	HNO <sub>3</sub> , HCl
Electronics	HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub> , H <sub>2</sub> SO <sub>4</sub> , etc.

**6. Phthalates**

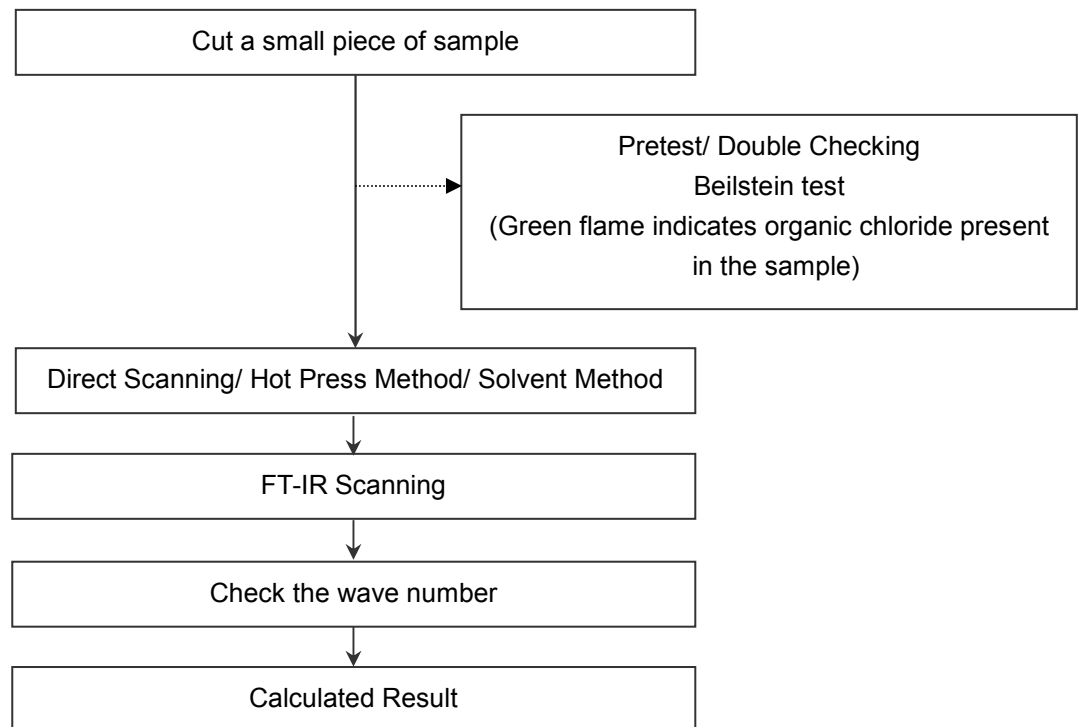
7. PFOA, PFOS



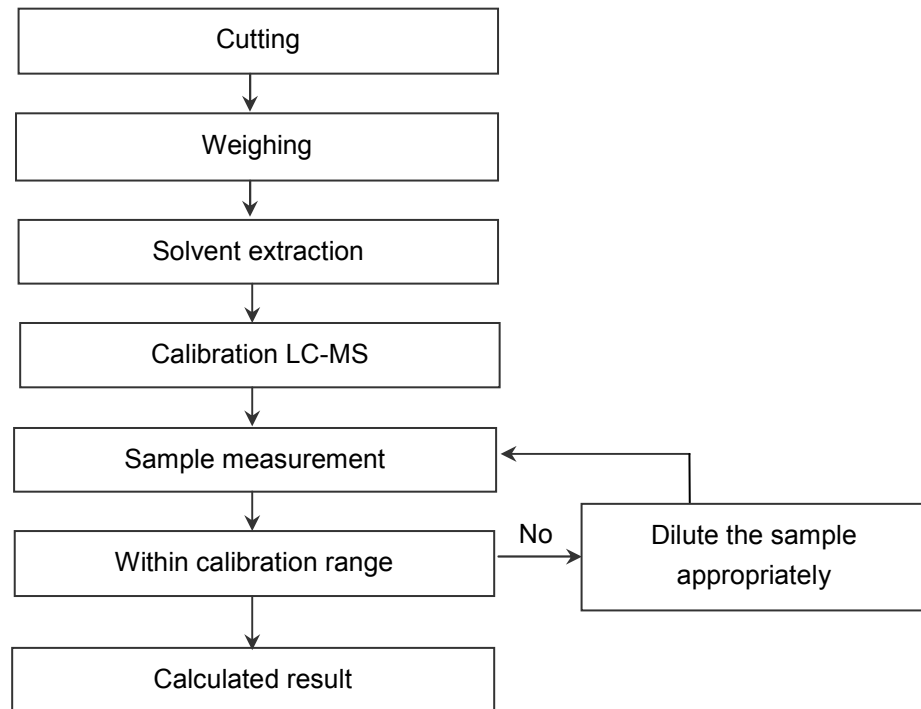
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**8. Short-chain chlorinated paraffins (SCCP)**

9. Polyvinyl chloride (PVC)



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**8. Hexabromocyclododecane (HBCDD)**

## 9. PCTs, PCNs, PCBs

