



# Test Report No. F690101/LF-CTSAYAA21-07897

Issued Date : 2021. 02. 09

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## YOUNG YIEL PRECISION CO., LTD

132, Beotkkot-ro  
Geumcheon-gu, Seoul  
Korea

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

**SGS File No.** : AYAA21-07897  
**Product Name** : Black Oxide HEAT STIFFENER  
**Item No./Part No.** : N/A  
**Client Reference Data** : HEAT SPREADER, SLUG, SINK, HAT TYPE  
**Received Date** : 2021. 01. 27  
**Test Period** : 2021. 01. 27 to 2021. 02. 09  
**Report Comments** : By the applicant's request, item No.s/part No.s & client reference information are stated/added on report.  
**Test Results** : For further details, please refer to following page(s)

SGS Korea Co., Ltd.

Tommy Oh / Chemical Lab Mgr

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CQP-7084E07 (01)

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**Sample No.** : AYAA21-07897.001  
**Sample Description** : Black Oxide HEAT STIFFENER  
**Item No./Part No.** : N/A  
**Materials** : N/A

## Heavy Metals

| Test Items                   | Unit               | Test Method   | MDL | Results |
|------------------------------|--------------------|---|-----|---------|
| Cadmium (Cd)                 | mg/kg              | With reference to IEC 62321-5 : 2013, by ICP-OES            | 0.5 | N.D.    |
| Lead (Pb)                    | mg/kg              | With reference to IEC 62321-5 : 2013, by ICP-OES            | 5   | N.D.    |
| Mercury (Hg)                 | mg/kg              | With reference to IEC 62321-4 : 2013+A1 : 2017, by ICP-OES  | 2   | N.D.    |
| Hexavalent Chromium (Cr VI)* | µg/cm <sup>2</sup> | With reference to IEC 62321-7-1 : 2015, by UV-Vis           | 0.1 | N.D.    |
| Antimony (Sb)                | mg/kg              | With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP | 10  | N.D.    |
| Arsenic (As)                 | mg/kg              | With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP | 10  | N.D.    |
| Beryllium (Be)               | mg/kg              | With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP | 5   | N.D.    |

## Flame Retardants-PBBs/PBDEs

| Test Items               | Unit  | Test Method                                    | MDL | Results |
|--------------------------|-------|--|-----|---------|
| Monobromobiphenyl        | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Dibromobiphenyl          | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Tribromobiphenyl         | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Tetrabromobiphenyl       | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Pentabromobiphenyl       | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Hexabromobiphenyl        | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Heptabromobiphenyl       | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Octabromobiphenyl        | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Nonabromobiphenyl        | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Decabromobiphenyl        | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Monobromodiphenyl ether  | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Dibromodiphenyl ether    | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Tribromodiphenyl ether   | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Tetrabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Pentabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Hexabromodiphenyl ether  | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Heptabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |

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**Sample No.** : AYAA21-07897.001  
**Sample Description** : Black Oxide HEAT STIFFENER  
**Item No./Part No.** : N/A  
**Materials** : N/A

**Flame Retardants-PBBs/PBDEs**

| Test Items              | Unit  | Test Method                                    | MDL | Results |
|-------------------------|-------|--|-----|---------|
| Octabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Nonabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |
| Decabromodiphenyl ether | mg/kg | With reference to IEC 62321-6 : 2015, by GC-MS | 5   | N.D.    |

**Phthalates**

| Test Items                         | Unit  | Test Method                                    | MDL | Results |
|------------------------------------|-------|--|-----|---------|
| Di-(2-ethylhexyl) phthalate (DEHP) | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Di-butyl phthalate (DBP)           | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Benzyl butyl phthalate (BBP)       | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Di-isobutyl phthalate (DIBP)       | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Di-isodecyl phthalate (DIDP)       | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Di-isononyl phthalate (DINP)       | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |
| Di-n-octyl phthalate (DNOP)        | mg/kg | With reference to IEC 62321-8 : 2017, by GC-MS | 50  | N.D.    |

**Halogen Content**

| Test Items   | Unit  | Test Method                              | MDL | Results |
|--------------|-------|--|-----|---------|
| Bromine(Br)  | mg/kg | With reference to EN 14582 : 2016, by IC | 30  | N.D.    |
| Chlorine(Cl) | mg/kg | With reference to EN 14582 : 2016, by IC | 30  | N.D.    |
| Fluorine(F)  | mg/kg | With reference to EN 14582 : 2016, by IC | 30  | N.D.    |
| Iodine(I)    | mg/kg | With reference to EN 14582 : 2016, by IC | 50  | N.D.    |

**Flame Retardants**

| Test Items                     | Unit  | Test Method                              | MDL | Results |
|--------------------------------|-------|--|-----|---------|
| Tetrabromobisphenol A          | mg/kg | With reference to US EPA 3540C, by GC-MS | 10  | N.D.    |
| Hexabromocyclododecane (HBCDD) | mg/kg | With reference to USEPA 3540 C, by LC/MS | 5   | N.D.    |

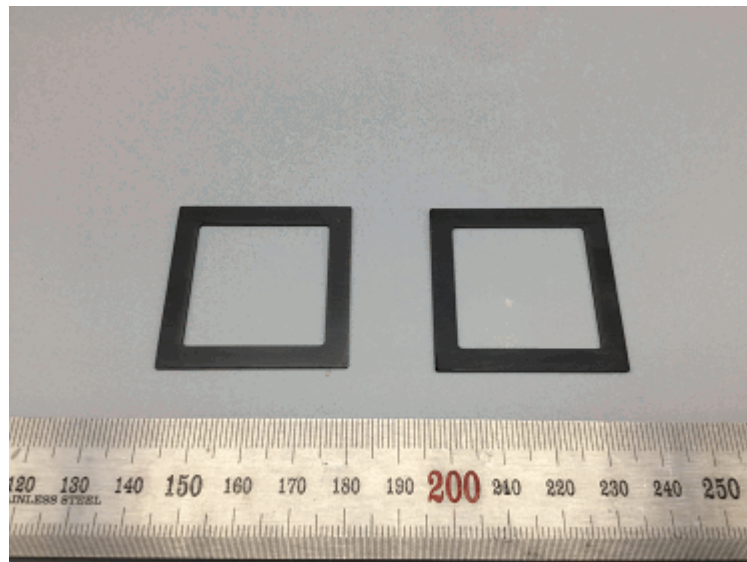
**Other(s)**

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

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- NOTE:
- (1) N.D. = Not detected.(<MDL)
  - (2) mg/kg = ppm, µg/kg = ppb, mg/L=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/cm<sup>2</sup>. 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/cm<sup>2</sup>). The coating is considered a non-CrVI based coating.  
 c. The result between 0.10 ug/cm<sup>2</sup> and 0.13 ug/cm<sup>2</sup> is considered to be inconclusive - unavoidable coating variations may influence the determination.
  - (8) The results shown in this test report refer only to the sample(s) tested unless otherwise stated.  
 This test report is not related to Korea Laboratory Accreditation Scheme .

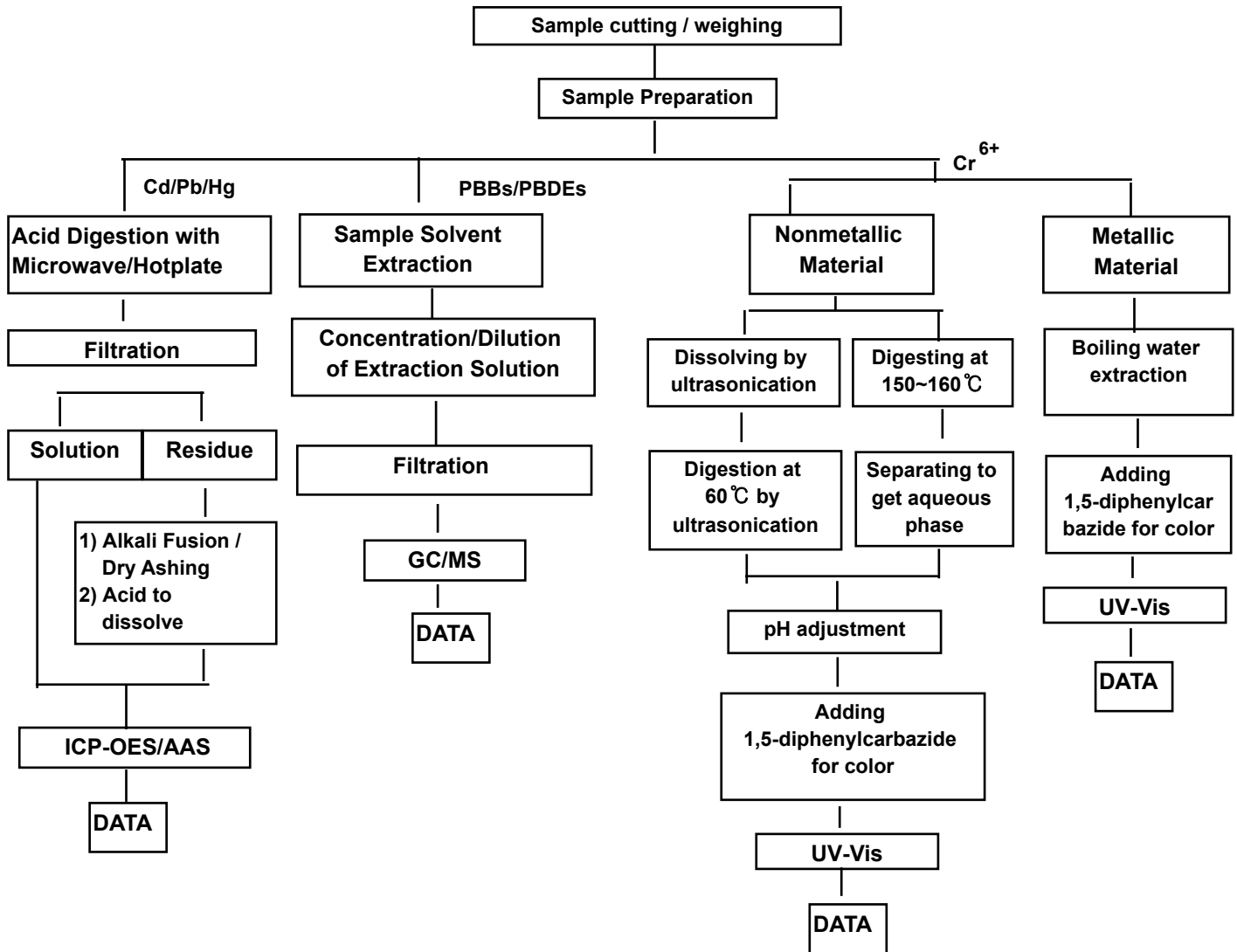
**Picture of Sample as Received:**



**AYAA21-07897.001**

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### Testing Flow Chart for RoHS:Cd/Pb/Hg/Cr<sup>6+</sup> /PBBs&PBDEs Testing



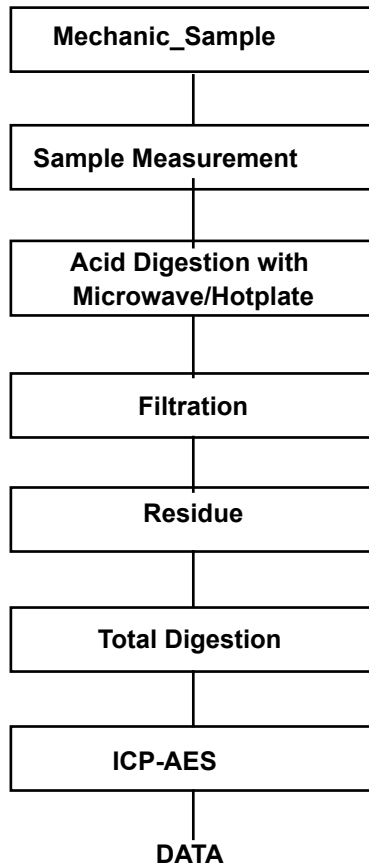
The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg  
 Section Chief : Timothy Jeon

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### Flow Chart for Inorganic Elements Testing

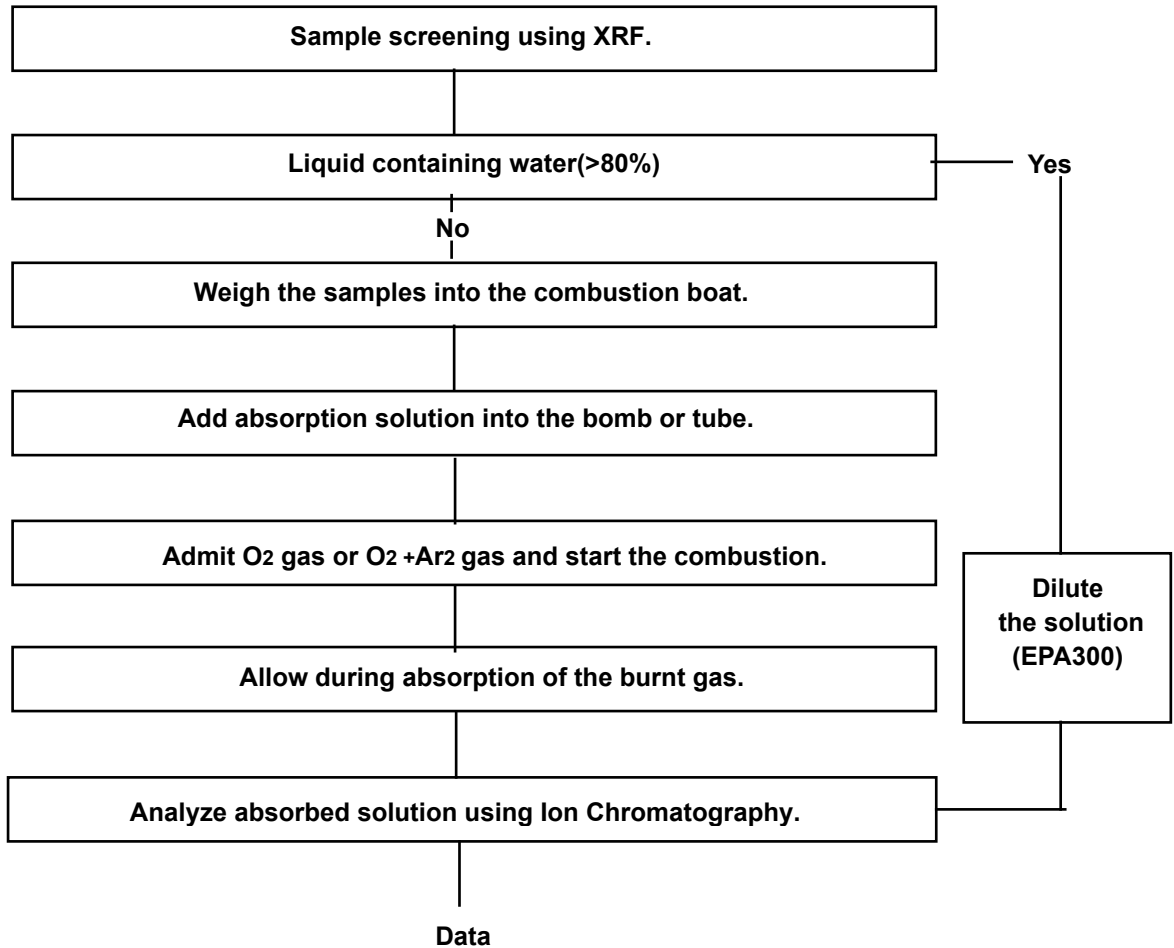
#### Inorganic Elements



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

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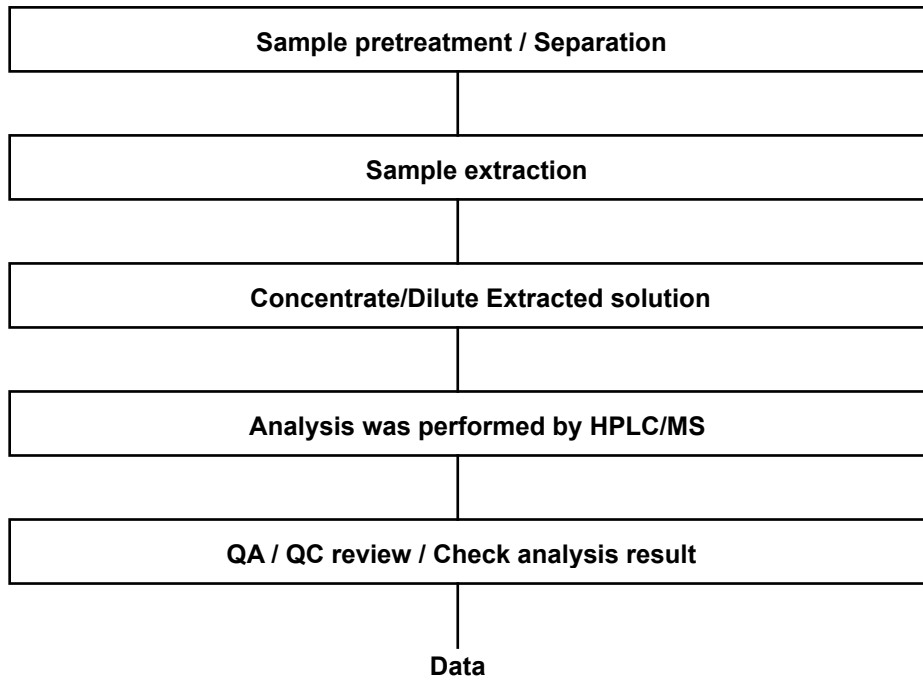
### Flow Chart for Halogen Test



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### Flow Chart for PFOS/PFOA Test

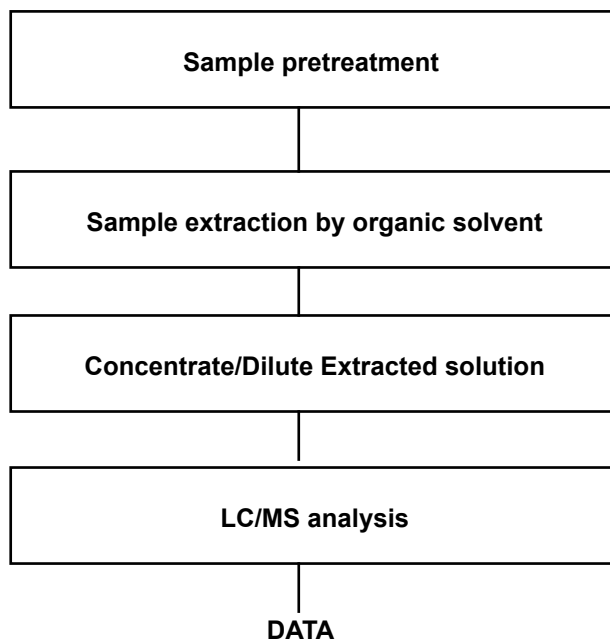


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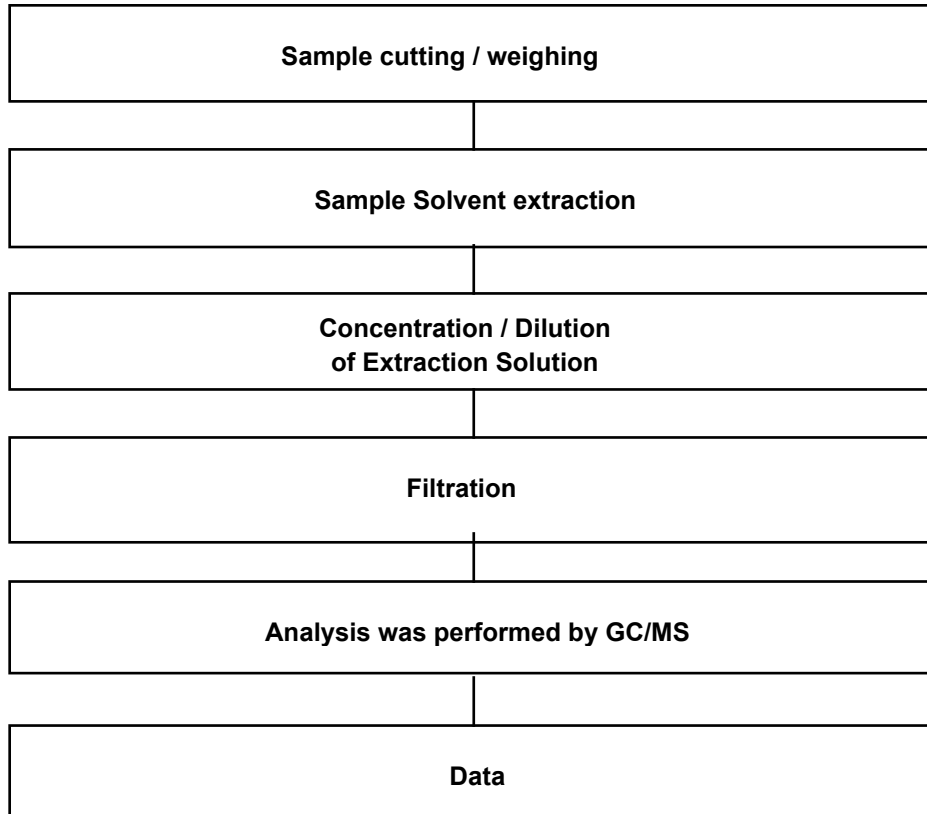
### Testing Flow Chart for HBCD



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### Flow Chart for Phthalate Test



\*\*\* End of Report \*\*\*

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