



Test Report No. F690101/LF-CTSAYAA24-06284

Issued Date : 2024. 02. 13

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Korea



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

SGS File No. : AYAA24-06284
Product Name : Arystal PMMA
Item No./Part No. : N/A
Received Date : 2024. 02. 02
Test Period : 2024. 02. 02 to 2024. 02. 13
Test Results : For further details, please refer to following page(s)


Tony Park


Billy Oh

Technical Manager / SGS Korea Co., Ltd

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CQP-7080E07 (01)

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Sample No. : AYAA24-06284.001
Sample Description : Arystal PMMA
Item No./Part No. : N/A
Materials : Poly-Methyl-Mechacrylate

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+AMD1:2017CSV, by ICP-OES | 2 | N.D. |
| Hexavalent Chromium (Cr VI)* | mg/kg | With reference to IEC 62321-7-2 : 2017, by UV-Vis and/or with reference to IEC 62321-5 : 2013, by ICP-OES | 8 | N.D. |

Total Metals

| Test Items | Unit | Test Method | MDL | Results |
|-----------------|-------|-----------------------------------------------------------------|-----|---------|
| Phosphorous (P) | mg/kg | With reference to EPA 3052 : 1996, EPA 6010D : 2018, by ICP-OES | 10 | 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. |

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Sample No. : AYAA24-06284.001
Sample Description : Arystal PMMA
Item No./Part No. : N/A
Materials : Poly-Methyl-Mechacrylate

Flame Retardants-PBBs/PBDEs

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

Halogen Contents

| Test Items | Unit | Test Method | MDL | Results |
|--------------|-------|----------------------------------------|-----|---------|
| Bromine(Br) | mg/kg | With reference to ASTM D 7359-18 , CIC | 30 | N.D. |
| Chlorine(Cl) | mg/kg | With reference to ASTM D 7359-18 , CIC | 30 | N.D. |
| Fluorine(F) | mg/kg | With reference to ASTM D 7359-18 , CIC | 30 | N.D. |
| Iodine(I) | mg/kg | With reference to ASTM D 7359-18 , CIC | 50 | N.D. |

Chlorinated Paraffin

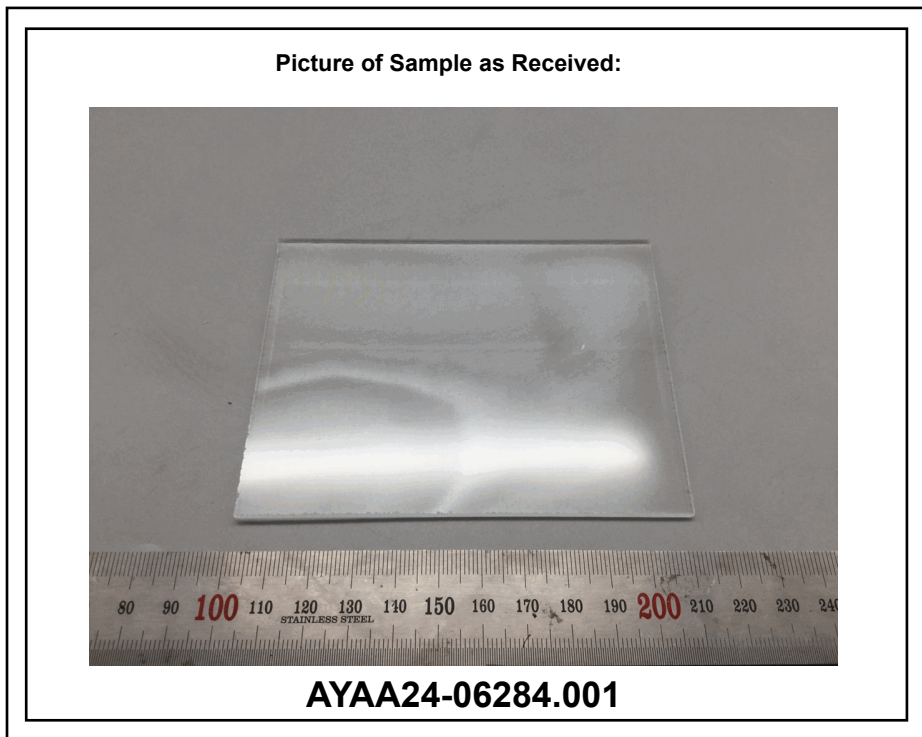
| Test Items | Unit | Test Method | MDL | Results |
|----------------------------------------------------------|-------|-------------------------------------------|-----|---------|
| Alkanes, C10~13, Short Chain Chlorinated Paraffins(SCCP) | mg/kg | With reference to ISO 18219, by GC-MS(Cl) | 50 | N.D.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

Polymer Identification

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

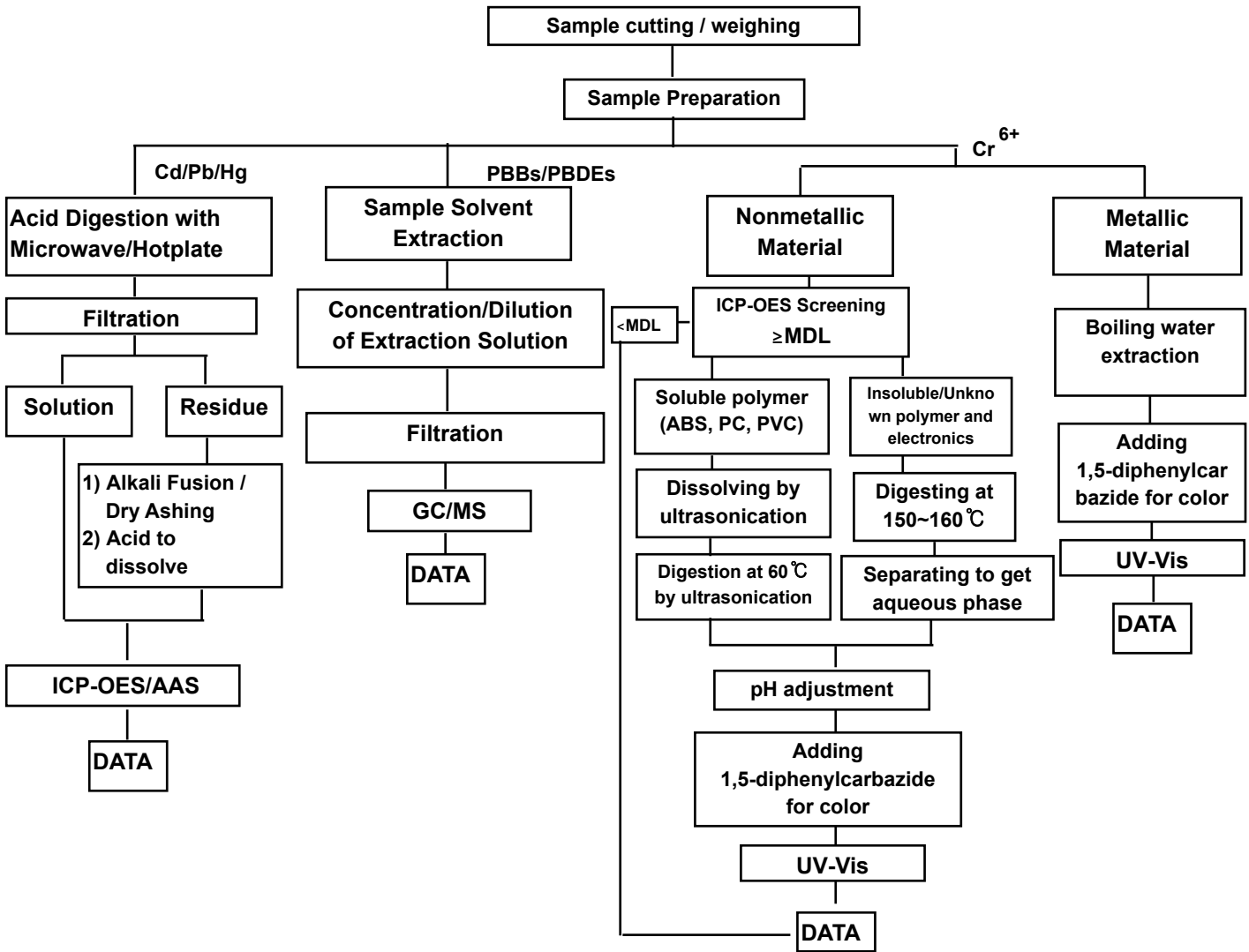
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- NOTE:
- (1) N.D. = Not detected. (<MDL)
 - (2) mg/kg = ppm, ug/kg = ppb, mg/L = ppm
 - (3) MDL = Method Detection Limit
 - (4) - = No regulation
 - (5) ** = Qualitative analysis (No Unit)
 - (6) Negative = Undetectable / Positive = Detectable
 - (7) * = a. The result of Hexavalent Chromium (Cr(VI)) is "ND" as the result of Chromium (Cr) is "ND", and confirmation test of Hexavalent Chromium (Cr(VI)) is not required.
b. If the content of Total Chromium (Cr) is greater than the MDL of Hexavalent Chromium (Cr(VI)), it is the result of hexavalent Chromium by UV-VIS.
 - (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 .



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Testing Flow Chart for RoHS: Cd/Pb/Hg/Cr⁶⁺ /PBBs&PBDEs Testing



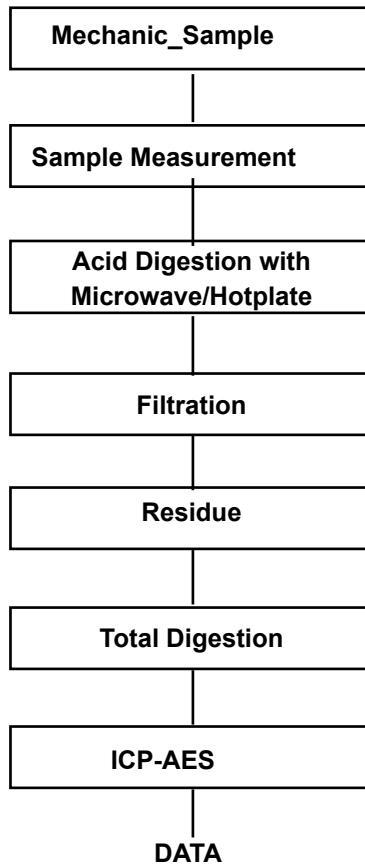
The samples were dissolved totally at the acid digestion step of the above flow chart for Cd,Pb,Hg
 Section Chief : Tonny Park

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Flow Chart for Inorganic Elements Testing

Inorganic Elements

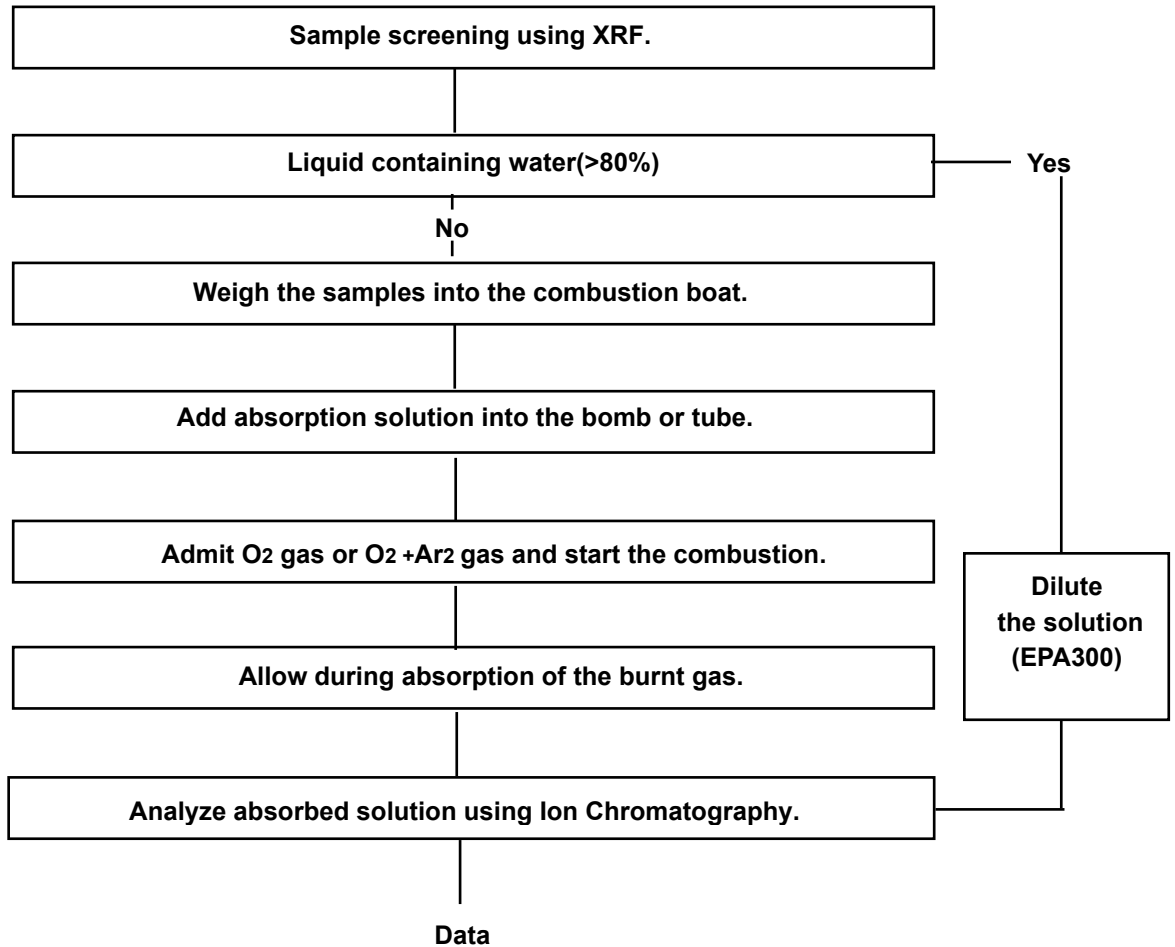


| | |
|------------------------------|-----------------------------------------------------------------|
| Major Inorganic Heavy Metals | Antimony(Sb) , Beryllium(Be) , Phosphorus(P) , Arsenic(As) etc. |
|------------------------------|-----------------------------------------------------------------|

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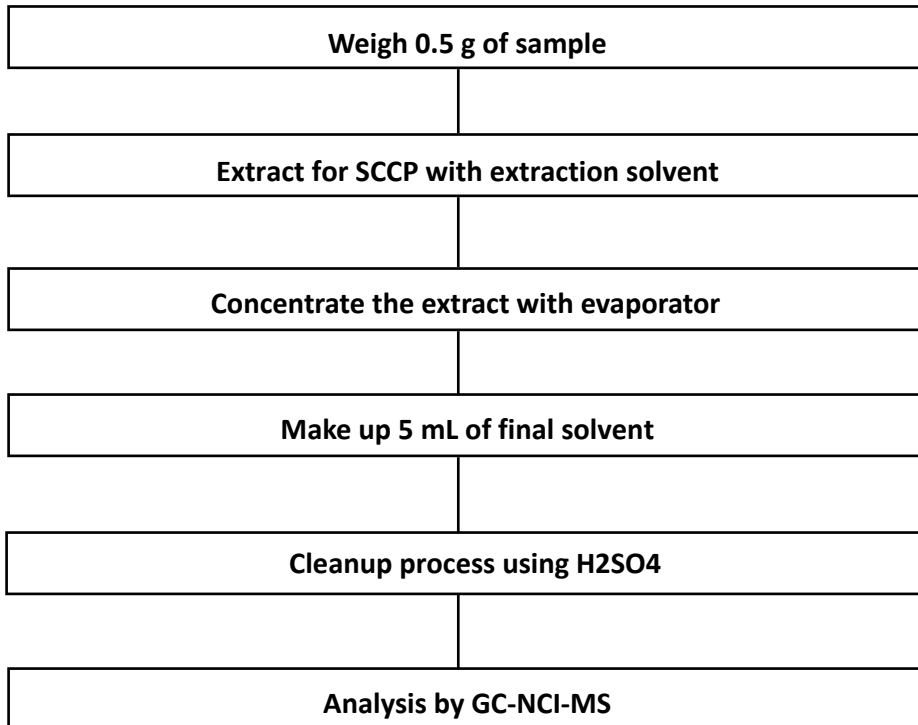
Flow Chart for Halogen Test



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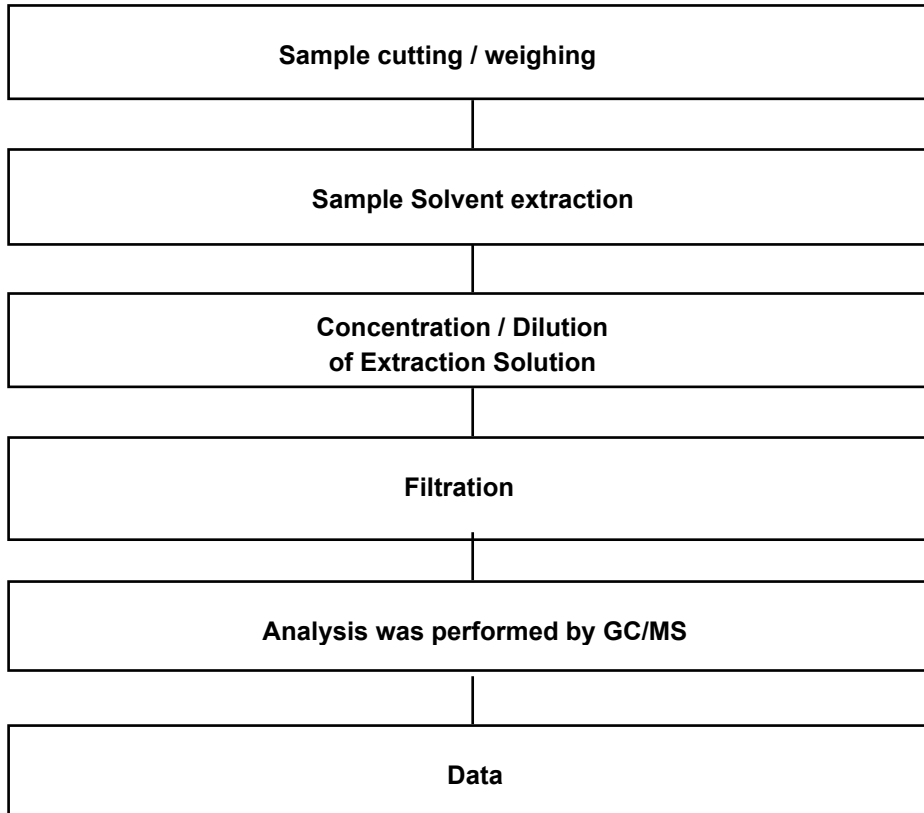
Flow Chart for SCCP



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Flow Chart for Phthalate Test



*** End of Report ***

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