

## Test Report

No. SHAEC1511244001

Date: 19 Jun 2015

Page 1 of 14

JIANGSU KUANGSHUN PHOTOSENSITIVITY NEW-MATERIAL STOCK CO., LTD.

Huacheng Road 18, Qingyang Industried Area, Jiangyin City, Jiangsu Province

The following sample(s) was/were submitted and identified on behalf of the clients as : Liquid photoimageable solder mask

SGS Job No. : SP15-019349 - SUZ

Model No. : KSM-S6188/KSM-18=3:1

Date of Sample Received : 12 Jun 2015

Testing Period : 12 Jun 2015 - 17 Jun 2015

Test Requested : Selected test(s) as requested by client.

Test Method : Please refer to next page(s).

Test Results : Please refer to next page(s).

Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) comply with the limits as set by RoHS Directive 2011/65/EU Annex II; recasting 2002/95/EC.

Signed for and on behalf of  
SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.



Helen Liu  
Approved Signatory



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Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	SHA15-112440.001	Green liquid

Remarks :

- (1) 1 mg/kg = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected ( < MDL )
- (4) "-" = Not Regulated

**RoHS Directive 2011/65/EU**

- Test Method :
- (1) With reference to IEC 62321-5:2013, determination of Cadmium by ICP-OES.
  - (2) With reference to IEC 62321-5:2013, determination of Lead by ICP-OES.
  - (3) With reference to IEC 62321-4:2013, determination of Mercury by ICP-OES.
  - (4) With reference to IEC 62321:2008, determination of Hexavalent Chromium by Colorimetric Method using UV-Vis.
  - (5) With reference to IEC 62321:2008, determination of PBBs and PBDEs by GC-MS.

Test Item(s)	Limit	Unit	MDL	001
Cadmium (Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	ND
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	2	ND
Sum of PBBs	1000	mg/kg	-	ND
Monobromobiphenyl	-	mg/kg	5	ND
Dibromobiphenyl	-	mg/kg	5	ND
Tribromobiphenyl	-	mg/kg	5	ND
Tetrabromobiphenyl	-	mg/kg	5	ND
Pentabromobiphenyl	-	mg/kg	5	ND
Hexabromobiphenyl	-	mg/kg	5	ND
Heptabromobiphenyl	-	mg/kg	5	ND
Octabromobiphenyl	-	mg/kg	5	ND
Nonabromobiphenyl	-	mg/kg	5	ND
Decabromobiphenyl	-	mg/kg	5	ND
Sum of PBDEs	1000	mg/kg	-	ND
Monobromodiphenyl ether	-	mg/kg	5	ND



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# Test Report

No. SHAEC1511244001

Date: 19 Jun 2015

Page 3 of 14

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Dibromodiphenyl ether	-	mg/kg	5	ND
Tribromodiphenyl ether	-	mg/kg	5	ND
Tetrabromodiphenyl ether	-	mg/kg	5	ND
Pentabromodiphenyl ether	-	mg/kg	5	ND
Hexabromodiphenyl ether	-	mg/kg	5	ND
Heptabromodiphenyl ether	-	mg/kg	5	ND
Octabromodiphenyl ether	-	mg/kg	5	ND
Nonabromodiphenyl ether	-	mg/kg	5	ND
Decabromodiphenyl ether	-	mg/kg	5	ND

Notes :

- (1) The maximum permissible limit is quoted from the directive 2011/65/EU, Annex II
- (2) Result shown is of the total weight of wet sample.

**EN71-3:2013+A1:2014 under European Directive 2009/48/EC-Migration of certain elements (Category III:for scrapped-off toy material)**

Test Method : With reference to EN71-3:2013+A1:2014, analysis was performed by ICP-OES.  
Soluble Organic Tin was analyzed by GC-MS.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Soluble Chromium (VI) (Cr VI)	0.2	mg/kg	0.18	ND
Soluble Lead (Pb)	160	mg/kg	10	ND
Soluble Antimony (Sb)	560	mg/kg	10	ND
Soluble Arsenic (As)	47	mg/kg	10	ND
Soluble Barium (Ba)	56000	mg/kg	50	343
Soluble Cadmium (Cd)	17	mg/kg	10	ND
Soluble Chromium (III) (Cr III)	460	mg/kg	5	ND
Soluble Mercury (Hg)	94	mg/kg	10	ND
Soluble Selenium (Se)	460	mg/kg	10	ND
Soluble Boron (B)	15000	mg/kg	50	ND
Soluble Cobalt (Co)	130	mg/kg	10	ND
Soluble Manganese (Mn)	15000	mg/kg	50	ND
Soluble Strontium (Sr)	56000	mg/kg	50	ND
Soluble Zinc (Zn)	46000	mg/kg	50	ND
Soluble Copper (Cu)	7700	mg/kg	50	ND
Soluble Aluminum (Al)	70000	mg/kg	50	ND
Soluble Nickel (Ni)	930	mg/kg	10	ND
Soluble Tin (Sn)	180000	mg/kg	4.9	ND
Soluble Organic Tin*	-	mg/kg	-	ND



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# Test Report

No. SHAEC1511244001

Date: 19 Jun 2015

Page 4 of 14

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
^Methyl tin (MeT)	-	mg/kg	0.5	ND
^Di-n-propyl tin (DProT)	-	mg/kg	0.5	ND
^Dibutyl tin (DBT)	-	mg/kg	0.5	ND
^Tributyl tin (TBT)	-	mg/kg	0.5	ND
^n-Octyl tin (MOT)	-	mg/kg	0.5	ND
^Tetrabutyl tin (TeBT)	-	mg/kg	0.5	ND
^Diphenyl tin (DPhT)	-	mg/kg	0.5	ND
^Di-n-octyl tin (DOT)	-	mg/kg	0.5	ND
^Triphenyl tin (TPhT)	-	mg/kg	0.5	ND
^Butyl tin(BuT)	-	mg/kg	0.5	ND
Sum of Soluble Organic Tin	12	mg/kg	-	ND

Notes :

- (1) Confirmation test of soluble chromium (III) & chromium (VI) is not required in case of soluble chromium does not exceed their requirements as specified in EN71-3:2013+A1:2014.
- (2) ^ means the Organic Tin specified in EN71-3:2013+A1:2014 and it is analyzed by GC-MS
- (3) Result shown is of the total weight of dried sample.

**Element(s)**

Test Method : With reference to US EPA 3052:1996, analysis was performed by ICP-OES.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Arsenic (As)	mg/kg	10	ND

Notes :

- (1) Result shown is of the total weight of wet sample.

**Tetrabromobisphenol A (TBBP-A)**

Test Method : With reference to IEC 62321:2008, analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Tetrabromobisphenol A (TBBP-A)	mg/kg	10	ND

Notes :

- (1) Result shown is of the total weight of wet sample.



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**Nonylphenol (NP)**

Test Method : In-house method (SHTC-CHEM-SOP-92-T), analysis was performed by LC-MS.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Nonylphenol(NP)	mg/kg	10	ND

**Notes :**

- 1.NP Reference Information: Entry 46 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006 (previously restricted under Directive 2003/53/EC): Shall not be placed on the market, or used, as substances or in mixtures in concentrations equal to or greater than 0,1 % by weight for industrial and institutional cleaning, domestic cleaning, textiles and leather processing, emulsifier in agricultural teat dips, metal working, manufacturing of pulp and paper, cosmetic products, other personal care products and co-formulants in pesticides and biocides.  
Please refer to Regulation (EC) No 552/2009 to get more detail information.
- 2 Result shown is of the total weight of wet sample.

**Phthalates**

Test Method : Determination of phthalates by GC-MS based on EN 14372:2004.

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Dibutyl Phthalate (DBP)	84-74-2	%	0.003	ND
Benzylbutyl Phthalate (BBP)	85-68-7	%	0.003	ND
Bis-(2-ethylhexyl) Phthalate (DEHP)	117-81-7	%	0.003	ND
Diisobutyl Phthalate (DIBP)	84-69-5	%	0.003	ND
Diisononyl Phthalate (DINP)	28553-12-0 /68515-48-0	%	0.01	ND
Di-n-octyl Phthalate (DNOP)	117-84-0	%	0.003	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 /68515-49-1	%	0.01	ND
Dimethyl Phthalate (DMP)	131-11-3	%	0.003	ND
Diethyl Phthalate (DEP)	84-66-2	%	0.003	ND
Dipropyl Phthalate (DPrP)	131-16-8	%	0.003	ND
Diphenyl Phthalate (DPhP)	84-62-8	%	0.003	ND
Dibenzyl Phthalate (DBzP)	523-31-9	%	0.003	ND
Dinonyl Phthalate (DNP)	84-76-4	%	0.003	ND
Diisooctyl Phthalate (DiOP)	27554-26-3	%	0.01	ND
Di-n-hexyl Phthalate (DnHP)	84-75-3	%	0.003	ND



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## Test Report

No. SHAEC1511244001

Date: 19 Jun 2015

Page 6 of 14

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Dicyclohexyl Phthalate (DCHP)	84-61-7	%	0.003	ND
1,2-Benzenedicarboxylic acid, dipentyl ester, branched and linear	84777-06-0	%	0.01	ND
Di-n-pentyl Phthalates (DnPP)	131-18-0	%	0.003	ND

### Notes :

Reference Information: Directive 2011/65/EU recasting RoHS directive 2002/95/EC and the latest amending directive:

(1) Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), and Dibutyl phthalate (DBP) are considered as a priority for risk evaluation and substance restriction.

(2) Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl Phthalates (DIBP) have been adopted in the draft of Commission Delegated Directive amending Annex II to Directive 2011/65/EU of the European Parliament, and the regulatory limit of each restricted substances should be 0.1%.

(3) Result shown is of the total weight of wet sample.

### PFOS (Perfluorooctane Sulfonates) and PFOA (Perfluorooctanoic Acid)

Test Method : With reference to US EPA 3550C: 2007, analysis was performed by HPLC-MS.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Perfluorooctane Sulfonates (PFOS) and related Acid, Metal Salt and Amide	10	mg/kg	10	ND
Perfluorooctanoic Acid (PFOA)	-	mg/kg	10	ND

### Notes :

(1) Max. limit specified by commission regulation (EU) No. 757/2010 amending regulation (EC) No 850/2004.

(2) Result shown is of the total weight of wet sample.

### Hexabromocyclododecane (HBCDD)

Test Method : With reference to US EPA 3550C: 2007, analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Hexabromocyclododecane (HBCDD)	3194-55-6	mg/kg	10	ND

### Notes :

(1) Result shown is of the total weight of wet sample.



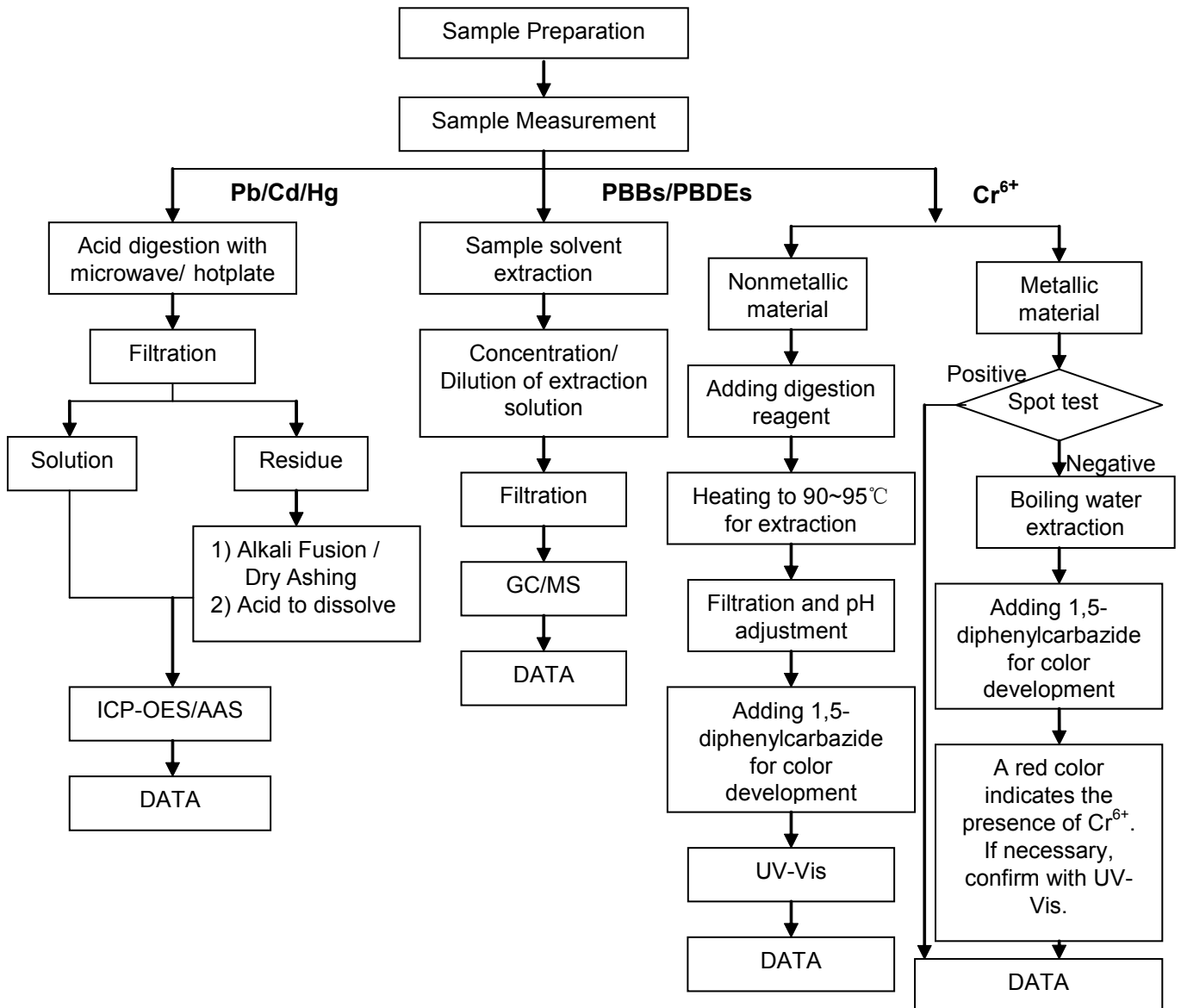
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RoHS Testing Flow Chart

- 1) Name of the person who made testing: Bob Zhang/Gary Xu/Zengzhen Zhu/Sunny Qin
- 2) Name of the person in charge of testing: Jan Shi/Summer Jin/Jessy Huang/Stone Chen
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded)



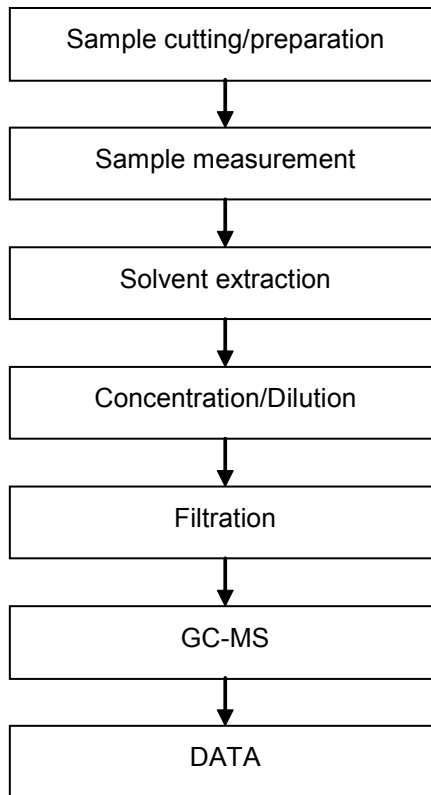
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### Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Sherlock Gao
- 2) Name of the person in charge of testing: Myra Ma



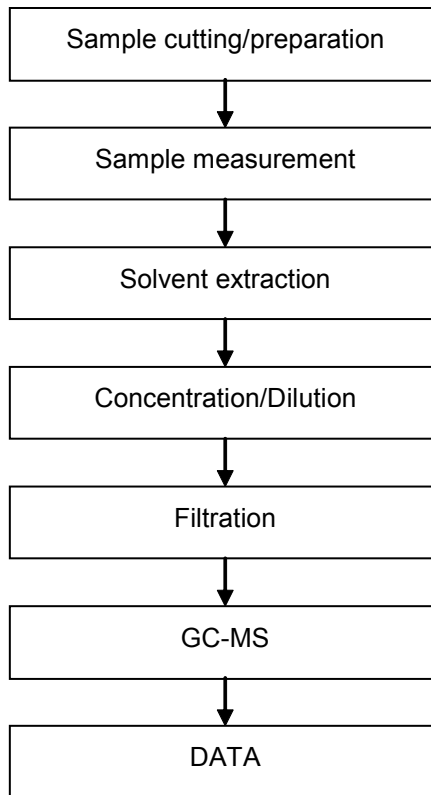
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HBCDD Testing Flow Chart

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Jessy Huang



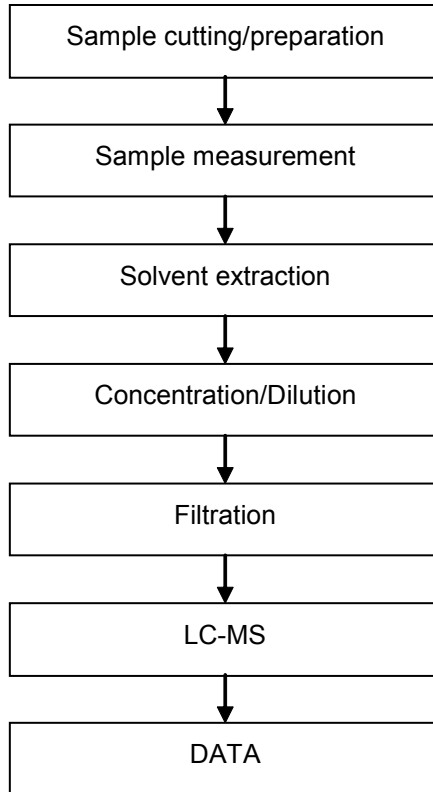
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PFOS/PFOA Testing Flow Chart

- 1) Name of the person who made testing: Jane Yang
- 2) Name of the person in charge of testing: Myra Ma



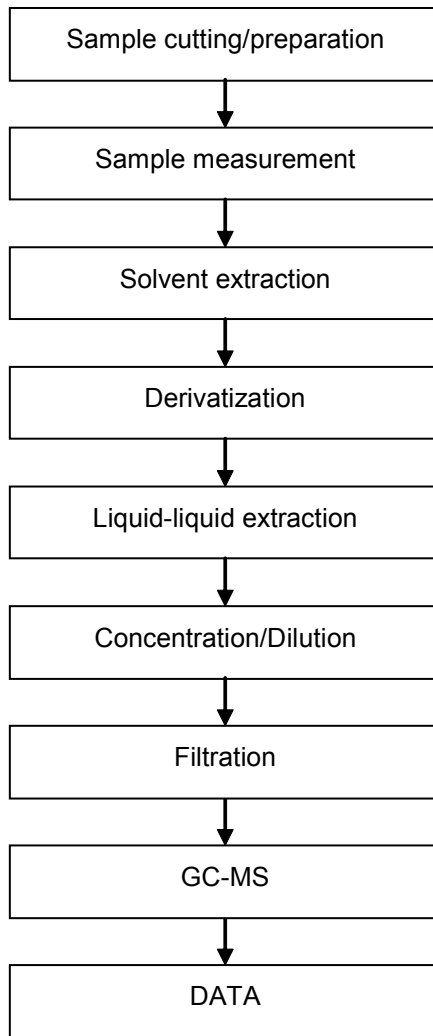
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**TBBP-A Testing Flow Chart**

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Jessy Huang



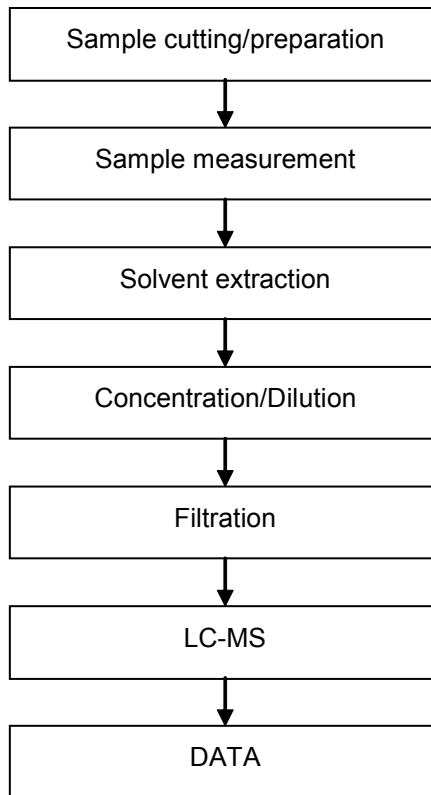
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## ATTACHMENTS

### NP Testing Flow Chart

- 1) Name of the person who made testing: Jane Yang
- 2) Name of the person in charge of testing: Myra Ma



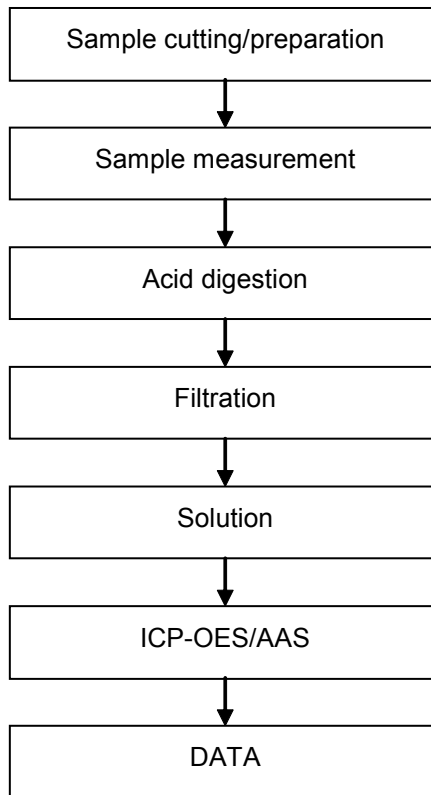
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ATTACHMENTS

Elements Testing Flow Chart

- 1) Name of the person who made testing: Bob Zhang/Sunny Qin
- 2) Name of the person in charge of testing: Summer Jin/Jan Shi



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