

## Test Report

No. CTSSA/22191/13+KA/2013/A0723  
CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

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TANAKA ELECTRONICS (M) SDN BHD  
PLOT 11, PHASE IV, BAYAN LEPAS FREE INDUSTRIAL ZONE  
11900 PENANG, MALAYSIA

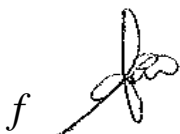
The following merchandise was (were) submitted and identified by the client as:

Sample Description : Au Bonding Wire  
Sample Receiving Date : 10/10/2013  
Testing Period : 10/10/2013 to 17/10/2013  
Date Completed : 17/10/2013  
Reporting Date : 01/11/2013

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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).  
Analysts : Ng Jing Wei, Cho Kar Yen, Tan Li Wei, Teh Pui Sean , Lim Meng Hoe  
Tay Siam Pine & Yee Sook Wai

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Test results:

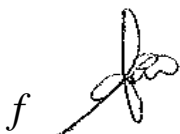
Test Part Description :

Sample Description : Au Bonding Wire

## RoHS Directive 2011/65/EU Annex II

Test Item(s):	Unit	Test Method	Results	MDL
Cadmium (Cd)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Lead (Pb)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Mercury (Hg)	mg/kg	With reference to IEC 62321:2008, and performed by ICP-OES	N.D.	2
Hexavalent Chromium (CrVI)	mg/kg	With reference to JIS H 8625, and performed by UV-VIS Spectrophotometry	N.D.	2
Hexavalent Chromium (CrVI) by Spot test / boiling water extraction (optional) #	---	With reference to IEC 62321:2008	Negative	-
<b>Sum of PBBs</b>	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	-
Monobromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Dibromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tribromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Pentabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Hexabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Heptabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Octabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Nonabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Decabromobiphenyl	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5

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Sum of PBDEs	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	-
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321:2008, and performed by GC-MS	N.D.	5

Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) # = **Spot-Test:**

a. Negative means the absence of Cr(VI) on the tested areas

b. Positive means the presence of Cr(VI) on the tested areas

(The tested sample should be further verified by boiling-water-extraction method if the spot test result is negative or cannot be confirmed)

**Boiling water extraction:**

a. Negative means the absence of Cr(VI) on the tested areas

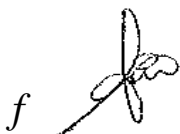
b. Positive means the presence of Cr(VI) on the tested areas;

The detected concentration in 50 mL boiling water extraction solution is equal or greater than 0.02 mg/kg with 50 cm<sup>2</sup> sample surface area.

For corrosion protection coatings on metals: Information on storage conditions and production date of the tested sample is unavailable and thus results of Cr(VI) represent status of the sample at the time of testing.

(e) - = Not regulated

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Test results by chemical method:

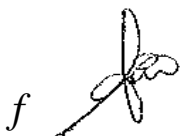
Test Item (s):	Unit	Method	Result	MDL
Antimony (Sb)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Magnesium (Mg)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Beryllium (Be)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	5	2
Polyvinylchloride (PVC)	**	Analysis was performed by FT-IR/ATR	Negative	-
<b>Halogen</b>	---	---	---	---
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Fluorine content.	N.D.	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Chlorine content.	N.D.	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Bromine content.	N.D.	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582. Analysis was performed by IC method for Iodine content.	N.D.	50

## Test Part Description:

Sample Description : Au Bonding Wire

- Note :
- (a) mg/kg = ppm
  - (b) N.D. = Not Detected
  - (d) --- = Not Conducted
  - (e) “-“ = Not regulated
  - (f) \*\* = Qualitative analysis (no unit)
  - (g) MDL= Method Detection Limit
  - (h) Negative = Undetectable / Positive = Detectable

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Test results by chemical method:

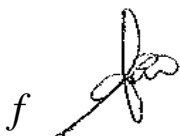
Test Item (s):	Unit	Method	Result	MDL
Hexabromocyclododecane (HBCDD)	mg/kg	Based on EPA 3540C, and performed by GC-MS	N.D.	10
<b>Phthalates</b>	---	---	---	---
DBP (Di-butyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DEHP (Di-(2-ethylhexyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
BBP (Benzyl Butyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DINP (Di-isononyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.01
DIDP (Di-isodecyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.01
DNOP (Di-n-octyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DNHP (Di-n-hexyl phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
DMEP (Bis(2-methoxyethyl)phthalate)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003
*Di-isobutyl phthalate (DIBP)	%	With reference to Chromatographia Vol.47, No.784, 1998. Analysis was performed by GC/MS.	N.D.	0.003

## Test Part Description:

Sample Description : Au Bonding Wire

- Note :
- (a) mg/kg = ppm
  - (b) N.D. = Not Detected
  - (c) MDL = Method Detection Limit
  - (d) --- = Not Conducted
  - (e) \* = The above result is extracted from the Report No. CTSSA/22889/13

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Test Part Description :

Sample Description : Au Bonding Wire

Test results:

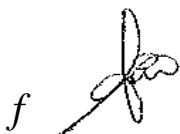
Test Item (s):	Unit	Method	Result	MDL
Dimethyl Fumarate (CAS No. 624-49-7)	mg/kg	With reference to US EPA 3550C method. Analysis was performed by GC/MS.	N.D.	0.1
Perfluorooctane sulfonates (PFOS) PFOS – Acid, Metal Salt, Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS content. Analysis was performed by LC/MS.	N.D.	10
PFOA (CAS No.: 000335-67-1)	mg/kg	With reference to US EPA 3540C: 1996 method for PFOA content. Analysis was performed by LC/MS.	N.D.	10
*Phosphorus (P)	mg/kg	With reference to US EPA Method 3052 for Phosphorus Content. Analysis was performed by ICP-AES	N.D.	2
*Polychlorinated Naphthalene (PCNs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS	N.D.	5
*Polychlorinated Terphenyls (PCTs)	mg/kg	With reference to US EPA 3540C method. Analysis was performed by GC/MS	N.D.	0.5

- Note : (a) mg/kg = ppm  
 (b) N.D. = Not Detected  
 (c) MDL = Method Detection Limit  
 (d) --- = Not Conducted  
 (e) \* = The above tests were subcontracted to SGS Taiwan based on report no. KA/2013/A0723

**PFOS Reference Information : POPs – (EU) 757/2010**

Outlawing PFOS as substances or preparations in concentrations above 0.001% (10ppm), in semi-finished products or articles or parts at a level above 0.1%(1000ppm), in textiles or other coated materials above 1µg/m<sup>2</sup>.

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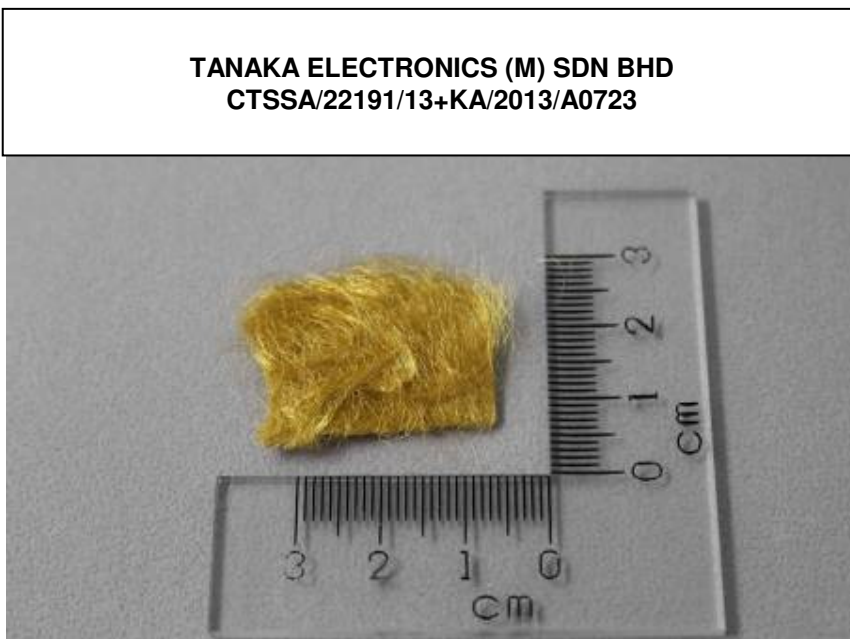
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### Test Part Description :

Sample Description : Au Bonding Wire

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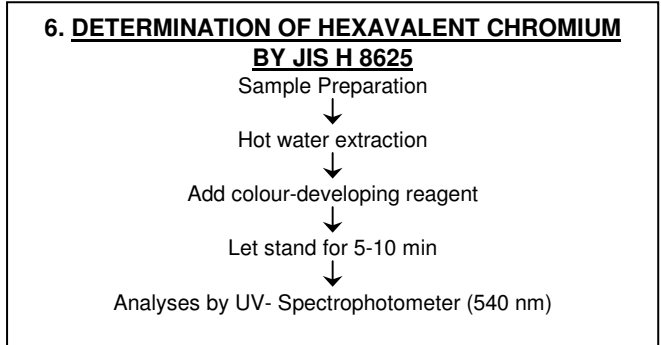
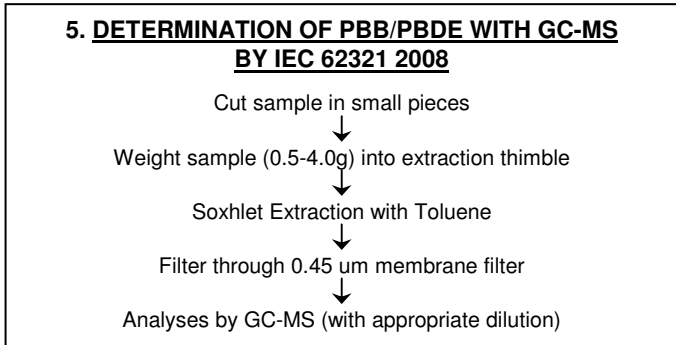
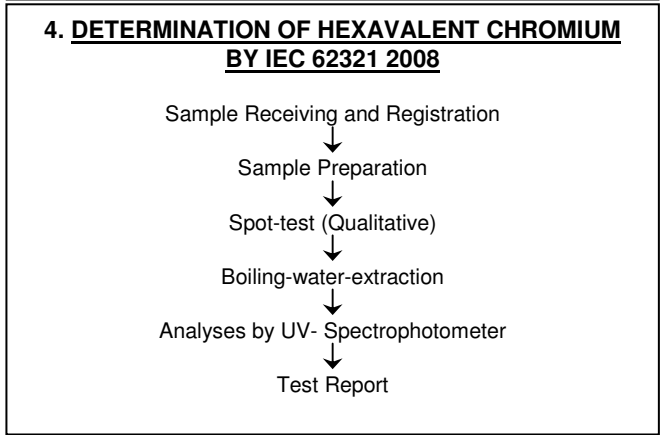
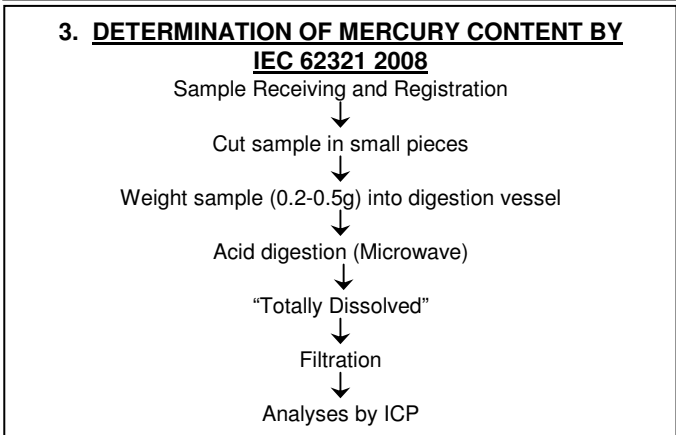
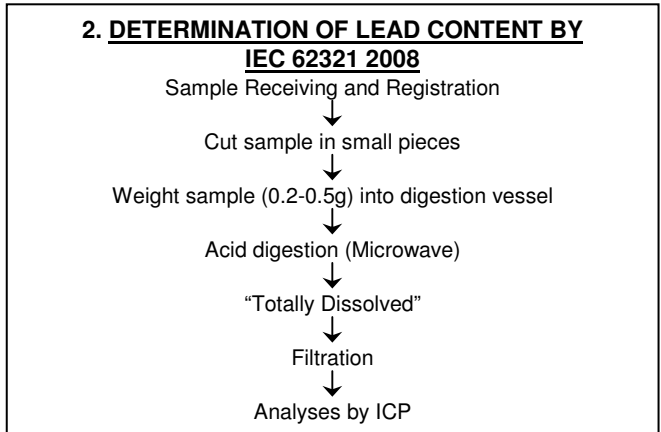
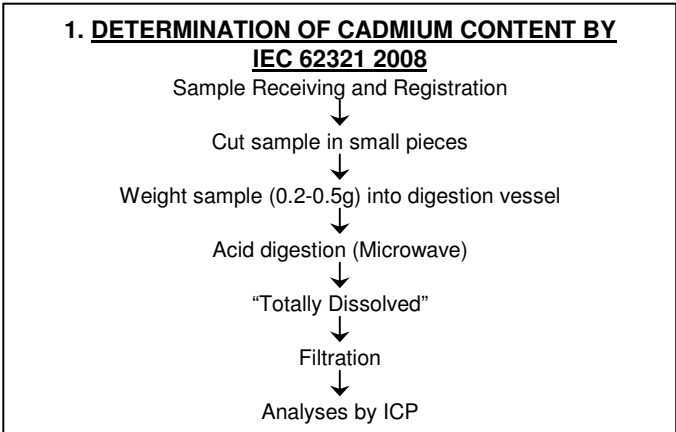
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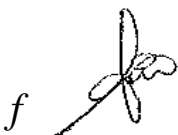
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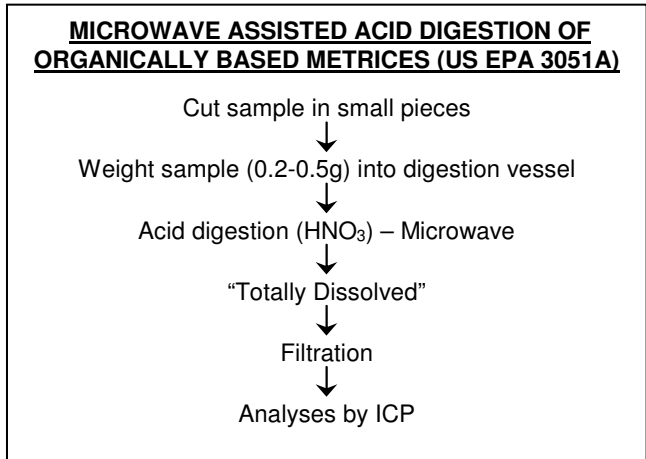
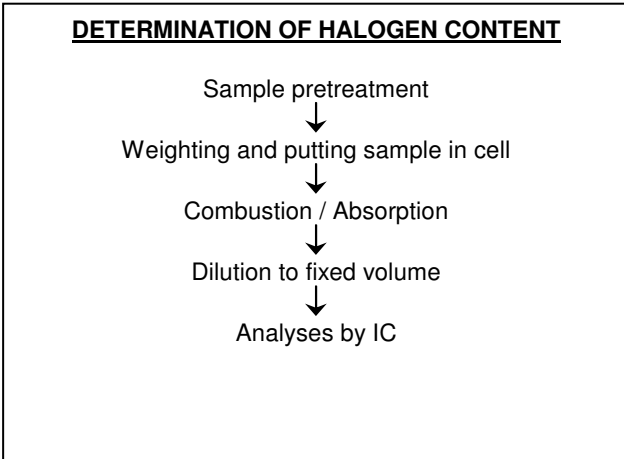
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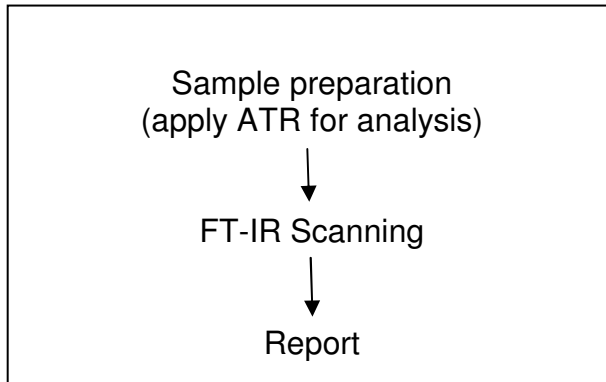
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**FLOW CHART FOR PVC DETECTION WITH FTIR**



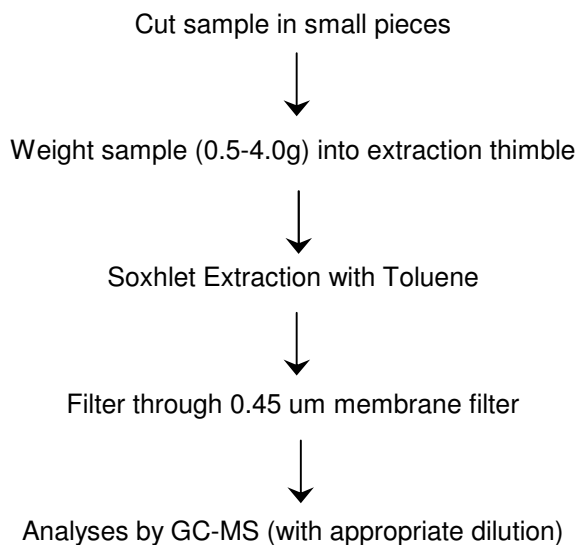
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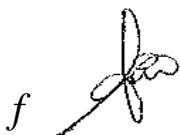
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### DETERMINATION OF HBCDD CONTENT



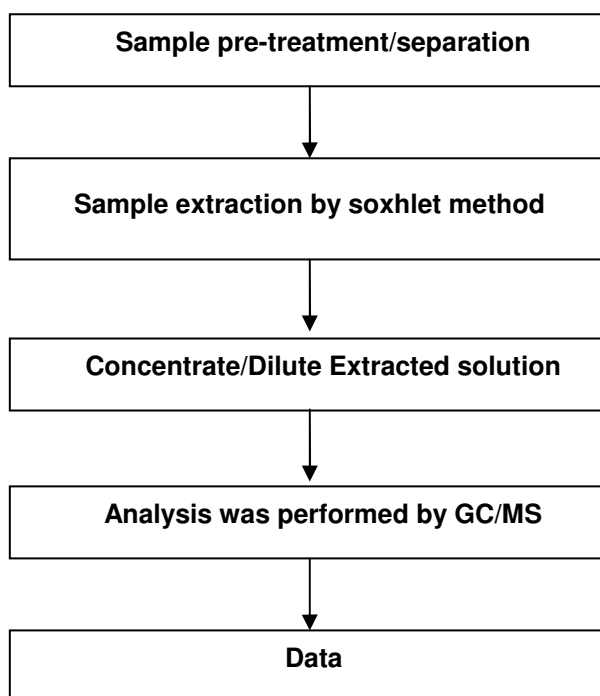
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### Analytical flow chart of Phthalates Content

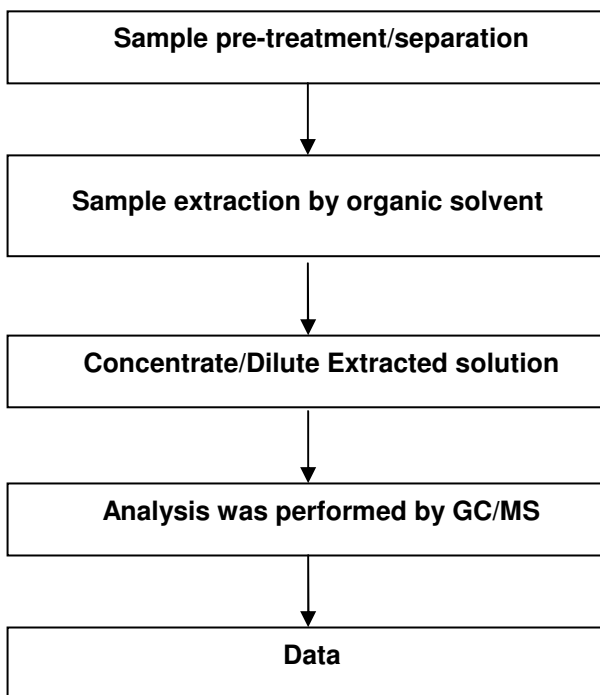


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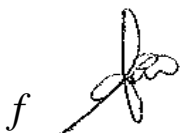
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**Analytical Flow Chart for Dimethyl Fumarate**



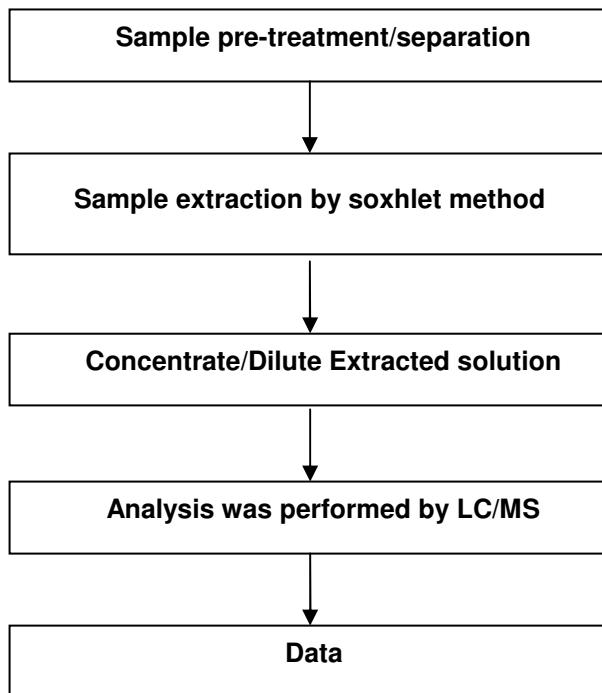
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### Analytical Flow Chart of PFOS & PFOA Content



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# Test Report

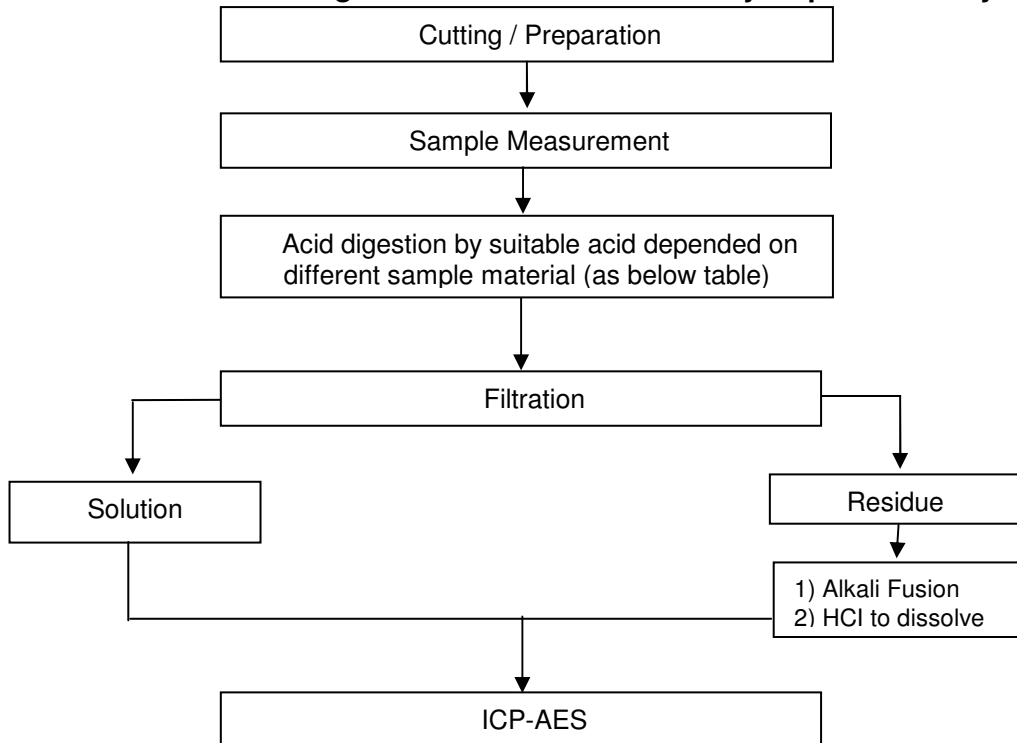
No. CTSSA/22191/13+KA/2013/A0723  
 CTS Ref. CTSSA/13/3207/Tanaka

Date : 01/11/2013

Page: 14 of 15

- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) Name of the person who made measurement: Alex Chang
- 3) Name of the person in charge of measurement: Ray Chang

## Flow Chart of digestion for the elements analysis performed by ICP-AES



Steel, copper, aluminium, solder	Aqua regia, HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
Glass	HNO <sub>3</sub> /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO <sub>3</sub>
Plastic	H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
Others	Any acid to total digestion

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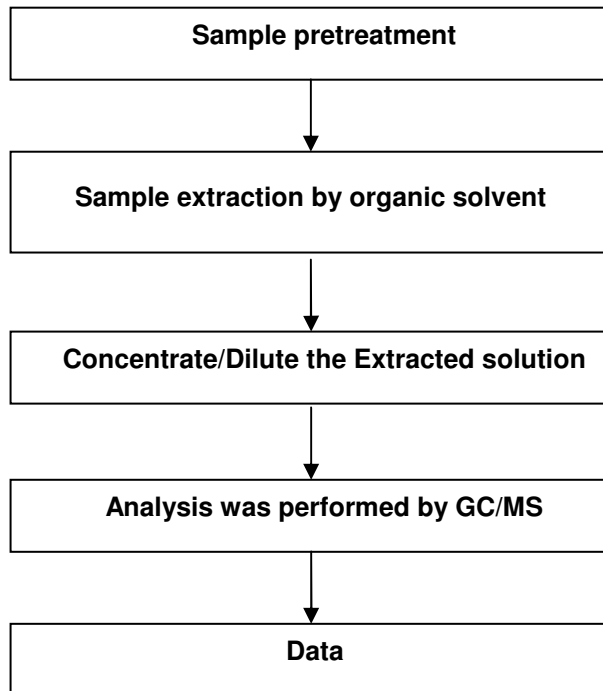
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**Chlorinated Flame retardant analytical Flow Chart**

- 1) Name of the person who made measurement: Anson Tsao
- 2) Name of the person in charge of measurement: Ray Chang

- Reference method: US EPA 8270D, US EPA 3540
- Test Item: PCNs, PCTs, Mirex
- 



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

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