

## Test Report

No. CRSSA/11509(AD)/17  
CRS Ref. CRSSA/17/2391/Tanaka

Date : 20/09/2017

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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 : 13/09/2017  
Testing Date : 13/09/2017 to 20/09/2017  
Date Completed : 20/09/2017  
Reporting Date : 20/09/2017

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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 : Tan Mei Ann, Ling Yii Ming, Leong Ryh Cherng & Chew Jia Jia

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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	Limit
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cd by ICP-OES)	N.D.	2	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Pb by ICP-OES)	N.D.	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Hg by ICP-OES)	N.D.	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to JIS H 8625, and performed by UV-VIS Spectrophotometry	N.D.	2	1000
Hexavalent Chromium (CrVI) #	µg/cm <sup>2</sup>	With reference to IEC 62321-7-1:2015 (Determination of CrVI by UV-VIS)	N.D.	0.10	-
<b>Sum of PBBs</b>	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	-	1000
Monobromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Dibromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Tribromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Tetrabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Pentabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Hexabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Heptabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Octabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Nonabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-
Decabromobiphenyl	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB by GC-MS)	N.D.	5	-

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Sum of PBDEs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	-	1000
Monobromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Dibromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Tribromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Tetrabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Pentabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Hexabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Heptabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Octabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Nonabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE by GC-MS)	N.D.	5	-
Decabromodiphenyl ether	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBDE 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) # = a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13  $\mu\text{g}/\text{cm}^2$ . 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  $\mu\text{g}/\text{cm}^2$ ). The coating is considered a non-CrVI based coating  
 c. The result between 0.10  $\mu\text{g}/\text{cm}^2$  and 0.13  $\mu\text{g}/\text{cm}^2$  is considered to be inconclusive - unavoidable coating variations may influence the determination
- 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 represent status of the sample at the time of testing.
- (e) - = not regulated
  - (f) The above test was conducted at SGS Shah Alam Seksyen 22
  - (g) This report supersedes report no. CRSSA/11509/17

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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
Arsenic (As)	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	N.D.	2
Phosphorus (P)	mg/kg	With reference to EPA Method 3051A, and performed by ICP-OES	N.D.	2
Polyvinylchloride (PVC)	**	Analysis was performed by FT-IR/ATR	Negative	-
<b>Halogen</b>	---	---	---	---
Halogen-Fluorine (F)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Fluorine content.	N.D.	50
Halogen-Chlorine (Cl)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Chlorine content.	N.D.	50
Halogen-Bromine (Br)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC method for Bromine content.	N.D.	50
Halogen-Iodine (I)	mg/kg	With reference to BS EN 14582:2007. 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
  - (c) --- = Not Conducted
  - (d) "-" = Not regulated
  - (e) \*\* = Qualitative analysis (no unit)
  - (f) MDL= Method Detection Limit
  - (g) Negative = Undetectable / Positive = Detectable
  - (h) The above test was conducted at SGS Shah Alam Seksyen 22
  - (i) This report supersedes report no. CRSSA/11509/17

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Test results by chemical method:

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
Hexabromocyclododecane (HBCDD) (Cas#25637-99-4 & 3194-55-6)	mg/kg	Based on IEC62321, and performed by GC-MS	N.D.	10
<b>Phthalates</b>	---	---	---	---
DBP (Di-butyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DEHP (Di-(2-ethylhexyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DNOP (Di-n-octyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DINP (Di-isononyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.01
DIDP (Di-isodecyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.01
BBP (Benzyl Butyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DNHP (Di-n-hexyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DMEP (Bis(2-methoxyethyl)phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005
DIBP (Di-isobutyl phthalate)	%	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	N.D.	0.005

## Test Part Description:

Sample Description : Au Bonding Wire

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

(b) N.D. = Not Detected

(c) MDL = Method Detection Limit

(d) - = Not regulated

(e) The above test was conducted at SGS Shah Alam Seksyen 22

(f) On 4 June 2015, [Commission Directive \(EU\) 2015/863](#) was published in the Official Journal of the European Union (OJEU) to include the phthalates BBP, DBP, DEHP and DIBP into ANNEX II of the Rohs Recast Directive. The new law restricts each phthalate to no more than 0.1% in each homogeneous material of an electrical product.

(g) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

(h) The restriction of DEHP, BBP, DBP and DIBP shall not apply to cables or spare parts for the repair, the reuse, the updating of functionalities or upgrading of capacity of EEE placed on the market before 22 July 2019, and of medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, placed on the market before 22 July 2021.

(i) The restriction of DEHP, BBP and DBP shall not apply to toys which are already subject to the restriction of DEHP, BBP and DBP through entry 51 of Annex XVII to Regulation (EC) No 1907/2006.

(j) The above test was conducted at SGS Shah Alam Seksyen 22

(k) This report supersedes report no. CRSSA/11509/17

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Test result:

Test Part Description :

Sample Description : Au Bonding Wire

## RoHS Directive 2011/65/EU Annex II (amended by Directive (EU) 2015/863)

Test Item(s):	Unit	Test Method	Results	MDL	Limit
Bis (2-ethylhexyl) phthalate (DEHP) (CAS No. 117-81-7)	mg/kg	Based on EN 14372:2004 (Determination of DEHP by GC-MS)	N.D.	30	1000
Butyl benzyl phthalate (BBP) (CAS No. 85-68-7)	mg/kg	Based on EN 14372:2004 (Determination of BBP by GC-MS)	N.D.	30	1000
Dibutyl phthalate (DBP) (CAS No. 84-74-2)	mg/kg	Based on EN 14372:2004 (Determination of DBP by GC-MS)	N.D.	30	1000
Diisobutyl phthalate (DIBP) (CAS No. 84-69-5)	mg/kg	Based on EN 14372:2004 (Determination of DIBP by GC-MS)	N.D.	30	1000

- Note : (a) mg/kg = ppm ; (0.1wt% = 1000ppm)  
 (b) N.D. = Not Detected  
 (c) MDL = Method Detection Limit  
 (d) - = Not regulated  
 (e) The above test was conducted at SGS Shah Alam Seksyen 22.  
 (f) This report supersedes report no. CRSSA/11509/17

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Test Method: With reference to CEN/TS 15968. Analysis was conducted by LC-MS.

	<u>Result / (%)</u>	<u>Max. Limit (µg/m<sup>2</sup>) (Textile/Coated material)</u>	<u>Max.Limit(%) (Plastic)</u>	<u>Max. Limit(%) (Substances or in mixtures)</u>
	<b>1</b>			
PFOS ^	N.D.	1	0.1	0.001
PFOA	N.D.	/	/	/
<b>Conclusion</b>	<b>PASS</b>			

Note: N.D. = Not Detected  
\* = exceeds the limit

Detection limit = 1 µg/m<sup>2</sup> for Textile / Coated Material  
= 0.001% for Plastic, substances or mixtures

Remark: Max. limit specified by commission regulation (EU) No. 757/2010 amending Regulation (EC) No 850/2004 (previously restricted under entry 53 of Regulation (EC) No 552/2009 amending Annex XVII of REACH Regulation (EC) No 1907/2006)

^ PFOS refer to Perfluorooctanesulfonic acid and its derivatives including Perfluorooctanesulfonic acid, Perfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamide, N-Ethylperfluorooctane sulfonamide, N-Methylperfluorooctane sulfonamidoethanol and N-Ethylperfluorooctane sulfonamidoethanol

## Test Part Description :

Sample Description : Au Bonding Wire

Note : (a) N.D. = Not Detected = < MDL  
(b) MDL = Method Detection Limit  
(c) --- = Not Conducted  
(d) The above test was conducted at SGS Shah Alam Seksyen 22  
(e) This report supersedes report no. CRSSA/11509/17

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## Test Report

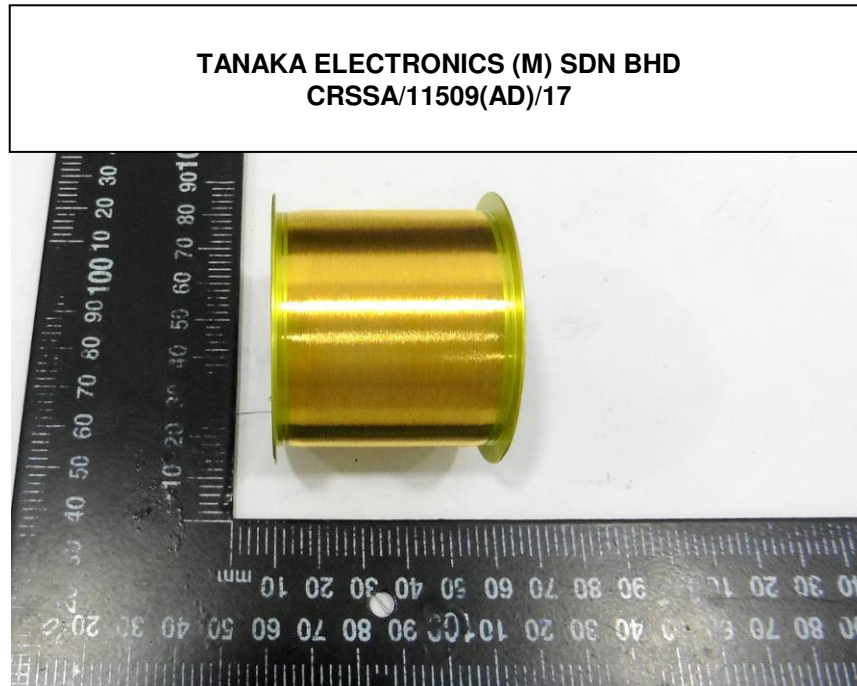
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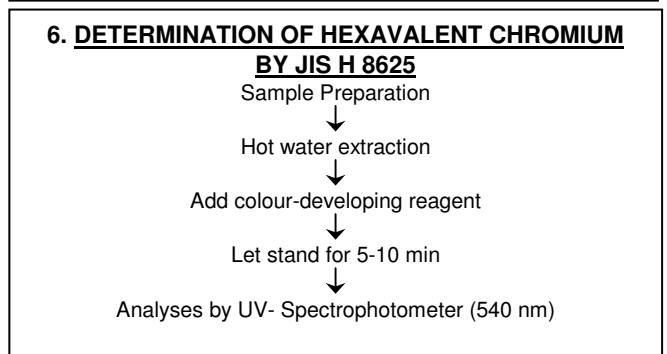
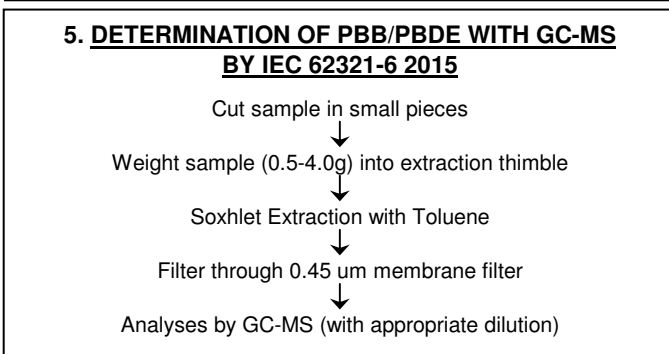
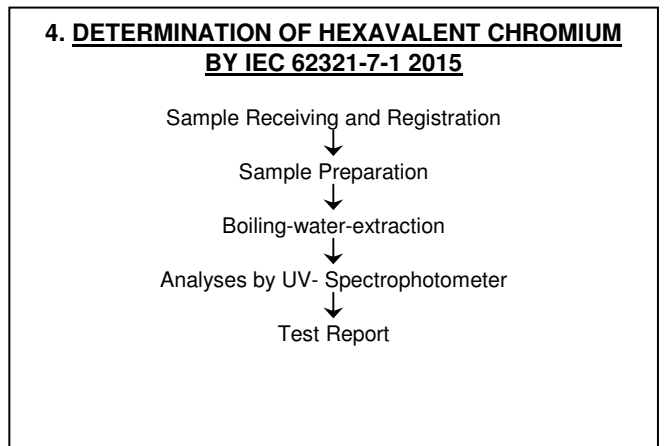
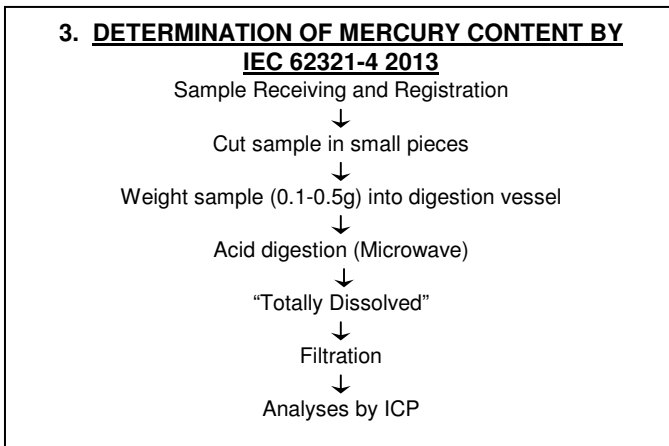
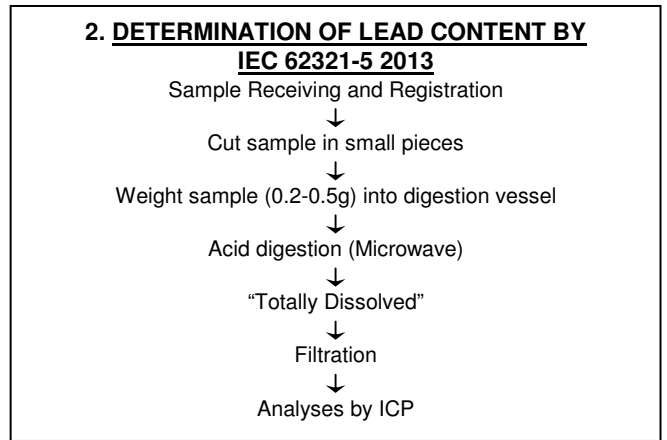
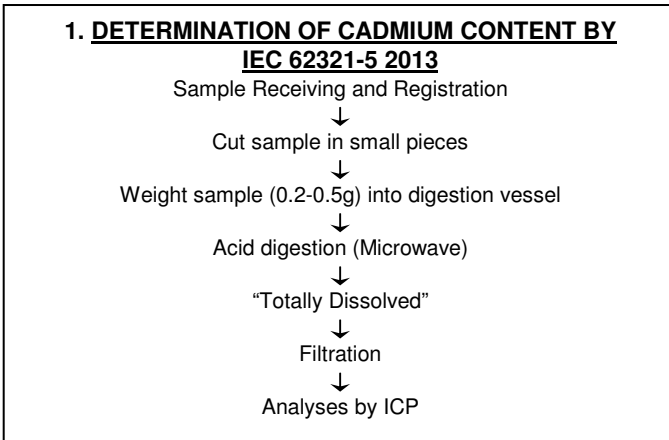


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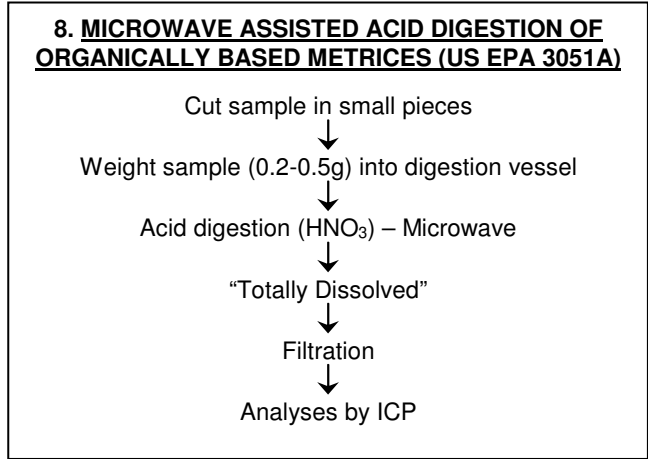
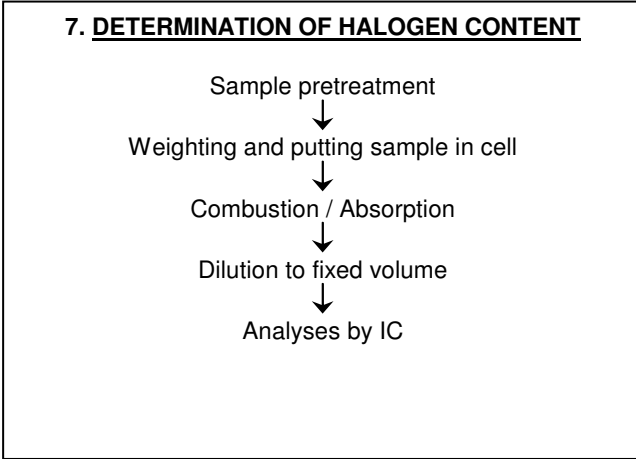


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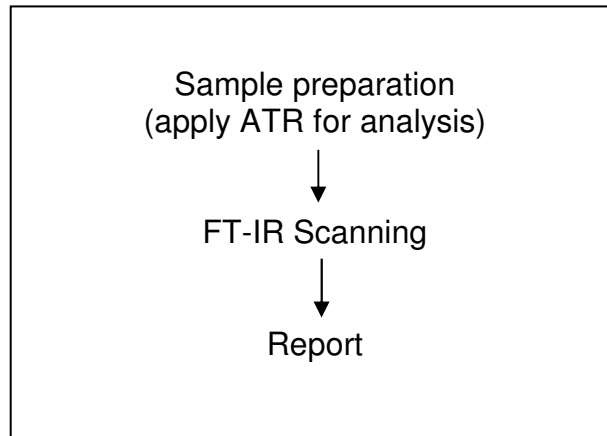


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**FLOW CHART FOR PVC DETECTION WITH FTIR**



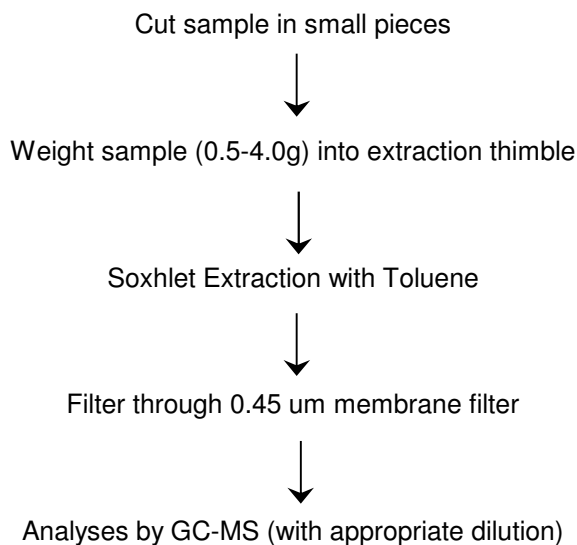
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### DETERMINATION OF HBCDD CONTENT



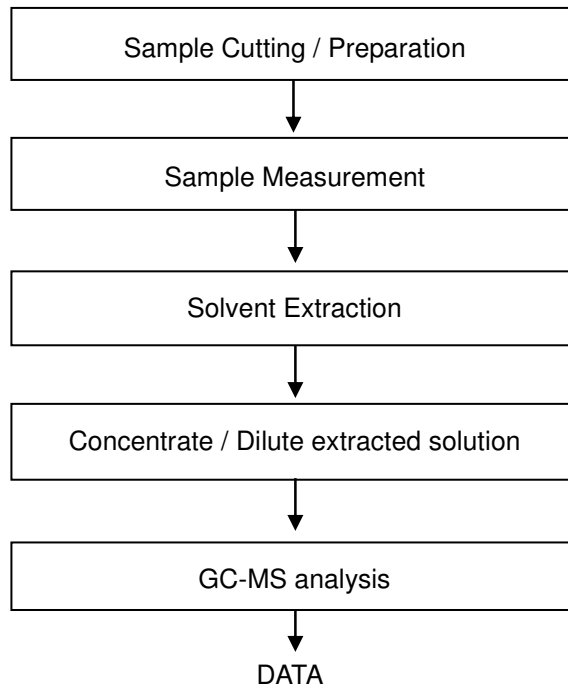
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### Flowchart for Phthalates Measurement

Method: IEC62321

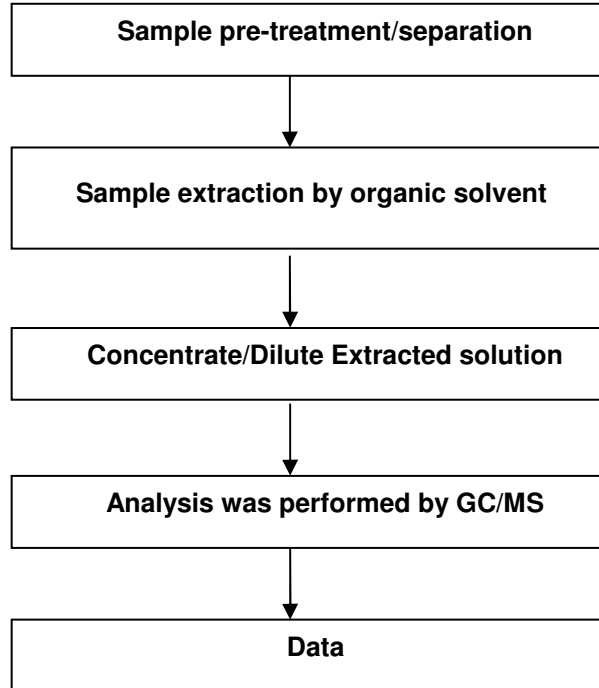


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**Analytical Flow Chart for Dimethyl Fumarate**



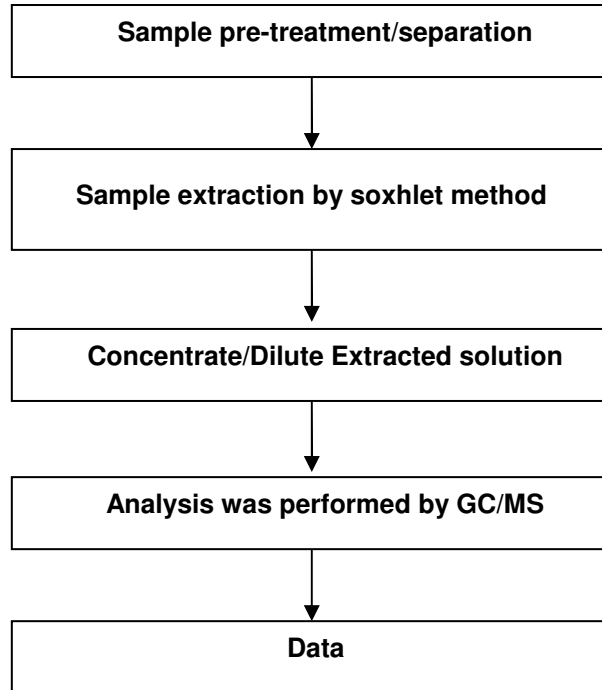
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**Analytical flow chart of Phthalates Content**



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

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