

Test Report

No. : KA/2019/90120

Date : 2019/09/09

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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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

Sample Submitted By : SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
Sample Description : DIE ATTACHED PASTE
Style/Item No. : CRM-1085A
Sample Receiving Date : 2019/09/02
Testing Period : 2019/09/02 to 2019/09/09

=====
Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).

(2) Please refer to next pages for the other item(s).

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

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.


Ray Chang Ph.D. / Manager
Signed for and on behalf of
SGS Taiwan Limited
Chemical Laboratory-Kaohsiung


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NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Result(s)

PART NAME NO.1 : SILVER DIE ATTACHED PASTE

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	100
Lead (Pb)	mg/kg	With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n.d.	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013+AMD1:2017 and performed by ICP-OES.	2	n.d.	1000
Hexavalent Chromium Cr(VI)	mg/kg	With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n.d.	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n.d.	1000
Monobromobiphenyl	mg/kg		5	n.d.	-
Dibromobiphenyl	mg/kg		5	n.d.	-
Tribromobiphenyl	mg/kg		5	n.d.	-
Tetrabromobiphenyl	mg/kg		5	n.d.	-
Pentabromobiphenyl	mg/kg		5	n.d.	-
Hexabromobiphenyl	mg/kg		5	n.d.	-
Heptabromobiphenyl	mg/kg		5	n.d.	-
Octabromobiphenyl	mg/kg		5	n.d.	-
Nonabromobiphenyl	mg/kg		5	n.d.	-
Decabromobiphenyl	mg/kg		5	n.d.	-
Sum of PBDEs	mg/kg		-	n.d.	1000
Monobromodiphenyl ether	mg/kg		5	n.d.	-
Dibromodiphenyl ether	mg/kg		5	n.d.	-
Tribromodiphenyl ether	mg/kg		5	n.d.	-
Tetrabromodiphenyl ether	mg/kg		5	n.d.	-
Pentabromodiphenyl ether	mg/kg		5	n.d.	-
Hexabromodiphenyl ether	mg/kg		5	n.d.	-
Heptabromodiphenyl ether	mg/kg		5	n.d.	-
Octabromodiphenyl ether	mg/kg		5	n.d.	-
Nonabromodiphenyl ether	mg/kg		5	n.d.	-
Decabromodiphenyl ether	mg/kg		5	n.d.	-

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NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Beryllium (Be)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-
Arsenic (As)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-
Antimony (Sb)	mg/kg	With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α -HBCDD, β -HBCDD, γ -HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	n.d.	-
Perfluorooctane sulfonates (PFOS-Acid, Metal Salt, Amide)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
PFOA (CAS No.: 335-67-1)	mg/kg	With reference to US EPA 3550C: 2007. Analysis was performed by LC/MS.	10	n.d.	-
Halogen					-
Halogen-Fluorine (F) (CAS No.: 14762-94-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	72.2	-
Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
Halogen-Iodine (I) (CAS No.: 14362-44-8)	mg/kg	With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-

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Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Phthalates					
DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DEHP (Di- (2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	1000
DIPP (Di-isopentyl phthalate) (CAS No.: 605-50-5)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0; 68515-48-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DNHP (Di-n-hexyl phthalate) (CAS No.: 84-75-3)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DMEP (Bis (2-methoxyethyl) phthalate) (CAS No.: 117-82-8)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DPP (Di-pentyl phthalate) DnPP (Di-n-pentyl phthalate) (CAS NO.:131-18-0)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DIHP (1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich) (CAS No.: 71888-89-6)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DHNUP (1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters) (CAS No.: 68515-42-4)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-
DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0; 68515-49-1)	mg/kg	With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n.d.	-

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Test Item (s)	Unit	Method	MDL	Result	Limit
				No.1	
Polynuclear Aromatic Hydrocarbons (PAHs)					-
Acenaphthene (CAS No.: 83-32-9)	mg/kg	With reference to AfPS GS 2014:01 PAK. Analysis was performed by GC/MS.	0.2	n.d.	-
Acenaphthylene (CAS No.: 208-96-8)	mg/kg		0.2	n.d.	-
Anthracene (CAS No.: 120-12-7)	mg/kg		0.2	n.d.	-
Benzo[a]anthracene (CAS No.: 56-55-3)	mg/kg		0.2	n.d.	-
Benzo[a]pyrene (CAS No.: 50-32-8)	mg/kg		0.2	n.d.	-
Benzo[b]fluoranthene (CAS No.: 205-99-2)	mg/kg		0.2	n.d.	-
Benzo[g,h,i]perylene (CAS No.: 191-24-2)	mg/kg		0.2	n.d.	-
Benzo[k]fluoranthene (CAS No.: 207-08-9)	mg/kg		0.2	n.d.	-
Chrysene (CAS No.: 218-01-9)	mg/kg		0.2	n.d.	-
Dibenzo[a,h]anthracene (CAS No.: 53-70-3)	mg/kg		0.2	n.d.	-
Fluoranthene (CAS No.: 206-44-0)	mg/kg		0.2	n.d.	-
Fluorene (CAS No.: 86-73-7)	mg/kg		0.2	n.d.	-
Indeno[1,2,3-c,d] pyrene (CAS No.: 193-39-5)	mg/kg		0.2	n.d.	-
Naphthalene (CAS No.: 91-20-3)	mg/kg		0.2	n.d.	-
Phenanthrene (CAS No.: 85-01-8)	mg/kg		0.2	n.d.	-
Pyrene (CAS No.: 129-00-0)	mg/kg		0.2	n.d.	-
Benzo[j]fluoranthene (CAS No.: 205-82-3)	mg/kg		0.2	n.d.	-
Benzo[e]pyrene (CAS No.: 192-97-2)	mg/kg		0.2	n.d.	-
Sum of 18 PAHs	mg/kg	-	n.d.	Δ	

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Note :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. n.d. = Not Detected
3. MDL = Method Detection Limit
4. " - " = Not Regulated

PFOS Reference Information : POPs - (EU) 2019/1021

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/m². 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.

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Δ AfPS (German commission for Product Safety): GS PAHs requirements

Parameter	Category 1	Category 2		Category 3	
	Material indented to be put in the mouth or toys with intended skin contact (longer than 30 s).	Materials not falling under category 1 with foreseeable contact to skin for longer than 30 seconds (long-term skin or frequent contact).		Materials not falling under category 1 or 2 with foreseeable contact to skin for less than 30 seconds (short-term skin contact).	
		Toy under 2009/48/EC	Other products under ProdSG	Toy under 2009/48/EC	Other products under ProdSG
Naphthalene	< 1	< 2		< 10	
Acenaphthylene	< 1 Sum	< 5 Sum	< 10 Sum	< 20 Sum	< 50 Sum
Acenaphthene					
Fluorene					
Phenanthrene					
Anthracene					
Fluoranthene					
Pyrene					
Benzo[a]anthracene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Chrysene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[b]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[j]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[k]fluoranthene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[a]pyrene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[e]pyrene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Indeno[1,2,3-c,d] pyrene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Dibenzo[a,h]anthracene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Benzo[g,h,i]perylene	< 0.2	< 0.2	< 0.5	< 0.5	< 1
Sum of 18 PAH	< 1	< 5	< 10	< 20	< 50

Unit: mg/kg

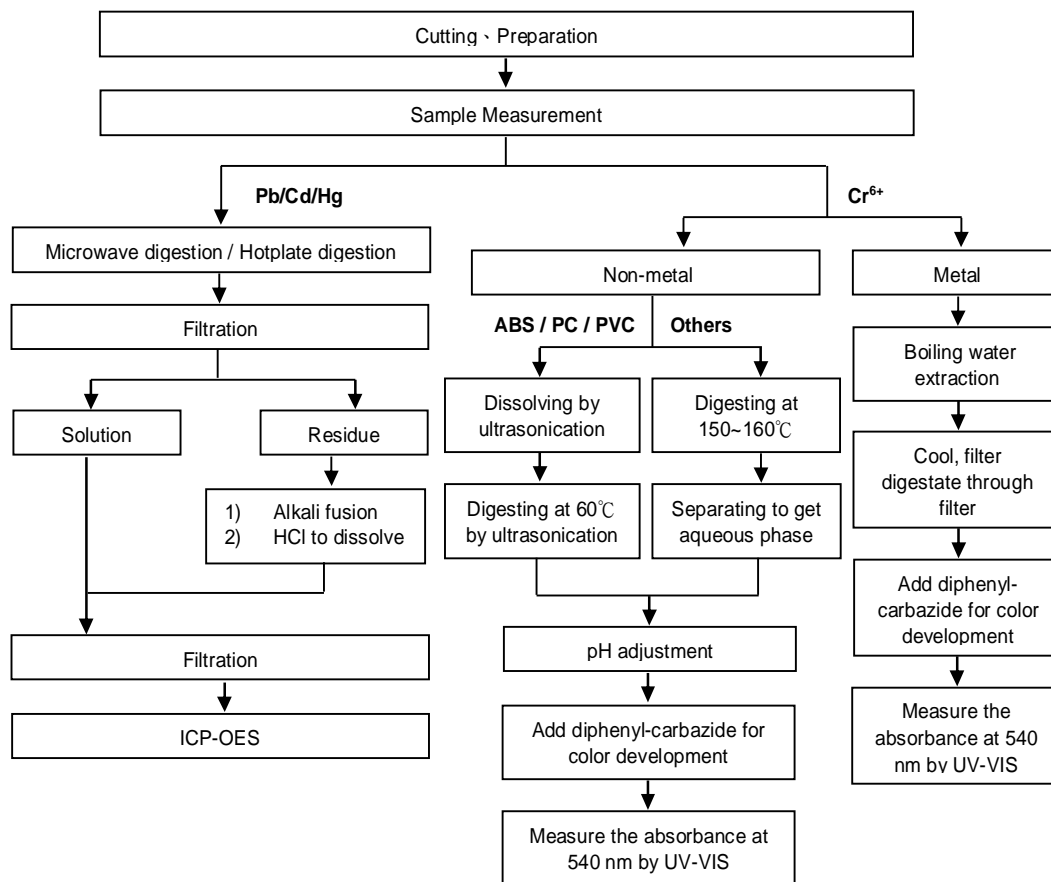
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
 NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of Heavy Metal

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)

- Technician: Jony Liu
- Supervisor: Ray Chang

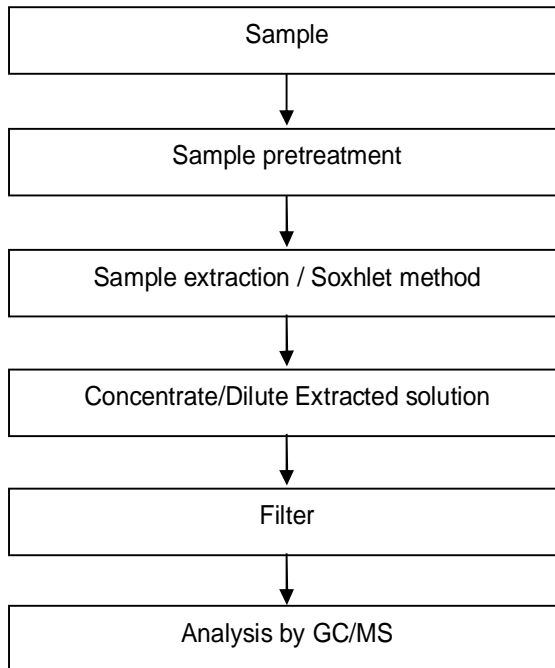


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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
 NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

PBB/PBDE analytical FLOW CHART

- Technician : Dorothy Chen
- Supervisor: Ray Chang



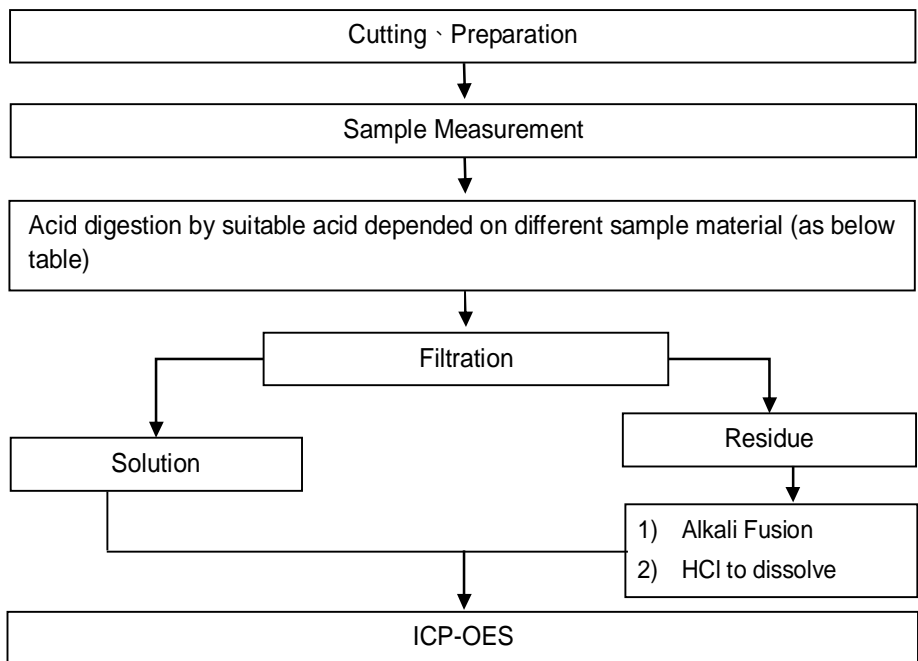
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 NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

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

These samples were dissolved totally by pre-conditioning method according to below flow chart.

- Technician: Jony Liu
- Supervisor: Ray Chang

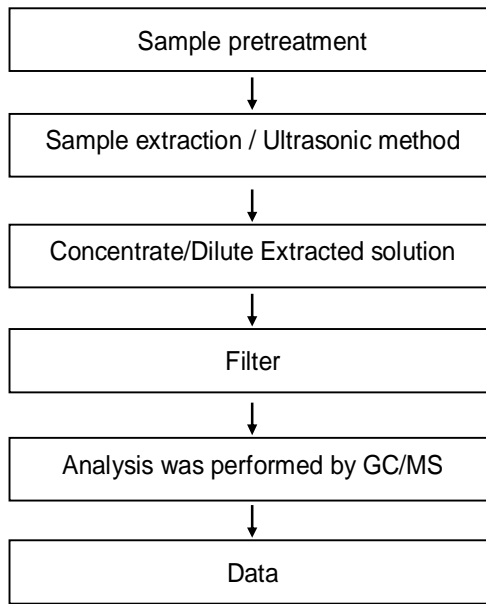


Steel, copper, aluminum, solder	Aqua regia, HNO ₃ , HCl, HF, H ₂ O ₂
Glass	HNO ₃ /HF
Gold, platinum, palladium, ceramic	Aqua regia
Silver	HNO ₃
Plastic	H ₂ SO ₄ , H ₂ O ₂ , HNO ₃ , HCl
Others	Any acid to total digestion

SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
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HBCDD analytical flow chart

- Technician : Dorothy Chen
- Supervisor: Ray Chang



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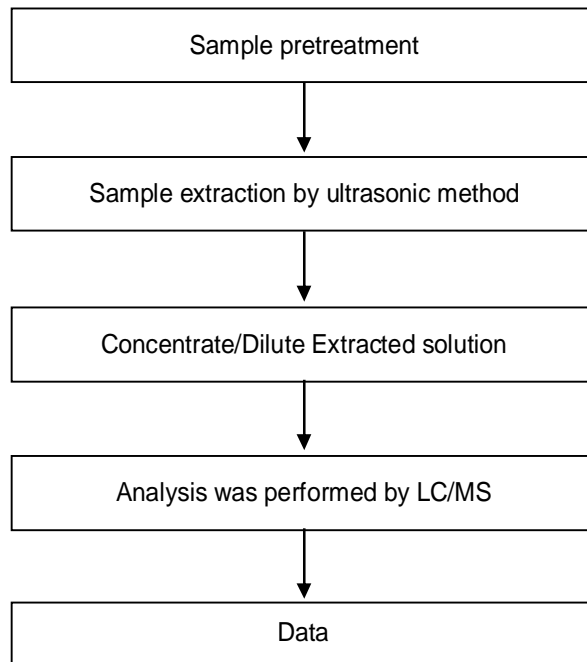
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 NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of PFOA/PFOS content

- Technician : Ginny Huang
- Supervisor: Ray Chang

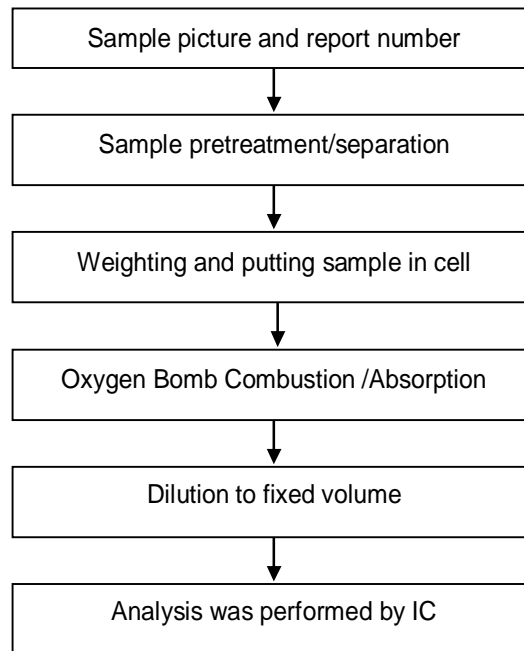


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Analytical flow chart of halogen content

- Technician : Jean Hung
- Supervisor: Ray Chang



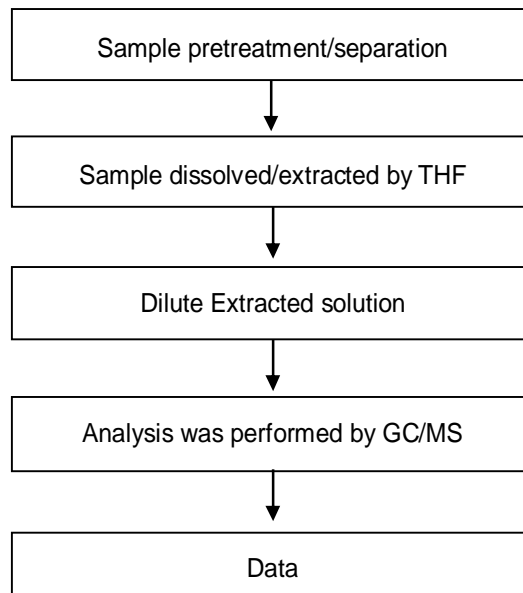
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SUMITOMO BAKELITE SINGAPORE PTE CO., LTD.
 NO. 1 SENOKO SOUTH ROAD, SINGAPORE 758069

Analytical flow chart of phthalate content

- Technician: Dorothy Chen
- Supervisor: Ray Chang

【Test method: IEC 62321-8】



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Test Report

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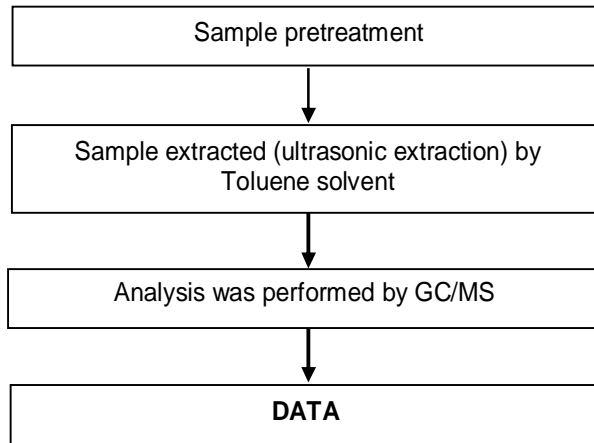
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PAHs (PolyAromaticHydrocarbons) analytical flow chart

- Technician : Dorothy Chen
- Supervisor : Ray Chang



Test Report

No. : KA/2019/90120

Date : 2019/09/09

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* The tested sample / part is marked by an arrow if it's shown on the photo. *

KA/2019/90120



** End of Report **