

Test Report

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HERAEUS MATERIALS SINGAPORE PTE LTD
BLOCK 5002, ANG MO KIO AVE 5, #04-05, TECHPLACE II, SINGAPORE 569871



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

Sample Description : Cu BONDING WIRE
Style/Item No. : iCu, DHF, MaxSoft, MaxSoftLD
Sample Receiving Date : 2009/09/09
Testing Period : 2009/09/09 TO 2009/09/16

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

Ray Chang / Asst. Manager
Signed for and on behalf of
SGS Taiwan Limited

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Test Result(s)

PART NAME NO.1 : COPPER Cu BONDING WIRE

Test Item (s):	Unit	Method	MDL	Result
				No.1
Cadmium (Cd)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Lead (Pb)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Mercury (Hg)	mg/kg	With reference to IEC 62321: 2008 and performed by ICP-AES.	2	n.d.
Hexavalent Chromium Cr(VI) by alkaline extraction	mg/kg	With reference to IEC 62321: 2008 and performed by UV-VIS.	2	n.d.
Antimony (Sb)	mg/kg	With reference to US EPA Method 3052 for Antimony Content. Analysis was performed by ICP-AES.	2	n.d.
Perfluorooctane sulfonates (PFOS) PFOS – Acid PFOS – Metal Salt PFOS – Amide	mg/kg	With reference to US EPA 3540C: 1996 method for PFOS Content. Analysis was performed by LC/MS.	10	n.d.
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.	10	n.d.

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Test Item (s):	Unit	Method	MDL	Result		
				No.1		
Halogen						
Halogen-Fluorine (F) (CAS No.: 014762-94-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.		
Halogen-Chlorine (Cl) (CAS No.: 022537-15-1)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.		
Halogen-Bromine (Br) (CAS No.: 010097-32-2)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.		
Halogen-Iodine (I) (CAS No.: 014362-44-8)	mg/kg	With reference to BS EN 14582:2007. Analysis was performed by IC.	50	n.d.		
Sum of PBBs						
Monobromobiphenyl	mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.		
Dibromobiphenyl			5	n.d.		
Tribromobiphenyl			5	n.d.		
Tetrabromobiphenyl			5	n.d.		
Pentabromobiphenyl			5	n.d.		
Hexabromobiphenyl			5	n.d.		
Heptabromobiphenyl			5	n.d.		
Octabromobiphenyl			5	n.d.		
Nonabromobiphenyl			5	n.d.		
Decabromobiphenyl			5	n.d.		
Sum of PBDEs						
Monobromodiphenyl ether			mg/kg	With reference to IEC 62321: 2008 and performed by GC/MS.	-	n.d.
Dibromodiphenyl ether	5	n.d.				
Tribromodiphenyl ether	5	n.d.				
Tetrabromodiphenyl ether	5	n.d.				
Pentabromodiphenyl ether	5	n.d.				
Hexabromodiphenyl ether	5	n.d.				
Heptabromodiphenyl ether	5	n.d.				
Octabromodiphenyl ether	5	n.d.				
Nonabromodiphenyl ether	5	n.d.				
Decabromodiphenyl ether	5	n.d.				

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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
 5. This is the additional test report of KA/2009/90530 which was issued on 2009/09/16.
Please refer to KA/2009/90530 for original information.

PFOS Reference Information : Directive 2006/122/EC

- (1) May not be placed on the market or used as a substance or constituent of preparations in a concentration equal to or higher than 0.005 % by mass.
- (2) May not be placed on the market in semi-finished products or articles, or parts thereof, if the concentration of PFOS is equal to or higher than 0.1 % by mass calculated with reference to the mass of structurally or microstructurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is equal to or higher than $1\mu\text{g}/\text{m}^2$ of the coated material.

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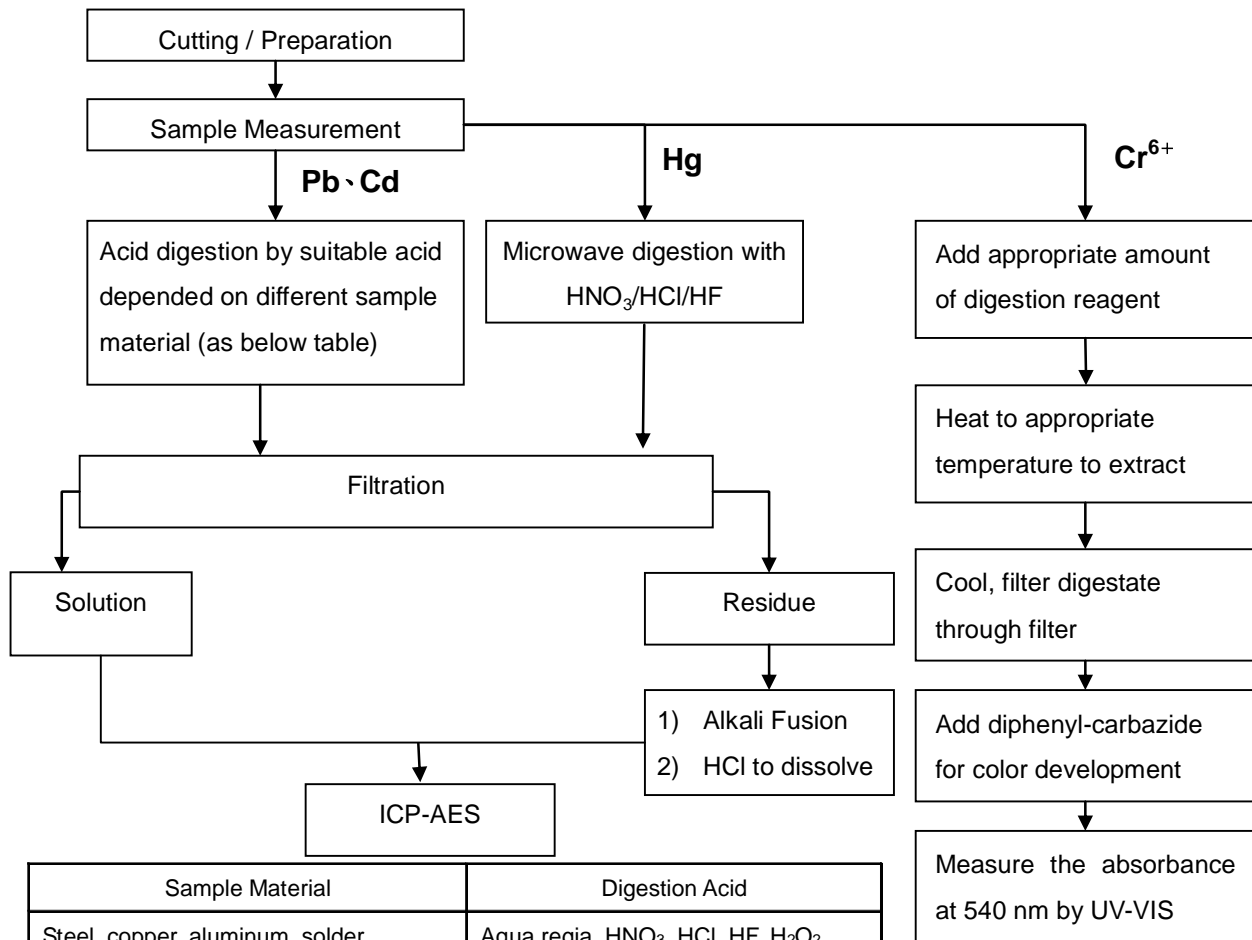
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- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr⁶⁺ test method excluded)
- 2) Name of the person who made measurement: Hungming Li
- 3) Name of the person in charge of measurement: Ray Chang



Sample Material	Digestion Acid
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

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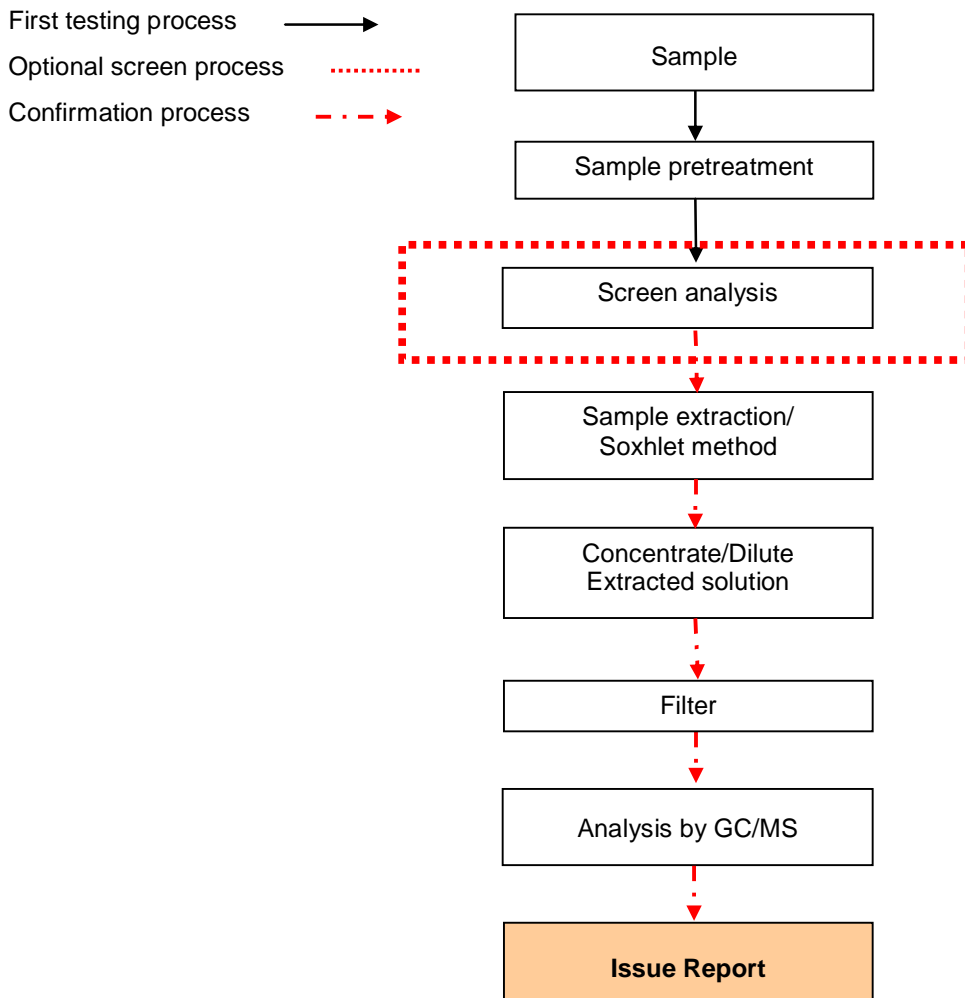
HERAEUS MATERIALS SINGAPORE PTE LTD
 BLOCK 5002, ANG MO KIO AVE 5, #04-05, TECHPLACE II, SINGAPORE 569871



PBB/PBDE analytical FLOW CHART

1) Name of the person who made measurement: Anson Tsao

2) Name of the person in charge of measurement: Ray Chang



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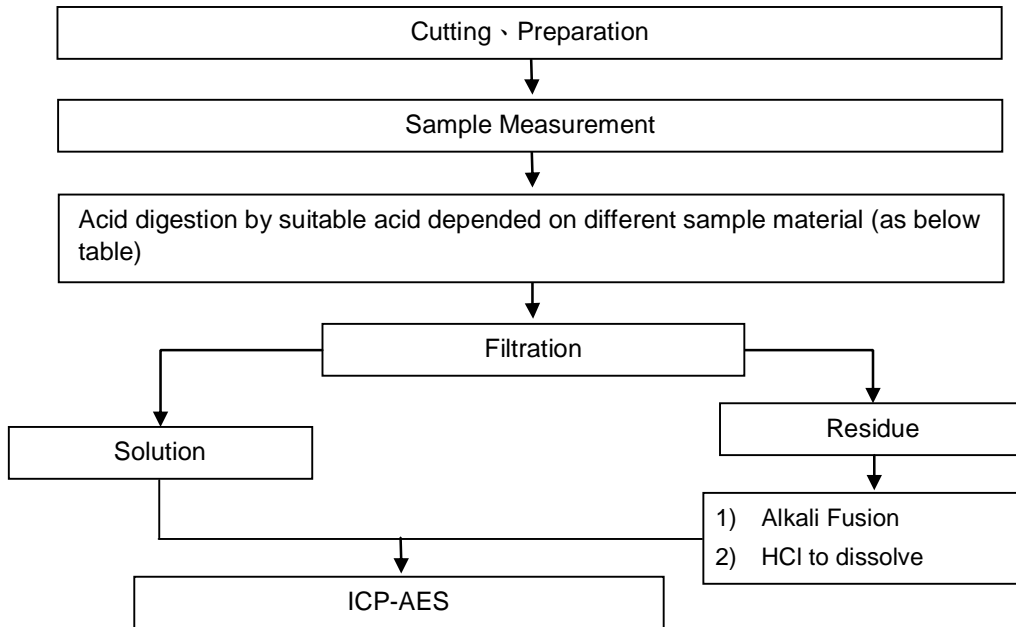
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- 1) These samples were dissolved totally by pre-conditioning method according to below flow chart.
- 2) Name of the person who made measurement: Hungming Li
- 3) Name of the person in charge of measurement: Ray Chang

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



Steel, copper, 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

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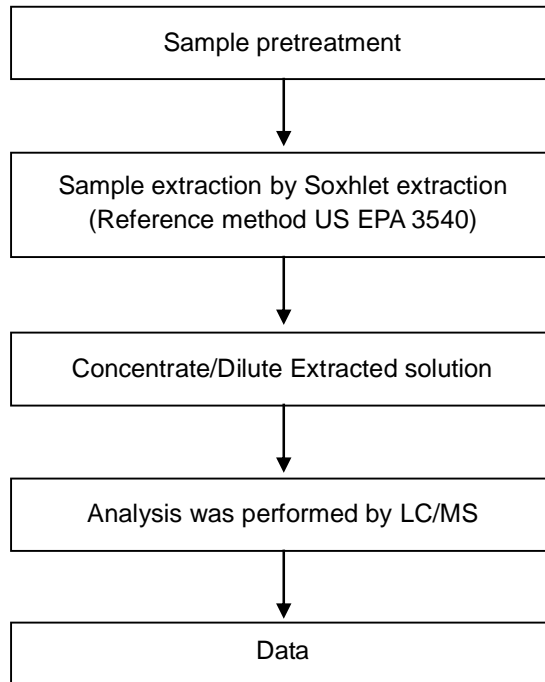
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Analytical flow chart of PFOA/PFOS content

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



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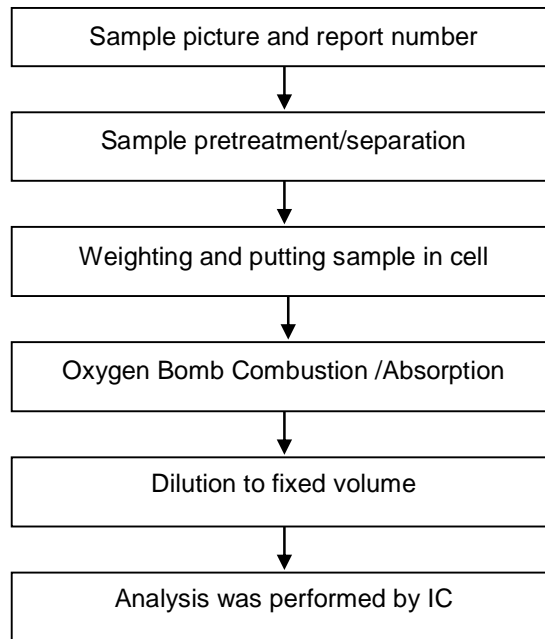
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Analytical flow chart of halogen content

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



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