

## 試驗報告

## Test Report

號碼(No.) : KA/2020/21018 日期(Date) : 2020/02/21

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奇菱科技股份有限公司/菱翔工程塑料(蘇州)有限公司

CHI LIN TECHNOLOGY CO., LTD./LIN SHINE ENGINEERING PLASTICS (SUZHOU) CO., LTD.

74148 台南市新市區王甲路1號(台南科學園區-樹谷園區)/中國江蘇省蘇州工業園區奇業路8號

NO.1, WANGJIA RD., XINSHI DIST., TAINAN CITY 74148, TAIWAN (R.O.C.)/

NO.8 QIYE ROAD, SUZHOU INDUSTRIAL PARK, JIANGSU PROVINCE, CHINA

以下測試樣品係由客戶送樣, 且由客戶聲稱並經客戶確認如下 (The following samples was/were submitted and identified by/on behalf of the client as):

送樣廠商(Sample Submitted By) : 奇菱科技股份有限公司 (CHI LIN TECHNOLOGY CO., LTD.)  
 樣品名稱(Sample Description) : ACRYLONITRILE-BUTADIENE-STYRENE (ABS) COPOLYMER  
 樣品型號(Style/Item No.) : GA-1535、GA-1565、GA-1585  
 收件日期(Sample Receiving Date) : 2020/02/15  
 測試期間(Testing Period) : 2020/02/15 to 2020/02/21

### 測試需求(Test Requested)

- (1) 依據客戶指定, 參考RoHS 2011/65/EU Annex II及其修訂指令(EU) 2015/863測試鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP. (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) 其他測試項目請見下一頁. (Please refer to next pages for the other item(s).)

測試結果(Test Results) : 請見下一頁 (Please refer to next pages).

### 結論(Conclusion)

- (1) 根據客戶所提供的樣品, 其鎘、鉛、汞、六價鉻、多溴聯苯、多溴聯苯醚, DBP, BBP, DEHP, DIBP的測試結果符合RoHS 2011/65/EU Annex II暨其修訂指令(EU) 2015/863之限值要求. (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.)

報告簽署人/張伯睿, 博士/技術經理  
 Ray Chang, Ph.D./Manager -Tech  
 Signed for and on behalf of  
 SGS Taiwan Limited  
 化學實驗室-高雄/Chemical Laboratory Kaohsiung



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### 測試結果(Test Results)

測試部位(PART NAME) NO.1 : 黑色塑膠粒 (BLACK PLASTIC PELLETS)

測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)	法規 限值 (Limit)
				NO.1	
鎘 / Cadmium (Cd)	mg/kg	參考IEC 62321-5: 2013, 以感應耦合電漿發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n. d.	100
鉛 / Lead (Pb)	mg/kg	參考IEC 62321-5: 2013, 以感應耦合電漿發射光譜儀檢測. / With reference to IEC 62321-5: 2013 and performed by ICP-OES.	2	n. d.	1000
汞 / Mercury (Hg)	mg/kg	參考IEC 62321-4:2013+AMD1:2017, 以感應耦合電漿發射光譜儀檢測. / With reference to IEC 62321-4:2013+AMD1:2017 and performed by ICP-OES.	2	n. d.	1000
六價鉻 / Hexavalent Chromium Cr(VI)	mg/kg	參考IEC 62321-7-2:2017, 以UV-VIS檢測. / With reference to IEC 62321-7-2:2017 and performed by UV-VIS.	8	n. d.	1000
多溴聯苯總和 / Sum of PBBs	mg/kg	參考IEC 62321-6:2015, 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n. d.	1000
一溴聯苯 / Monobromobiphenyl	mg/kg		5	n. d.	-
二溴聯苯 / Dibromobiphenyl	mg/kg		5	n. d.	-
三溴聯苯 / Tribromobiphenyl	mg/kg		5	n. d.	-
四溴聯苯 / Tetrabromobiphenyl	mg/kg		5	n. d.	-
五溴聯苯 / Pentabromobiphenyl	mg/kg		5	n. d.	-
六溴聯苯 / Hexabromobiphenyl	mg/kg		5	n. d.	-
七溴聯苯 / Heptabromobiphenyl	mg/kg		5	n. d.	-
八溴聯苯 / Octabromobiphenyl	mg/kg		5	n. d.	-
九溴聯苯 / Nonabromobiphenyl	mg/kg		5	n. d.	-
十溴聯苯 / Decabromobiphenyl	mg/kg		5	n. d.	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)	法規 限值 (Limit)
				NO. 1	
多溴聯苯醚總和 / Sum of PBDEs	mg/kg	參考 IEC 62321-6:2015, 以氣相層析/質譜儀檢測. / With reference to IEC 62321-6:2015 and performed by GC/MS.	-	n. d.	1000
一溴聯苯醚 / Monobromodiphenyl ether	mg/kg		5	n. d.	-
二溴聯苯醚 / Dibromodiphenyl ether	mg/kg		5	n. d.	-
三溴聯苯醚 / Tribromodiphenyl ether	mg/kg		5	n. d.	-
四溴聯苯醚 / Tetrabromodiphenyl ether	mg/kg		5	n. d.	-
五溴聯苯醚 / Pentabromodiphenyl ether	mg/kg		5	n. d.	-
六溴聯苯醚 / Hexabromodiphenyl ether	mg/kg		5	n. d.	-
七溴聯苯醚 / Heptabromodiphenyl ether	mg/kg		5	n. d.	-
八溴聯苯醚 / Octabromodiphenyl ether	mg/kg		5	n. d.	-
九溴聯苯醚 / Nonabromodiphenyl ether	mg/kg		5	n. d.	-
十溴聯苯醚 / Decabromodiphenyl ether	mg/kg		5	n. d.	-
鄰苯二甲酸二異丁酯 / DIBP (Di-isobutyl phthalate) (CAS No.: 84-69-5)	mg/kg	參考 IEC 62321-8:2017, 以氣相層析/質譜儀檢測. / With reference to IEC 62321-8:2017. Analysis was performed by GC/MS.	50	n. d.	1000
鄰苯二甲酸二丁酯 / DBP (Dibutyl phthalate) (CAS No.: 84-74-2)	mg/kg		50	n. d.	1000
鄰苯二甲酸丁苯甲酯 / BBP (Butyl Benzyl phthalate) (CAS No.: 85-68-7)	mg/kg		50	n. d.	1000
鄰苯二甲酸二(2-乙基己基)酯 / DEHP (Di-(2-ethylhexyl) phthalate) (CAS No.: 117-81-7)	mg/kg		50	n. d.	1000
鄰苯二甲酸二正辛酯 / DNOP (Di-n-octyl phthalate) (CAS No.: 117-84-0)	mg/kg		50	n. d.	-
鄰苯二甲酸二異壬酯 / DINP (Di-isononyl phthalate) (CAS No.: 28553-12-0, 68515-48-0)	mg/kg		50	n. d.	-
鄰苯二甲酸二異癸酯 / DIDP (Di-isodecyl phthalate) (CAS No.: 26761-40-0, 68515-49-1)	mg/kg		50	n. d.	-

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測試項目 (Test Items)	單位 (Unit)	測試方法 (Method)	MDL	結果 (Result)	法規 限值 (Limit)
				NO.1	
鹵素(溴) / Halogen-Bromine (Br) (CAS No.: 10097-32-2)	mg/kg	參考BS EN 14582:2016, 以離子層析儀檢測。 / With reference to BS EN 14582:2016. Analysis was performed by IC.	50	n.d.	-
鹵素(氯) / Halogen-Chlorine (Cl) (CAS No.: 22537-15-1)	mg/kg	參考BS EN 14582:2016, 以離子層析儀檢測。 / With reference to BS EN 14582:2016. Analysis was performed by IC.	50	97.0	-
六溴環十二烷及所有主要被辨別出的異構物 / Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD, $\gamma$ -HBCDD) (CAS No.: 25637-99-4 and 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	mg/kg	參考IEC 62321: 2008, 以氣相層析/質譜儀檢測。 / With reference to IEC 62321: 2008. Analysis was performed by GC/MS.	5	n.d.	-
短鏈氯化石蠟 / Alkanes, C10-13, chloro (Short Chain Chlorinated Paraffins) (CAS No.: 85535-84-8))	mg/kg	參考US EPA 3550C: 2007, 以氣相層析儀/電子捕獲偵測器檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/ECD.	100	n.d.	-
中鏈氯化石蠟 / Medium-Chained Chlorinated Paraffins (C14-C17) (MCCP) (CAS No.: 85535-85-9)	%	參考US EPA 3550C: 2007, 以氣相層析儀/電子捕獲偵測器檢測。 / With reference to US EPA 3550C: 2007. Analysis was performed by GC/ECD.	0.01	n.d.	-
聚氯乙烯 / PVC	**	以紅外光譜分析及焰色法檢測。 / Analysis was performed by FTIR and FLAME Test.	-	Negative	-
紅磷 / Red phosphorus	**	以熱裂解-氣相層析/質譜儀檢測。 / Analysis was performed by Pyrolyzer-GC/MS.	-	Negative	-
磷 / Phosphorus (P)	mg/kg	參考US EPA 3052: 1996, 以感應耦合電漿發射光譜儀檢測。 / With reference to US EPA 3052: 1996. Analysis was performed by ICP-OES.	2	103	-

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				NO. 1	
四溴雙酚-A / Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	mg/kg	參考RSTS-E&E-121, 以液相層析/質譜儀檢 測. / With reference to RSTS-E&E-121. Analysis was performed by LC/MS.	10	n. d.	-
多環芳香烴 / Polynuclear Aromatic Hydrocarbons (PAHs)					
萘 / Acenaphthene (CAS No.: 83-32-9)	mg/kg	參考AfPS GS 2014:01 PAK, 以氣相層析/質 譜儀檢測. / With reference to AfPS GS 2014:01 PAK method. Analysis was performed by GC/MS.	0.2	n. d.	-
萘烯 / Acenaphthylene (CAS No.: 208- 96-8)	mg/kg		0.2	n. d.	-
蒽 / Anthracene (CAS No.: 120-12-7)	mg/kg		0.2	n. d.	-
苯駢蒽 / Benzo[a]anthracene (CAS No.: 56-55-3)	mg/kg		0.2	n. d.	-
苯駢(a)芘 / Benzo[a]pyrene (CAS No.: 50-32-8)	mg/kg		0.2	n. d.	-
苯(b)苯駢芴 / Benzo[b]fluoranthene (CAS No.: 205-99-2)	mg/kg		0.2	n. d.	-
苯駢芘 / Benzo[g,h,i]perylene (CAS No.: 191-24-2)	mg/kg		0.2	n. d.	-
苯(k)苯駢芴 / 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.	-
二苯駢蒽 / Dibenzo[a,h]anthracene (CAS No.: 53-70-3)	mg/kg		0.2	n. d.	-
苯駢萘 / Fluoranthene (CAS No.: 206- 44-0)	mg/kg		0.2	n. d.	-
芴 / Fluorene (CAS No.: 86-73-7)	mg/kg		0.2	n. d.	-
節酮芘 / Indeno[1,2,3-c,d] pyrene (CAS No.: 193-39-5)	mg/kg		0.2	n. d.	-
萘 / Naphthalene (CAS No.: 91-20-3)	mg/kg		0.2	n. d.	-
菲 / Phenanthrene (CAS No.: 85-01-8)	mg/kg		0.2	n. d.	-
芘 / Pyrene (CAS No.: 129-00-0)	mg/kg		0.2	n. d.	-
苯(j)苯駢芴 / Benzo[j]fluoranthene (CAS No.: 205-82-3)	mg/kg		0.2	n. d.	-
苯駢(e)芘 / Benzo[e]pyrene (CAS No.: 192-97-2)	mg/kg		0.2	n. d.	-
多環芳香烴18項總和 / Sum of 18 PAHs	mg/kg		-	n. d.	-

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### 備註(Note) :

1. mg/kg = ppm ; 0.1wt% = 1000ppm
2. MDL = Method Detection Limit (方法偵測極限值)
3. n.d. = Not Detected (未檢出)
4. "-" = Not Regulated (無規格值)
5. \*\*= Qualitative analysis (No Unit) 定性分析(無單位)
6. Negative = Undetectable 陰性(未偵測到); Positive = Detectable 陽性(已偵測到)



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### △ 德國產品安全委員會(AfPS) GS PAHs 要求 /

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

項目 (Parameter)	第1類(Category 1)	第2類(Category 2)		第3類(Category 3)	
	意圖放入嘴內的材料或玩具會與皮膚有所接觸(超過30秒). (Material indented to be put in the mouth or toys with intended skin contact (longer than 30 s).)	不屬於第1類的材料並可預見與皮膚接觸逾30秒(長期或經常與皮膚接觸). (Materials not falling under category 1 with foreseeable contact to skin for longer than 30 seconds (long-term skin or frequent contact).)		可預見與皮膚接觸短於30秒(短期與皮膚接觸), 以及不屬於第1類或第2類的材料. (Materials not falling under category 1 or 2 with foreseeable contact to skin for less than 30 seconds (short-term skin contact).)	
		列於2009/48/EC之玩具 (Toy under 2009/48/EC)	列於德國產品安全法之其他產品 (Other products under ProdSG)	列於2009/48/EC之玩具 (Toy under 2009/48/EC)	列於德國產品安全法之其他產品 (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
18項PAH總濃度 (Sum of 18 PAH)	< 1	< 5	< 10	< 20	< 50

單位(Unit) : mg/kg

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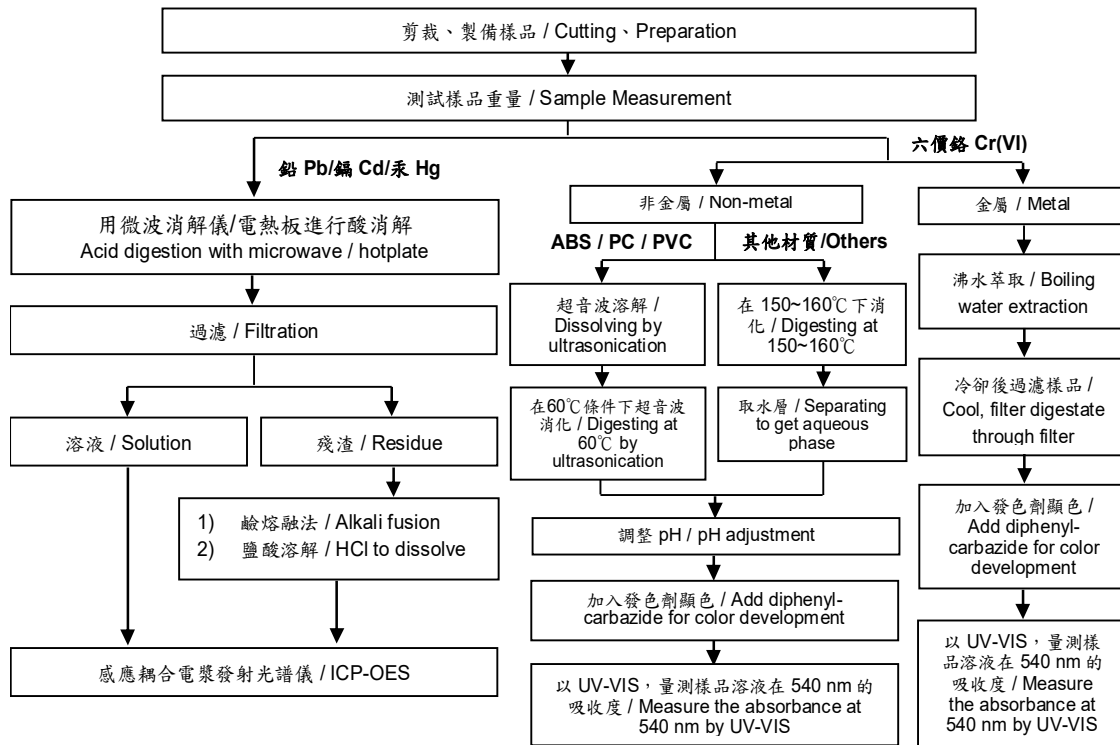
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### 重金屬流程圖 / Analytical flow chart of Heavy Metal

根據以下的流程圖之條件，樣品已完全溶解。(六價鉻測試方法除外)

These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> test method excluded)

- 測試人員：劉俊宏 / Technician : Jony Liu
- 測試負責人：張伯睿 / Supervisor: Ray Chang





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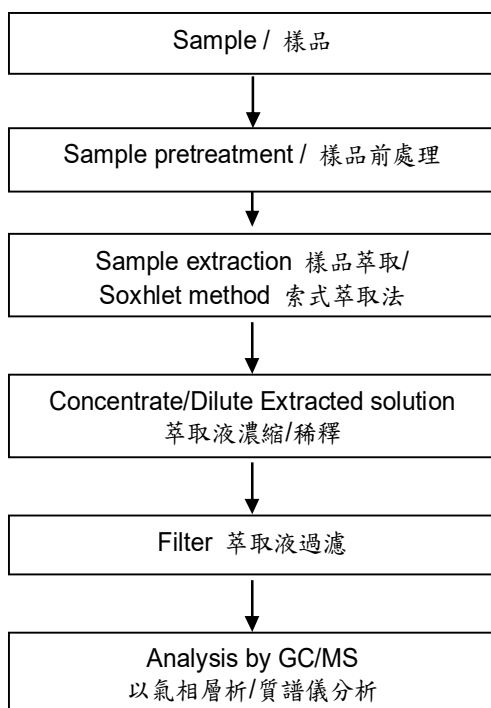
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### 多溴聯苯/多溴聯苯醚 分析流程圖 / PBB/PBDE analytical FLOW CHART

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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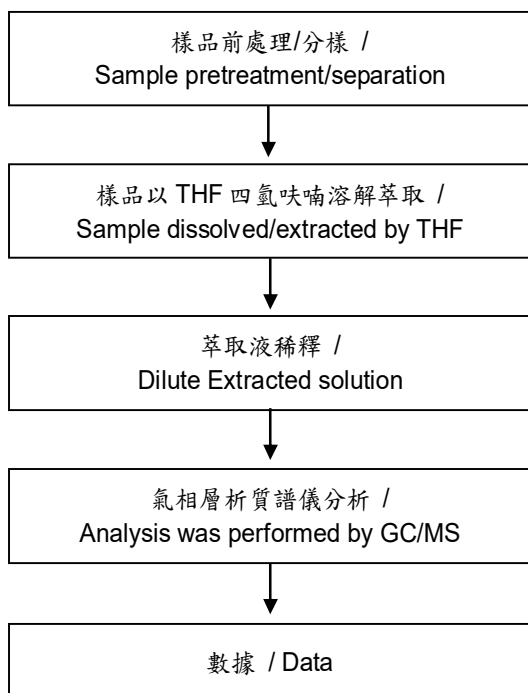
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### 可塑劑分析流程圖 / Analytical flow chart of phthalate content

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang

#### 【測試方法/Test method: IEC 62321-8】



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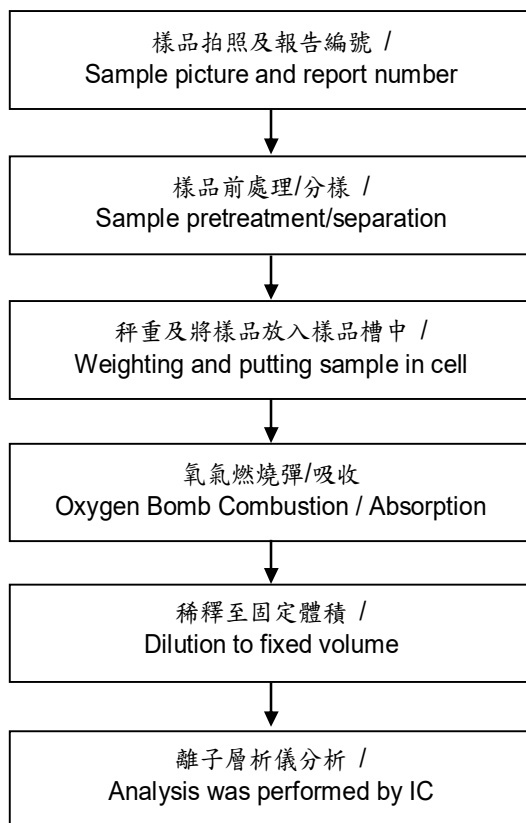
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### 鹵素分析流程圖 / Analytical flow chart of halogen content

- 測試人員：洪秀真 / Technician : Jean Hung
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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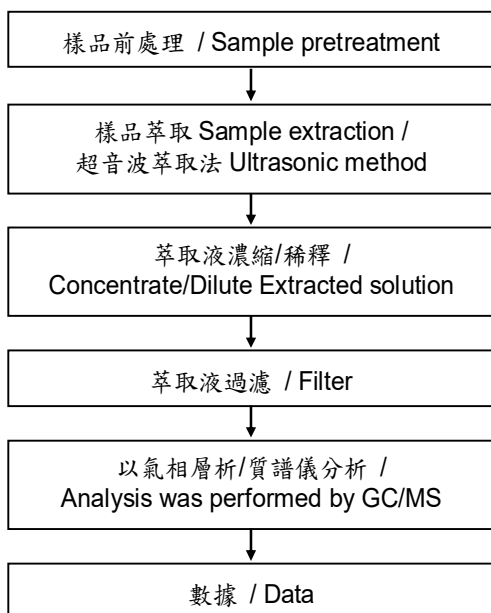
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### 六溴環十二烷分析流程圖 / HBCDD analytical flow chart

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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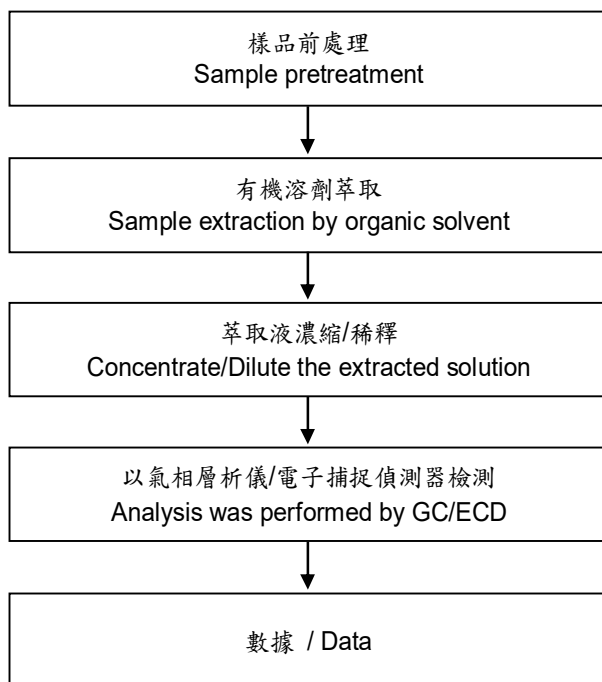
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### 氯化石蠟分析流程圖 / Analytical flow chart - Chlorinated Paraffins

- 測試人員：陳威錚 / Technician : Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang

【參考方法(Reference method): US EPA 3550C】



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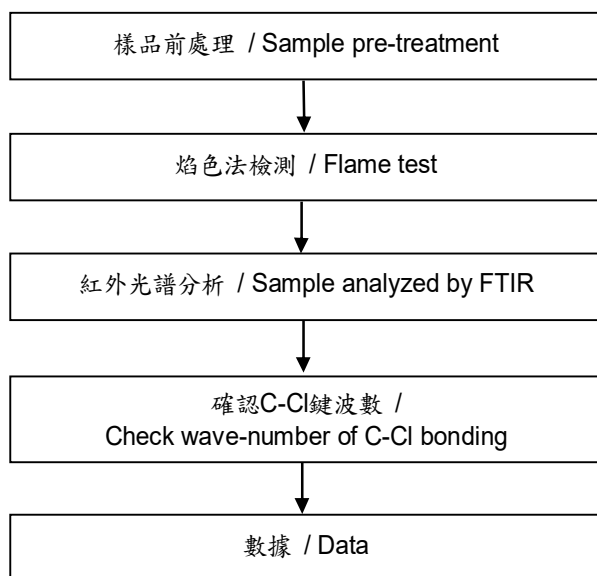
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### 聚氯乙烯物質判定分析流程圖 /

#### Analysis flow chart for determination of PVC in material

- 測試人員：涂仕杰 / Technician : Jin Tu
- 測試負責人：林立翔 / Supervisor: Roger Lin



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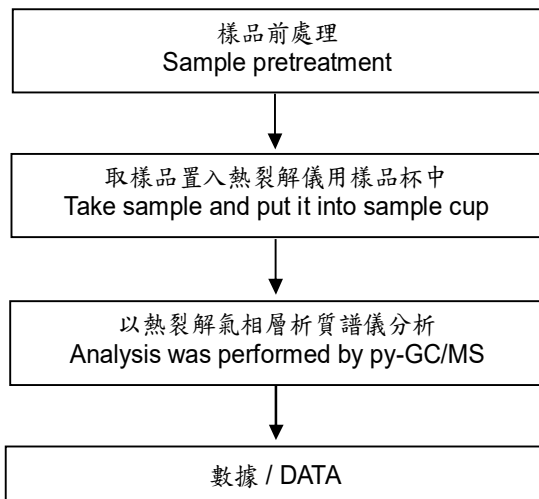
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### 紅磷分析流程 / Analytical flow chart of Red phosphorus

- 測試人員：涂雅苓 / Technician: Yaling Tu
- 測試負責人：張啟興 / Supervisor: Troy Chang



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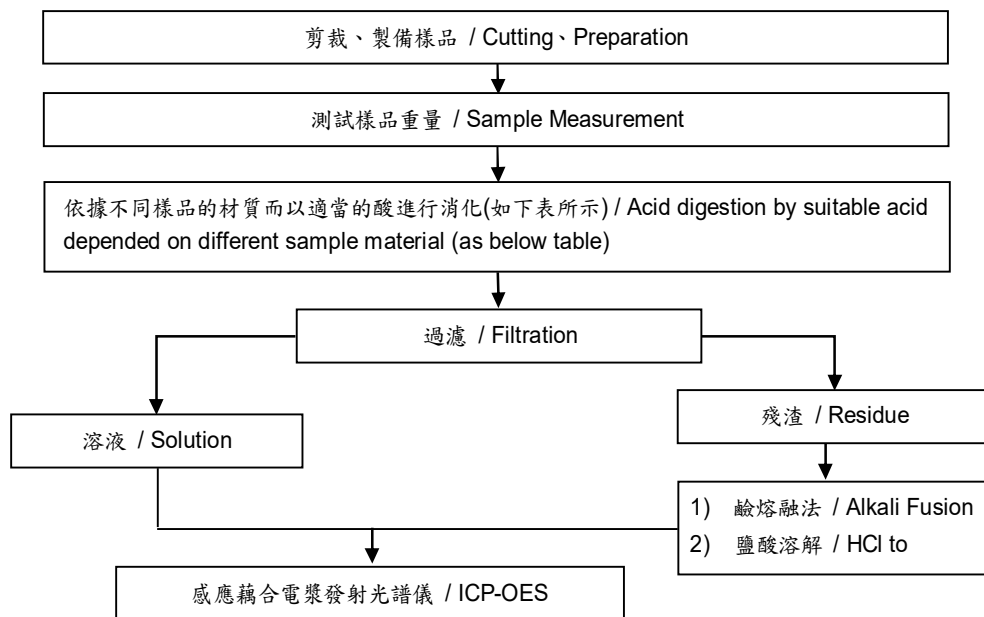
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### 元素以 ICP-OES 分析的消化流程圖

### (Flow Chart of digestion for the elements analysis performed by ICPOES)

根據以下的流程圖之條件，樣品已完全溶解。 / These samples were dissolved totally by pre conditioning method according to below flow chart.

- 測試人員：劉俊宏 / Technician: Jony Liu
- 測試負責人：張伯睿 / Supervisor: Ray Chang



鋼,銅,鋁,焊錫 / Steel, copper, aluminum, solder	王水,硝酸,鹽酸,氫氟酸,雙氧水 / Aqua regia, HNO <sub>3</sub> , HCl, HF, H <sub>2</sub> O <sub>2</sub>
玻璃 / Glass	硝酸,氫氟酸 / HNO <sub>3</sub> /HF
金,鉑,鈀,陶瓷 / Gold, platinum, palladium, ceramic	王水 / Aqua regia
銀 / Silver	硝酸 / HNO <sub>3</sub>
塑膠 / Plastic	硫酸,雙氧水,硝酸,鹽酸 / H <sub>2</sub> SO <sub>4</sub> , H <sub>2</sub> O <sub>2</sub> , HNO <sub>3</sub> , HCl
其他 / Others	加入任何酸至完全溶解 / Any acid to total digestion

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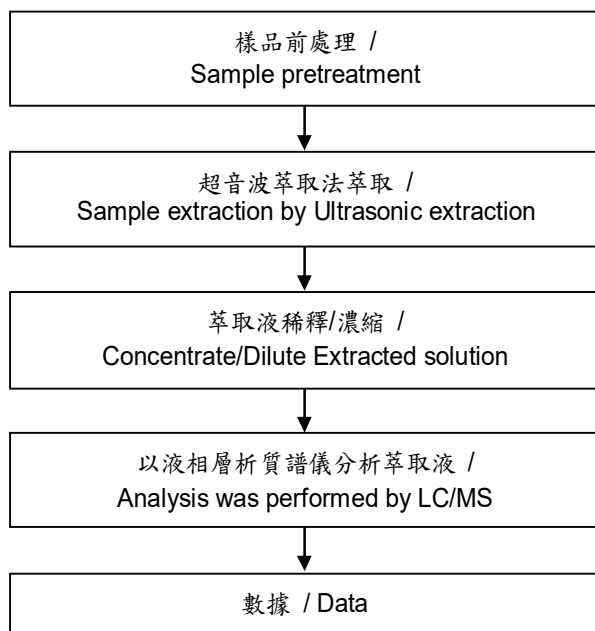
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### 四溴雙酚-A分析流程圖 / TBBP-A analytical flow chart

- 測試人員：黃環璽/ Technician: Ginny Huang
- 測試負責人：張伯睿/ Supervisor: Ray Chang



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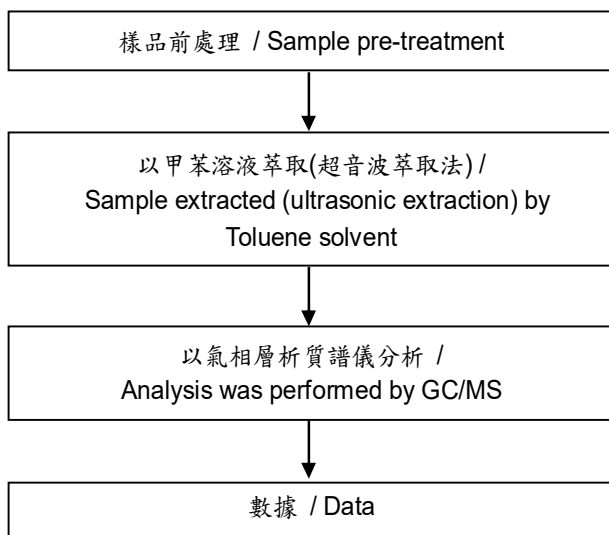
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### 多環芳香烴分析流程圖 /

### PAHs (Poly Aromatic Hydrocarbons) analytical flow chart

- 測試人員：陳威錚 / Technician: Dorothy Chen
- 測試負責人：張伯睿 / Supervisor: Ray Chang



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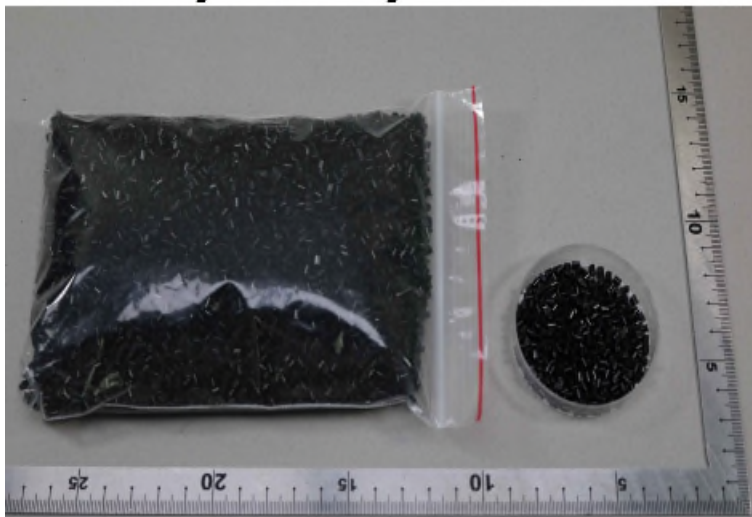
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\* 照片中如有箭頭標示,則表示為實際檢測之樣品/部位。\*

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

# KA/2020/21018



\*\* 報告結尾(End of Report) \*\*

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