



TEST REPORT

Lab No. : (6223)061-0034
Date : March 09, 2023
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APPLICANT
申請人 : Macronix International Co., Ltd
No. 16, Lixing Rd., Hsinchu Science Park, Hsinchu City 300, Taiwan
(R.O.C.)
旺宏電子股份有限公司
300 新竹科學園區力行路十六號

CONTACT PERSON
聯絡人 : —

DATE OF SUBMISSION
送樣日期 : March 02, 2023
2023 年 03 月 02 日

PERFORMANCE PERIOD
測試日期 : March 02, 2023 to March 09, 2023
2023 年 03 月 02 日至 2023 年 03 月 09 日

SAMPLE DESCRIPTION
樣品描述 : IC

ITEM NO.
產品型號 : 16SOP (300mil)

SUMMARY OF TEST RESULTS 測試結果摘要

TEST REQUESTED 測試要求	CONCLUSION 結論	REMARK 備註
Heavy Metals and Flame Retardants Content – European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) 重金屬和阻燃劑含量 – 有關歐盟委員會針對電子產品的指令(電子電氣禁用某些有害物質指令), 2011/65/EU	PASS 通過	—
Phthalates Test – Directive (EU)2015/863 Amendment of European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS) (Note: The amendment will be effective on 22 July 2019. For medical devices, monitoring and control instruments, effective date will be 22 July 2021.) 鄰苯二甲酸鹽測試 – 指令2011/65/EU 歐洲議會和理事會關於電子電氣設備中限制使用某些有害物質 (RoHS) 的修正案指令(EU)2015/863. (注釋:修正案將於2019年7月22日起生效。對於醫療設備及監測和控制設備生效日期為2021年7月22日)	PASS 通過	—

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Bureau Veritas
Consumer Product Service (H.K.) Ltd.
Taiwan Branch
37, Zhongyang S Rd., Sec. 2, Beitou,
Taipei 112, Taiwan, R.O.C.

Tel : 886-2-2895-3666
Fax: 886-2-2895-6999
<http://www.cps.bureauveritas.com>

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TEST REQUESTED 測試要求	CONCLUSION 結論	REMARK 備註
Phthalates Test 鄰苯二甲酸鹽測試	DATA 數據	Test result in page 4 測試結果請見第 4 頁
Halogenated compounds – F, Cl, Br & I 含鹵素物質檢測 – 氟, 氯, 溴 和 碘	DATA 數據	Test result in page 5 測試結果請見第 5 頁

REMARK 備註

If there are questions or concerns on this report, please contact:
若有任何疑問或諮詢, 請與我們聯絡

Primary Contact: Tiffany Chin

Tel: 886-2-2895-3666, Ext 231

Email: tiffany.chin@bureauveritas.com

Technical Inquiry Jack Chiu

Tel: 886-2-2895-3666, Ext 208

Email: jack.chiu@bureauveritas.com

Back-up Contact: Vico Lin

Tel: 886-2-2895-3666, Ext 336

Email: vico.lin@bureauveritas.com

BUREAU VERITAS CONSUMER PRODUCTS SERVICES
(H.K.) LIMITED, TAIWAN BRANCH

PREPARED BY : Tiffany Chin

VICO LIN
MANAGER
ANALYTICAL DEPARTMENT

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TEST RESULT 測試結果

Tested item 測試部件	
1.	Black mixed material / 黑色混合材料
2.	Silvery metal / 銀色金屬

Heavy Metals and Flame Retardants Content – European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)
重金屬和阻燃劑含量 - 有關歐盟委員會針對電子產品的指令(電子電氣禁用某些有害物質指令), 2011/65/EU

Compounds 化合物	Unit 單位	Tested item 測試部件		RoHS' Limits 限用有害物質指令限值	
		1	2		
Lead [Pb] / 鉛	mg/kg	N.D.	N.D.	1000	
Cadmium [Cd] / 鎘	mg/kg	N.D.	N.D.	100	
Mercury [Hg] / 汞	mg/kg	N.D.	N.D.	1000	
Chromium (VI) [Cr(VI)] / 六價鉻	mg/kg	N.D.	—	1000	
Chromium (VI) [Cr(VI)] / 六價鉻	µg/cm ²	—	N.D.* ³	1000	
Polybrominated Biphenyls[PBBs] / 多溴聯苯					
Bromobiphenyls / 一溴聯苯	mg/kg	N.D.	N.D.		
Dibromobiphenyls / 二溴聯苯	mg/kg	N.D.	N.D.		
Tribromobiphenyls / 三溴聯苯	mg/kg	N.D.	N.D.		
Tetrabromobiphenyls / 四溴聯苯	mg/kg	N.D.	N.D.		
Pentabromobiphenyls / 五溴聯苯	mg/kg	N.D.	N.D.		
Hexabromobiphenyls / 六溴聯苯	mg/kg	N.D.	N.D.		
Heptabromobiphenyls / 七溴聯苯	mg/kg	N.D.	N.D.		
Octabromobiphenyls / 八溴聯苯	mg/kg	N.D.	N.D.		
Nonabromobiphenyls / 九溴聯苯	mg/kg	N.D.	N.D.		
Decabromobiphenyl / 十溴聯苯	mg/kg	N.D.	N.D.		
Sum of PBBs / 多溴聯苯總和	mg/kg	N.D.	N.D.		1000
Polybrominated Diphenyl Ethers[PBDEs] / 多溴聯苯醚					
Bromodiphenyl ethers / 一溴聯苯醚	mg/kg	N.D.	N.D.		
Dibromodiphenyl ethers / 二溴聯苯醚	mg/kg	N.D.	N.D.		
Tribromodiphenyl ethers / 三溴聯苯醚	mg/kg	N.D.	N.D.		
Tetrabromodiphenyl ethers / 四溴聯苯醚	mg/kg	N.D.	N.D.		
Pentabromodiphenyl ethers / 五溴聯苯醚	mg/kg	N.D.	N.D.		
Hexabromodiphenyl ethers / 六溴聯苯醚	mg/kg	N.D.	N.D.		
Heptabromodiphenyl ethers / 七溴聯苯醚	mg/kg	N.D.	N.D.		
Octabromodiphenyl ethers / 八溴聯苯醚	mg/kg	N.D.	N.D.		
Nonabromodiphenyl ethers / 九溴聯苯醚	mg/kg	N.D.	N.D.		
Decabromodiphenyl ether / 十溴聯苯醚	mg/kg	N.D.	N.D.		
Sum of PBDEs / 多溴聯苯醚總和	mg/kg	N.D.	N.D.		1000
Conclusion 結論	—	PASS 通過	PASS 通過		—



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TEST RESULT 測試結果

Phthalates Test – Directive (EU)2015/863 Amendment of European Parliament and Council Directive 2011/65/EU on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (RoHS)

鄰苯二甲酸鹽測試- 指令 2011/65/EU 歐洲議會和理事會關於電子電氣設備中限制使用某些有害物質 (RoHS) 的修正案指令(EU)2015/863.

Test Parameter 測試項目	CAS No. CAS 編號	Unit 單位	Tested item 測試部件		Maximum Allowable Limit: 最大允許限值:
			1	2	
Dibutyl phthalate (DBP) 鄰苯二甲酸二丁酯	84-74-2	%	N.D.	N.D.	0.1
Butyl benzyl phthalate (BBP) 鄰苯二甲酸丁苄酯	85-68-7	%	N.D.	N.D.	0.1
Bis(2-ethylhexyl) phthalate (DEHP) 鄰苯二甲酸二異辛酯	117-81-7	%	N.D.	N.D.	0.1
Diisobutyl phthalate (DIBP) 鄰苯二甲酸二異丁酯	84-69-5	%	N.D.	N.D.	0.1
Conclusion 結論	—	—	PASS 通過	PASS 通過	—

Phthalates Test

鄰苯二甲酸鹽測試

Test Item 測試項目	CAS No. CAS 編號	Unit 單位	Tested item 測試部件
			1
Di-n-hexyl phthalate (DNHP) 鄰苯二甲酸二己酯 (DNHP)	84-75-3	%	N.D.
Di-n-octyl phthalate (DNOP) 鄰苯二甲酸二正辛酯 (DNOP)	117-84-0	%	N.D.
Di-isodecyl phthalate (DIDP) 鄰苯二甲酸二異癸酯 (DIDP)	26761-40-0	%	N.D.
Di-isononyl phthalate (DINP) 鄰苯二甲酸二異壬酯 (DINP)	28553-12-0	%	N.D.
Sum of Phthalates / 鄰苯二甲酸鹽總和	—	%	N.D.



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TEST RESULT 測試結果

Halogen Content - Fluorine, Chlorine, Bromine and Iodine

鹵素含量 - 氟、氯、溴和碘

Compounds 化合物	Unit 單位	Tested item 測試部件
		1
Halogenated Compounds / 鹵素:		
Fluorine [F] / 氟	mg/kg	N.D.
Chlorine [Cl] / 氯	mg/kg	N.D.
Bromine [Br] / 溴	mg/kg	N.D.
Iodine [I] / 碘	mg/kg	N.D.
Sum of Halogenated Compounds / 鹵素總和	mg/kg	N.D.

Note 註解:

N.D. = Not Detected (低於偵測極限) — = Empty (空白)

Negative = (陰性)

Positive = (陽性)

% = percent (百分率)

10 000 mg/kg = 1 %

mg/kg = milligram per kilogram = ppm (毫克/公斤, 百萬分之一)

*測試面積: 25.11cm²

*體積: 25mL

Detection Limit / 偵測極限:

Pb, Cd, Hg: 2 mg/kg

Cr(VI) (非金屬, Non-metal): 8 mg/kg

Cr(VI) (金屬, Metal): 0.1 µg/cm²

Metal 金屬

Cr(VI): 0.1 µg/cm²

#The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13µg/cm². The coating is considered to contain Cr(VI).

當六價鉻結果大於 0.13µg/cm², 表示樣品表層含有六價鉻。

#The sample is negative for Cr(VI) if the Cr(VI) concentration is less than 0.10µg/cm². The coating is considered a non-Cr(VI) based coating.

當六價鉻結果小於 0.10µg/cm², 表示樣品表層不含六價鉻。

#The result between 0.10µg/cm² and 0.13µg/cm² is considered to be inconclusive – unavoidable coating variations may influence the determination.

當六價鉻結果介於 0.10µg/cm² 和 0.13µg/cm² 之間, 表示樣品表層不確定含有六價鉻 – 不可避免塗料的變化性可能影響結果判定。

PBBs & PBDEs: Each 5 mg/kg

Phthalates Content: Each 0.005%

F, I: 100 mg/kg

Cl, Br: 50 mg/kg



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Test Parameter 測試項目	Test Method 測試方法
Lead [Pb] / 鉛	With reference to IEC 62321-5: 2014. 參照 IEC 62321-5: 2014.
Cadmium [Cd] / 鎘	
Mercury [Hg] / 汞	With reference to IEC 62321-4: 2013+AMD 1:2017 CSV. 參照 IEC 62321-4: 2013+AMD 1:2017 合併版本.
Chromium (VI) [Cr(VI)] / 六價鉻	Metal 金屬: With reference to IEC 62321-7-1:2015. ^[a] 參照 IEC 62321-7-1:2015. ^[a] Polymers & Electronics 聚合物及電子: With reference to IEC 62321-7-2:2017. 參照 IEC 62321-7-2:2017.
Polybrominated Biphenyls[PBBs] and Polybrominated Diphenyl Ethers [PBDEs] / 多溴聯苯和多溴聯苯醚:	With reference to IEC 62321-6: 2015. 參照 IEC 62321-6: 2015.
Phthalates Test 鄰苯二甲酸鹽測試	With reference to IEC 62321-8: 2017. 參照 IEC 62321-8: 2017.
Halogenated Compounds: F, Cl, Br, I / 鹵素: 氟, 氯, 溴, 碘:	With reference to EN14582:2016(E). 參照 EN14582:2016(E).
[a]	The principle of this method was evaluated and supported by two studies organized by IEC TC 111 WG3. These studies were focused on detecting the presence of Cr VI in the corrosion protection coatings on metallic samples. 該方法的原理是在由 IEC TC111 WG3 組織的兩次研究中得到充分評估並獲得了認可。這些研究著重於對金屬樣品上的防腐塗層中六價鉻的存在檢測(定性測試)

Remark 備註:

- The result only relates to the tested item. The report shall not be reproduced except full without the written approval of the testing laboratory. Parameters which are not covered by the lab's testing scope are subcontracted to laboratories with government approval. The accreditation relates to competences given in the accreditation certificate.
測試結果僅代表經測試部件。本報告未經測試實驗室認可不得複製。未在本實驗室測試範疇之測試均委外至經官方核可之實驗室。委外實驗室之能力經認證許可。
- Samples test were conducted as per applicant's request.
樣品測試進行為依照申請人的要求。
- *The surface area of submitted sample is less than 50 cm² and client can not provide sufficient sample, under the premise of ensuring that the data can be accurately analyzed, the laboratory refers to the test method and conducts the test according to 25 cm² and reduces the amount of extraction solvent in proportion. (the ratio of sample area and extraction solvent will be 1cm² : 1mL).
*提交的樣品表面積小於 50 cm² 且客戶無法提供足夠的樣品，在確保數據可被準確分析的前提下，實驗室參照測試方法依 25 cm² 進行測試並等比例減少萃取溶劑的用量。(樣品面積與萃取溶劑的比例為 1cm²:1mL)。

- End 結束 -

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Photo of the Submitted Sample
委送樣品照片



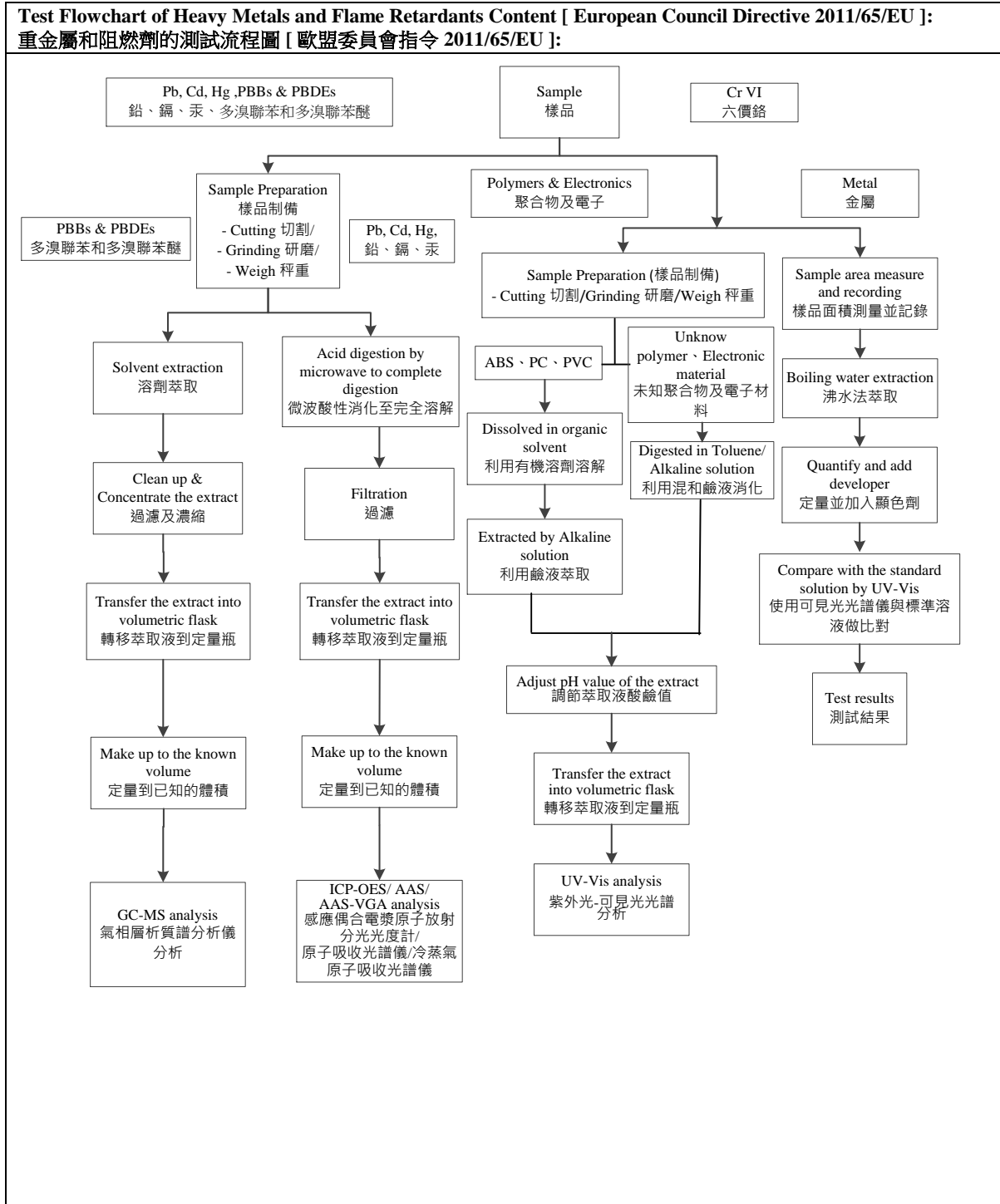
Sample



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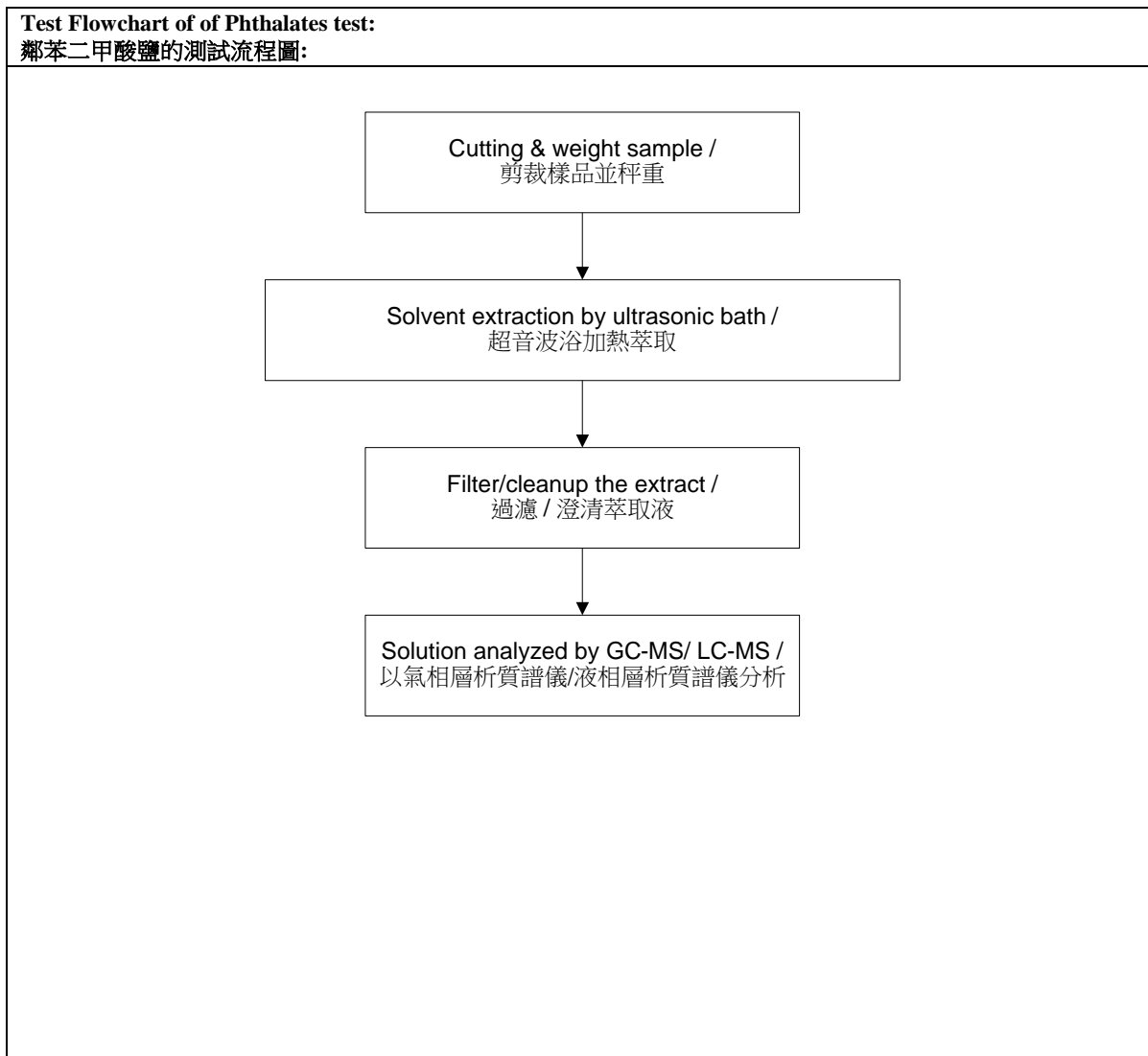
APPENDIX(附錄)

Test Flowchart of Heavy Metals and Flame Retardants Content [European Council Directive 2011/65/EU]:
重金屬和阻燃劑的測試流程圖 [歐盟委員會指令 2011/65/EU]:



APPENDIX(附錄)

Test Flowchart of of Phthalates test:
鄰苯二甲酸鹽的測試流程圖:



APPENDIX(附錄)

Test Flowchart of Halogenated Compounds-F, Cl, Br, I:

鹵素: 氟, 氯, 溴, 碘的測試流程圖:

