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专利产品:

- 1、亚光磨砂PC材料（发明专利号：201510645767.4）
- 2、亚光磨砂 PMMA 材料（发明专利号：201510645768.9）
- 3、板材挤压 102C 黄色耐候荧光色母（发明专利号：201510899924.4）
- 4、PC纳米减轻剂（发明专利号：201610199856.5）
- 5、GPPS反射材料(发明专利号:201610199857.X)
- 6、PC,PBT反射材料(发明专利号:201610325214.5)
- 7、HIPS反射材料(发明专利号:201610381620.3)
- 8、PP,PE,PET反射材料(发明专利号:201610381619.0)
- 9、超分散瓷白开关面板母粒及其制备方法和应用（发明专利号:201910985960.0）
- 10、PCP新型透光材料（发明专利号：201810443635.7）
- 11、超分散PC光扩散母粒及其制备方法和应用（发明专利号:201910985991.6）
- 12、散热用石墨烯复合塑料及其制备方法（发明专利号：202210361824.6）

经营: 石墨烯散热材料、LED光扩散料、改性塑料、汽车免喷涂材料。

证书号第5587643号



发明专利证书

发明名称：散热用石墨烯复合塑料及其制备方法

发明人：吴洲

专利号：ZL 2022 1 0361824.6

专利申请日：2022年04月07日

专利权人：中山市华洋塑胶颜料有限公司

地址：528400 广东省中山市神湾镇外沙村福源路1号D栋厂房之二(住所申报)

授权公告日：2022年11月18日

授权公告号：CN 114702752 B

国家知识产权局依照中华人民共和国专利法进行审查，决定授予专利权，颁发发明专利证书并在专利登记簿上予以登记。专利权自授权公告之日起生效。专利权期限为二十年，自申请日起算。

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局长
申长雨

申长雨



华洋兄弟石墨烯报告

华洋美国发明证书11, 767, 416B1_00



To Promote the Progress



of Science and Useful Arts

The Director

of the United States Patent and Trademark Office has received an application for a patent for a new and useful invention. The title and description of the invention are enclosed. The requirements of law have been complied with, and it has been determined that a patent on the invention shall be granted under the law.

Therefore, this United States

Patent

grants to the person(s) having title to this patent the right to exclude others from making, using, offering for sale, or selling the invention throughout the United States of America or importing the invention into the United States of America, and if the invention is a process, of the right to exclude others from using, offering for sale or selling throughout the United States of America, products made by that process, for the term set forth in 35 U.S.C. 154(a)(2) or (c)(1), subject to the payment of maintenance fees as provided by 35 U.S.C. 41(b). See the Maintenance Fee Notice on the inside of the cover.



Katherine Kelly Vidal



DIRECTOR OF THE UNITED STATES PATENT AND TRADEMARK OFFICE



US011767416B1

(12) **United States Patent**
Wu

(10) **Patent No.:** **US 11,767,416 B1**
(45) **Date of Patent:** **Sep. 26, 2023**

(54) **GRAPHENE COMPOSITE PLASTIC AND
PREPARATION METHOD THEREOF**

(71) Applicant: **Zhongshan Huayang Plastic Dyestuffs
Co., Ltd.**, Zhongshan (CN)

(72) Inventor: **Zhou Wu**, Zhongshan (CN)

(*) Notice: Subject to any disclaimer, the term of this
patent is extended or adjusted under 35
U.S.C. 154(b) by 0 days.

(21) Appl. No.: **18/095,031**

(22) Filed: **Jan. 10, 2023**

(30) **Foreign Application Priority Data**

Apr. 7, 2022 (CN) 202210361824.6

(51) **Int. Cl.**
C08K 13/06 (2006.01)
C08K 3/04 (2006.01)
C08L 23/12 (2006.01)

(52) **U.S. Cl.**
CPC **C08K 13/06** (2013.01); **C08K 3/042**
(2017.05); **C08L 23/12** (2013.01)

(58) **Field of Classification Search**
CPC C08K 3/042; C08L 23/12
See application file for complete search history.

(56) **References Cited**

FOREIGN PATENT DOCUMENTS

CN	107057192 A	8/2017
CN	109054306 A	12/2018
CN	113773583 A	* 12/2021

OTHER PUBLICATIONS

Machine translation of CN 109054306 A, published Dec. 21, 2018.*
Machine translation of CN 113773583 A, published Dec. 10, 2021.*

* cited by examiner

Primary Examiner — Vickey Nerangis

(74) *Attorney, Agent, or Firm* — Jose Cherson Weissbrot

(57) **ABSTRACT**

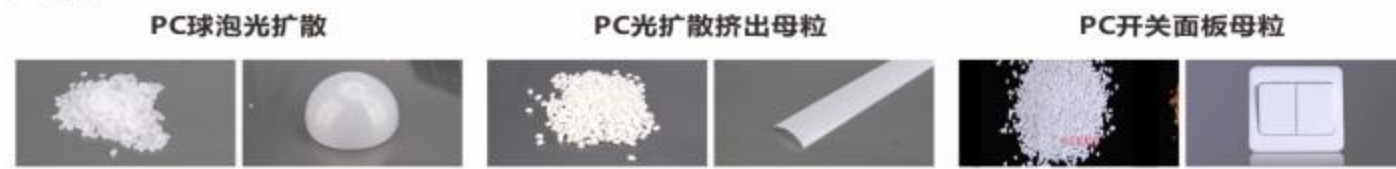
The present disclosure provides a graphene composite plastic for heat dissipation, comprising 10%-85% of carrier resin, 10%-85% of modified graphene, 1%-10% of lubricant, 1%-5% of coupling agent and a stabilizer. The present disclosure also provides a method for preparing the above graphene composite plastic.

5 Claims, No Drawings

公司简介 Company Profile

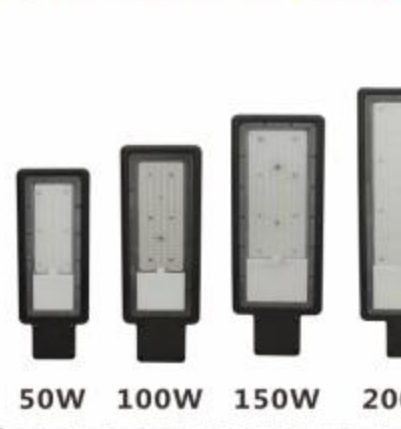
中山市华洋塑胶颜料有限公司成立于2008年, 是专业从事反射材料、改性材料、LED 光扩散材料、PC反射材料、PS反射材料、注吹球泡PC光扩散、注塑超分散PC开关面板瓷白阻燃母粒、PC光扩散挤出母粒、PS光扩散材料、PP光扩散材料、工程塑料、石墨烯散热材料、碳纤维材料等的生产、销售、技术支持一体化科技型企业。

公司现拥有11项国家发明专利, 拥有11台具备国内先进水平的造粒生产线; 公司一贯重视独立自主研发生产能力, 致力于高分子材料的改性技术研究开发, 为客户提供高品质的产品。



石墨烯美国发明专利PCT

石墨烯宝刀系列



石墨烯小金豆系列



石墨烯F91系列



石墨烯照树灯系列



直径: 155/内径112
直径: 185/内径142
直径: 205/内径160
直径: 235/内径190

石墨烯UFO系列



石墨烯筒灯系列



石墨烯磁吸照树灯车轮



石墨烯5054系列



石墨烯小苹果系列



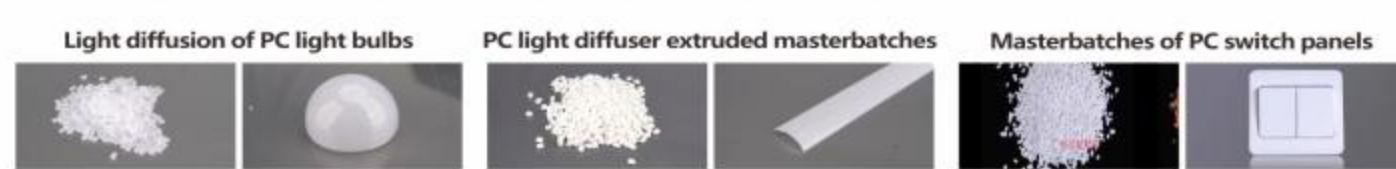
石墨烯材质应用说明:

石墨烯是一种导热性能优异, 难以注塑加工成型的材质。须通过特殊改性方案, 用注塑成型工艺实现了规模量产, 替代铝压铸投光灯外壳降低成本30%~50%以上, 并且提高了生产效率, 迎来行业的真正革命, 所有工艺, 配方均受发明专利保护。

Company Profile

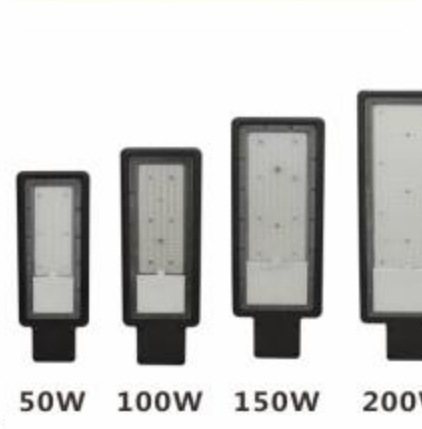
Zhongsan Huayang Plastic Pigment Co., Ltd. was established in 2008, specializing in the production and sales of reflective materials, modified materials, LED light diffusion materials, PC reflection materials, PS reflection materials, injection blown bubble PC light diffusion, injection molded ultra dispersed PC switch panel porcelain white flame retardant masterbatch, PC light diffusion extrusion masterbatch, PS light diffusion materials, PP light diffusion materials, engineering plastics, graphene heat dissipation materials, carbon fiber materials, etc Technical support for integrated technology oriented enterprises.

The company currently has 11 national invention patents and 11 domestically advanced granulation production lines; The company has always attached great importance to independent research and development production capacity, and is committed to the research and development of polymer material modification technology, providing customers with high-quality products.



American Invention Patent PCT for Graphene

Graphene Knife Shaped Series



Graphene Golden Bean Series



Graphene F91 series



Graphene Spotlight Series



Outer:185/Inner:142
Outer:205/Inner:160
Outer:235/Inner:190
Outer:125/Inner:82

Graphene UFO Light Series



Graphene tube lamp series



Graphene magnetic absorption tree lamp wheel



Graphene 5054 Series



Graphene Little Apple Series



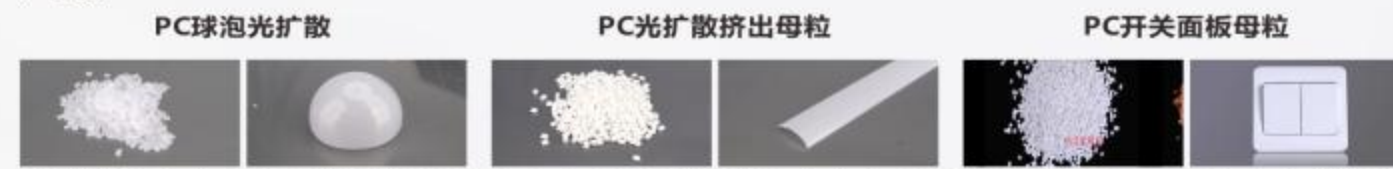
Application instructions for graphene materials:

Graphene is a material with excellent thermal conductivity that is difficult to be molded by injection molding. Through special modification schemes, large-scale production has been achieved through injection molding technology, replacing the aluminum die-casting floodlight shell to reduce costs by more than 30%-50%, and improving production efficiency, ushering in a true revolution in the industry. All processes and formulas are protected by invention patents.

公司简介 Company Profile

中山市华洋塑胶颜料有限公司成立于2008年, 是专业从事反射材料、改性材料、LED 光扩散材料、PC反射材料、PS反射材料、注吹球泡PC光扩散、注塑超分散PC开关面板瓷白阻燃母粒、PC光扩散挤出母粒、PS光扩散材料、PP光扩散材料、工程塑料、石墨烯散热材料、碳纤维材料等的生产、销售、技术支持一体化科技型企业。

公司现拥有11项国家发明专利, 拥有11台具备国内先进水平的造粒生产线; 公司一贯重视独立自主研发生产能力, 致力于高分子材料的改性技术研究开发, 为客户提供高品质的产品。



石墨烯美国发明专利PCT

石墨烯照树灯外壳



直径: 155/内径112
直径: 185/内径142
直径: 205/内径160
直径: 235/内径190

石墨烯灯打款外壳



石墨烯UFO外壳



石墨烯UFO电源盒外壳



石墨烯无主筒灯散热器



石墨烯小金豆外壳



石墨烯开关电源盒



石墨烯塔吊灯驱动壳



石墨烯小苹果外壳



石墨烯材质应用说明:

石墨烯是一种导热性能优异, 难以注塑加工成型的材质。须通过特殊改性方案, 用注塑成型工艺实现了规模量产, 替代铝压铸投光灯外壳降低成本30%~50%以上, 并且提高了生产效率, 迎来行业的真正革命, 所有工艺, 配方均受发明专利保护。

Company Profile

Zhongsan Huayang Plastic Pigment Co., Ltd. was established in 2008, specializing in the production and sales of reflective materials, modified materials, LED light diffusion materials, PC reflection materials, PS reflection materials, injection blown bubble PC light diffusion, injection molded ultra dispersed PC switch panel porcelain white flame retardant masterbatch, PC light diffusion extrusion masterbatch, PS light diffusion materials, PP light diffusion materials, engineering plastics, graphene heat dissipation materials, carbon fiber materials, etc Technical support for integrated technology oriented enterprises.

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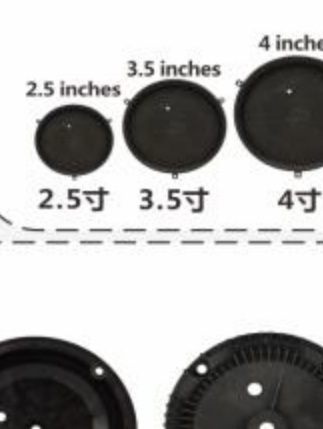
American Invention Patent PCT for Graphene

Graphene Shells of Spotlights



直径: 155/内径112
直径: 185/内径142
直径: 205/内径160
直径: 235/内径190

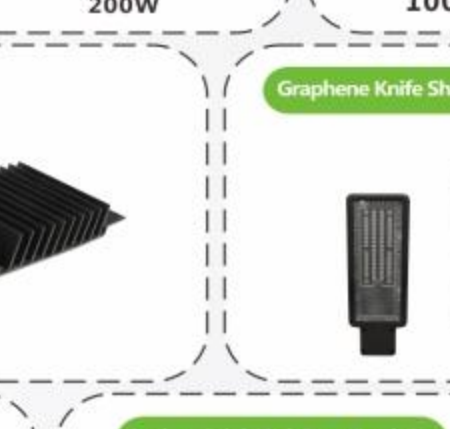
Graphene Dingding Shell



Graphene Shells of UFO Lights



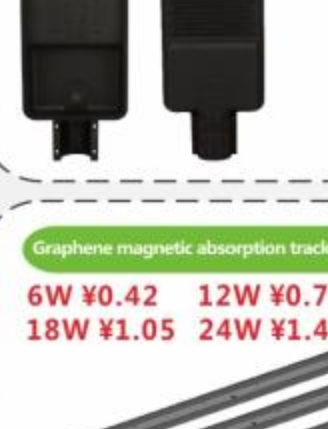
Graphene Shells of UFO Light Power Boxes



Graphene mainless downlight radiator



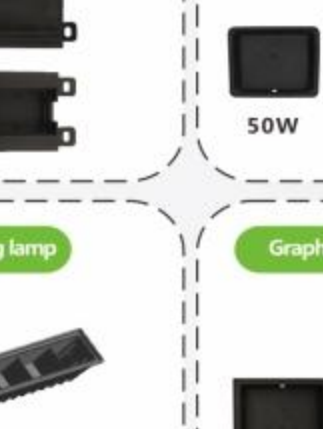
Modular graphene radiator



Graphene Knife Shaped Shell



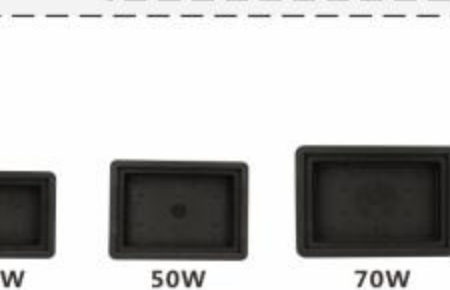
Graphene Sword Shaped Shell



Graphene Golden Bean Shell



Graphene Switch Mode Power Supply Box



Graphene LED Drive Shells of High Bay Lights



Application instructions for graphene materials:

Graphene is a material with excellent thermal conductivity that is difficult to be molded by injection molding. Through special modification schemes, large-scale production has been achieved through injection molding technology, replacing the aluminum die-casting floodlight shell to reduce costs by more than 30%-50%, and improving production efficiency, ushering in a true revolution in the industry. All processes and formulas are protected by invention patents.




中山市华洋塑胶颜料有限公司

石墨烯系列报价单

日期：2023年9月24日

小苹果系列	10W	20W	30W	50W	70W	100W	150W	200W
穴数	1*4	1*4	1*4	1*2	1*2	1*1	1*1	1*1
铝合金 (单位:克)	52	70	110	195	300	375	496	785
PA66+石墨烯 (单位:克)	40	55	90	145	188	305	385	560
单价/PCS	0.77元	0.99元	1.53元	2.61元	4.00元	5.40元	7.74元	11.25元


黑金钢系列	50W	100W	150W	200W	备注
图示					
产品尺寸	198*228*36	232*263*41.5	287*322*45	352*382*52	
重量/PCS	140克	240克	410克	500克	
单价/PCS	2.61元	4.59元	6.75元	10.80元	
小金豆单价/PCS	6.5元				




照树灯系列	9W 照树灯		18W 照树灯		24W 照树灯		36W 照树灯		48W 照树灯	
图示										
铝合金重量	227g		314g		416g		482g		641g	
瓦数	5-7W		9-12W		12-18W		18-24W		24-36W	
产品尺寸	外径Φ125 / 内径Φ84		外径Φ155 / 内径Φ115		外径Φ185 / 内径Φ146		外径Φ205 / 内径Φ164		外径Φ235 / 内径Φ188	
石墨烯重量	面盖	底座	面盖	底座	面盖	底座	面盖	底座	面盖	底座
	24g	130g	32g	190g	38g	260g	44g	300g	57g	385g
单价(元)	0.85	3.4	1.3	5.2	1.5	6.5	1.8	8	2.2	10.3
合计单价(元)	4.25元		6.5元		8.0元		9.8元		12.5元	

UFO	UFO100W	UFO150W	UFO200W
图示			
铝合金重量	514g	732g	980g
产品尺寸	Φ290	Φ350	Φ400
石墨烯重量	286g	440g	591g
单价(元)	6.3元	9.9元	12.1元

UFO 电源盒	100W	150W	200W
图示			
铝合金重量	203g	253g	350g
产品尺寸	Φ130	Φ150	Φ180
石墨烯重量	102g	130g	160g
单价(元)	3.20元	4.30元	5.20元

备注：款到发货，现金价不含税；中山市范围内包送货，省外不含运费。

品名	UFO100W	UFO150W	UFO200W
图示			
铝合金重量	514g	732g	980g
产品尺寸	Φ290	Φ350	Φ400
石墨烯重量	286g	440g	591g
单价（元）	6.3元	9.9元	12.1元

品名	UFO电源盒100W	UFO电源盒150W	UFO电源盒200W
图示			
铝合金重量	203g	253g	350g
产品尺寸	Φ130	Φ150	Φ180
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备注：款到发货，现金价不含税；中山市范围内包送货，省外不含运费。

中山市华洋塑胶颜料有限公司

小苹果系列石墨烯报价单

日期：2023 年 3 月 17 日

品名	10W	20W	30W	50W	70W	100W	150W	200W
穴数	1*4	1*4	1*4	1*2	1*2	1*1	1*1	1*1
铝合金 (单位：克)	52	70	110	195	300	375	496	785
PA66+石墨烯 (单位：克)	40	55	90	145	188	305	385	560
单价/PCS	0.77 元	0.99 元	1.53 元	2.61 元	4.00 元	5.40 元	7.74 元	11.25 元

5054 黑金钢系列石墨烯报价单

品名	50W	100W	150W	200W	备 注
图示					
产品尺寸	198*228*36	232*263*41.5	287*322*45	352*382*52	
重量/PCS	140 克	240 克	410 克	500 克	
单价/PCS	2.61 元	4.59 元	6.75 元	10.80 元	
小金豆单价/PCS	6.5 元				

备注：现金价不含税，款到发货，省外不含运费。

中山市华洋塑胶颜料有限公司

石墨烯F91系列报价单

日期：2023年10月14日

产品名称	50W	100W	150W	200W	300W
图示					
石墨烯重量	160克	250克	350克	380克	580克
单价/PCS	2.5元	4.5元	6.5元	7.0元	11.0元

备注：现金价不含税，款到发货，省外不含运费

中山市华洋塑胶颜料有限公司

车轮照树灯套件报价单

日期：2023年10月18日






品名	9W车轮照树灯			18W车轮照树灯			24W车轮照树灯			36W车轮照树灯			48W车轮照树灯		
图示															
产品尺寸	Φ 120			Φ 150			Φ 180			Φ 200			Φ 230		
石墨烯重里	面盖	中壳	底座	面盖	中壳	底座	面盖	中壳	底座	面盖	中壳	底座	面盖	中壳	底座
	24克	137克	82克	44克	195克	120克	48克	250克	160克	55克	300克	192克	70克	363克	243克
单价（元）	0.85元	3.4元	2.2元	1.5元	4.9元	3.1元	1.5元	6元	3.5元	1.6元	7元	4.4元	2元	8.3元	5.2元
合计单价（元）	6.45元			9.5元			11元			13元			15.5元		

备注：现金价不含税，省外不含运费

中山市华洋塑胶颜料有限公司

石墨烯报价单

日期：2023年8月16日

产品名称	钉钉款2.5寸	钉钉款4寸	钉钉款5寸	钉钉款6寸	钉钉款8寸
图示					
瓦数	5W-5.5W	9.5W-10W	14W-15W	18W-19W	20W-21W
石墨烯重量	8.5g	21g	31g	40g	66g
单价/PCS	0.21元	0.3元	0.53元	0.7元	1.25元

备注：现金价不含税，款到发货，省外不含运费。

中山市华洋塑胶颜料有限公司

宝刀石墨烯套件报价单

日期：2023年10月14日





产品名称	50W路灯头	100W路灯头	150W路灯头	200W路灯头
图示				
单价/PCS	11.00元	14.20元	19.00元	27.50元

备注：现金价不含税，款到发货，省外不含运费

中山市华洋塑胶颜料有限公司

宝刀石墨烯外壳报价单

日期：2023年10月14日







产品名称	50W路灯头	100W路灯头	150W路灯头	200W路灯头
图示				
石墨烯重量	327克	395克	615克	985克
单价/PCS	6.00元	7.20元	12.00元	16.5元

备注：现金价不含税，款到发货，省外不含运费

中山市华洋塑胶颜料有限公司

泛光灯、聚光灯报价单


日期：2023年8月8日

产品名称	泛光灯12W	泛光灯24W	聚光灯6W	聚光灯12W	聚光灯18W	聚光灯24W
图示						
铝合金型材重量	72g	144g	25g	46g	68g	90g
石墨烯重量	83g	163g	28g	52g	77g	102g
石墨烯壁厚	1.5	1.5	1.5	1.5	1.5	1.5
单价/PCS	1.1元	2.2元	0.42元	0.7元	1.05元	1.45元

中山华洋塑胶颜料有限公司

筒灯套件报价单

2023年10月30日

品名	石墨烯筒灯	PP支架
图示		
产品尺寸	Φ63	Φ59.2
产品重量	62克	7.5克
单价（元）	1.15元	0.12元

备注：现金价不含税，省外不含运费

检测报告

编号 : GZMR230802333501_CN

日期 : 2023-09-15

页码 : 1 of 4



客户名称: 中山市华洋塑胶颜料有限公司
客户地址: 中山市神湾镇外沙村福源路 1 号 D 栋厂房之二

样品名称 : 石墨烯投光灯外壳
型号 : 3113 (材料型号)

以上信息及样品由客户提供及确认, SGS 不承担证实客户提供信息的准确性、适当性和(或)完整性的责任。

SGS 参考号 : GZP23-010392
收样日期 : 2023-08-14
测试开始时间 : 2023-08-14
测试结束时间 : 2023-09-15
测试结果 : 请见下页 (除另有特别说明外, 此报告结果仅对测试样品负责)

通标标准技术服务有限公司广州分公司
授权签名

白宇

授权签字人



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Guangzhou Branch Testing Services & Reliability Laboratory

□ No.198, Kaifu Road, Science City, Economic & Technology Development Area, Guangzhou, Guangdong, China □ Room 101, Building 3, No.1501, Kaichuang Avenue, Huangpu District, Guangzhou, China t:(86-20) 8215555 www.sgs.com.cn
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检测报告

编号：GZMR230802333501_CN

日期：2023-09-15

页码：2 of 4

结果总结：

序号	测试项目	测试方法	结果	结论
1	规定变化速率的温度 变化试验	客户提供	无开裂、无鼓泡、 无变色	合格

备注：合格：达到要求
不合格：未达到要求
/：不下判定

原样照片：



原样 A



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Guangzhou Branch Testing Services & Reliability Laboratory

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检测报告

编号 : GZMR230802333501_CN

日期 : 2023-09-15

页码 : 3 of 4

测试项目: 规定变化速率的温度变化试验

样品描述: 石墨烯投光灯外壳

测试方法: 客户提供

测试条件:

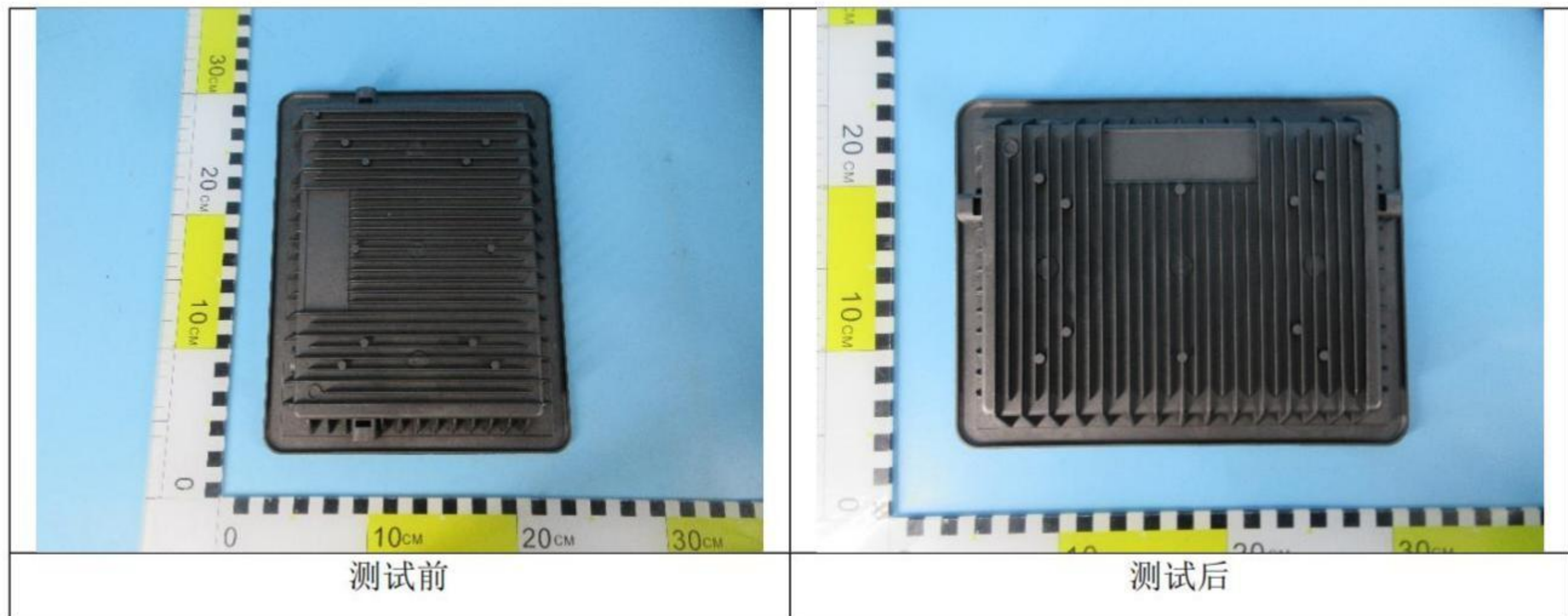
步骤	测试温度	时间
1	-30℃	30min
2	120℃	30min
温度变换速率: 15℃/min		
循环次数: 375 (500h)		

实验室环境条件: 15℃~ 35℃, 25% ~ 75%RH

测试结果:

样品	测试后外观	客户要求	结论
#1	无开裂、无鼓泡、无变色	无开裂、无鼓泡、无变色	合格

测试照片:

SGS-CSTC
Guangzhou Branch Testing Center & Reliability Laboratory

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检测报告

编号 : GZMR230802333501_CN

日期 : 2023-09-15

页码 : 4 of 4



测试中

设备信息:

设备	型号	设备编号	校准日期	下次校准日期
快速温变试验箱	SE-400-15-15	GZMR-RL-E064	2023-04-03	2024-04-02

附录信息: 本测试报告内容是报告编号为 GZMR230802333501 的中文版本。中英文版本如有歧义, 概以英文版为准。

***** 报告结束*****



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Guangzhou Branch Testing Services & Reliability Laboratory

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TEST REPORT

No. : GZMR230802333501

Date : Sep 15, 2023

Page: 1 of 4



CUSTOMER NAME: ZHONG SHAN CITY HUA YANG PLASTIC PIGMENT CO.,LTD.
ADDRESS: 1 FUYUAN ROAD,WAISHA VILLAGE,SHENWAN TOWN,
ZHOINGSHAN CITY

Sample Name : GRAPHENE PROJECTION LAMP HOUSING
Model No. : 3113 (MATERIAL MODEL)

Above information and sample(s) was/were submitted and confirmed by the client. SGS, however, assumes no responsibility to verify the accuracy, adequacy and completeness of the sample information provided by client.

SGS Ref. No. : GZP23-010392
Date of Receipt : Aug 14, 2023
Testing Start Date : Aug 14, 2023
Testing End Date : Sep 15, 2023
Test result(s) : For further details, please refer to the following page(s)
(Unless otherwise stated the results shown in this test report refer only to the sample(s) tested)

Signed for
SGS-CSTC Standards Technical
Services Co., Ltd. Guangzhou Branch

Gary Bai
Authorized signatory



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TEST REPORT

No. : GZMR230802333501

Date : Sep 15, 2023

Page: 2 of 4

Summary of Results:

No.	Test Item	Test Method	Result	Conclusion
1	Change of Temperature with Specified Rate of Change	Provided by client	No evidence of cracking, blistering, discoloration	Pass

Note: Pass : Meet the requirements;
Fail : Does not meet the requirements;
/ : Not Apply to the judgment.

Original Sample Photo:



Original sample A



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TEST REPORT

No. : GZMR230802333501

Date : Sep 15, 2023

Page: 3 of 4

Test Item: Change of Temperature with Specified Rate of Change

Sample Description: Graphene projection lamp housing

Test Method: Provided by client

Test Condition:

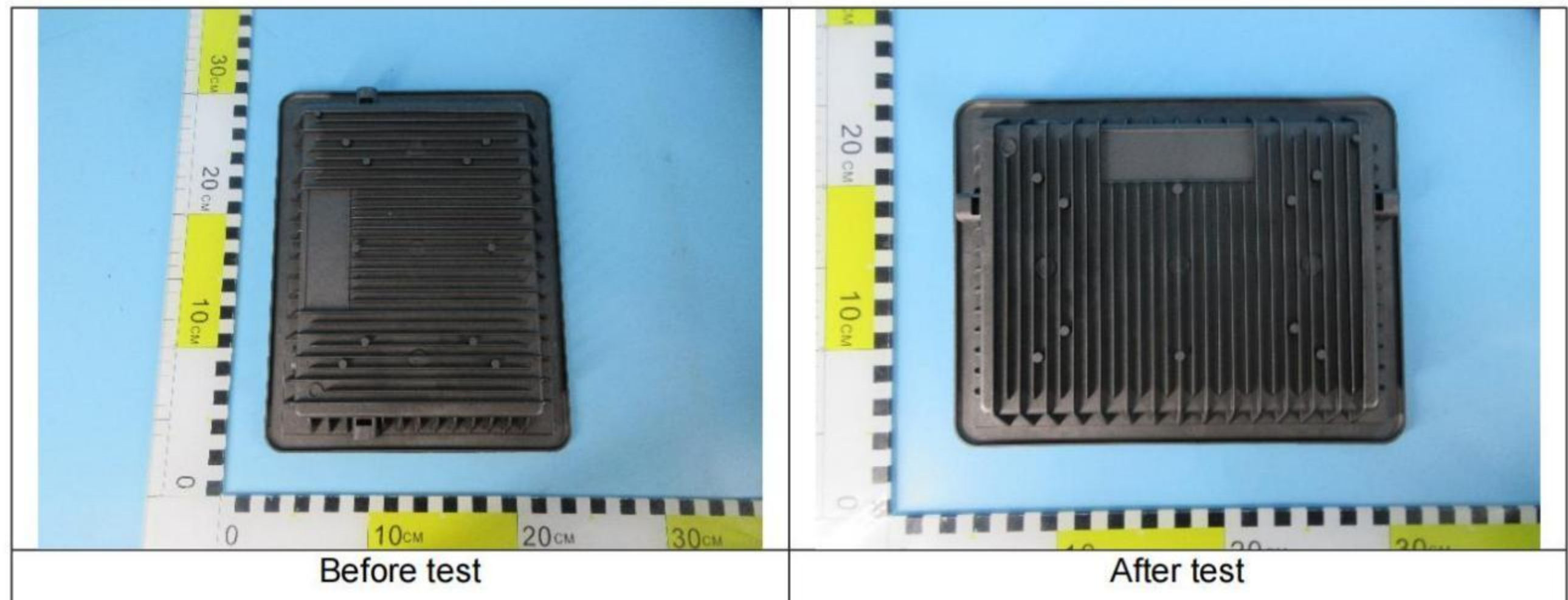
Interval	Test temperature	Duration
1	-30℃	30min
2	120℃	30min
Temperature change rate:15℃/minute		
Cycles: 375 (500h)		

Lab Environment Condition: 15℃~35℃, 25% ~75%RH

Test Result:

Sample	Appearance after test	Client's requirement	Conclusion
#1	No evidence of cracking, blistering, discoloration	No evidence of cracking, blistering, discoloration	Pass

Test Photo:



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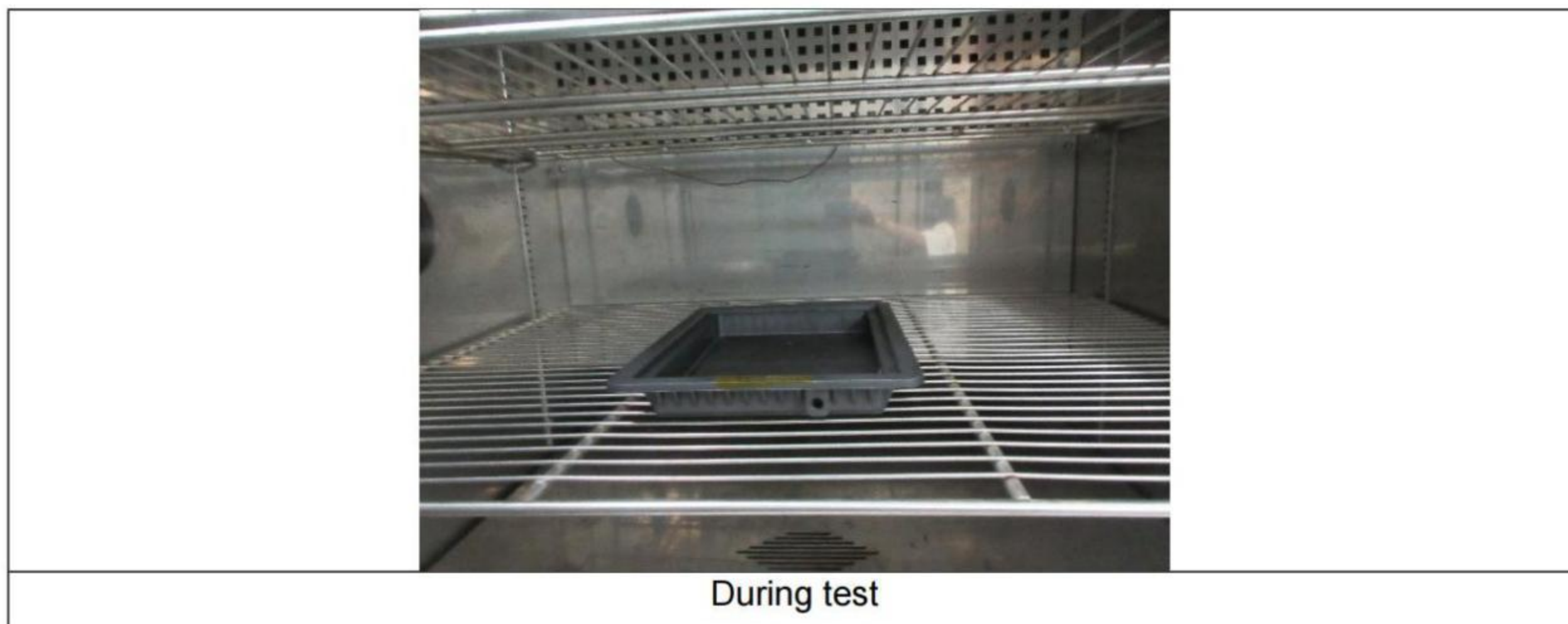
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TEST REPORT

No. : GZMR230802333501

Date : Sep 15, 2023

Page: 4 of 4



Equipment Information:

Equipment	Model	Equipment No.	Calibration date	Next Calibration date
Temperature Rapid Change Chamber	SE-400-15-15	GZMR-RL-E064	2023-04-03	2024-04-02

***** End of report*****



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检测报告

编号: CANEC23006250301

日期: 2023 年 07 月 20 日

第 1 页, 共 8 页

客户名称: 中山市华洋塑胶颜料有限公司
客户地址: 中山市神湾镇外沙村福源路 1 号 D 栋厂房之二

样品名称: 石墨烯
型号: 3113

以上样品及信息由客户提供。

SGS 工作编号: GZP23-007305
样品接收时间: 2023 年 07 月 17 日
检测周期: 2023 年 07 月 17 日 ~ 2023 年 07 月 20 日
检测要求: 根据客户要求检测
检测方法: 见后续页。
检测结果: 见后续页。

检测要求	结论
欧盟 RoHS 指令 2011/65/EU 附录 II 的修正指令(EU) 2015/863- 铅、汞、镉、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基己基)酯(DEHP)和邻苯二甲酸二异丁酯(DIBP)	符合

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钟臻

Jany Zhong
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检测报告

编号: CANEC23006250301

日期: 2023 年 07 月 20 日

第 2 页, 共 8 页

检测结果:

检测部件外观描述:

样品序号	样品编号	SGS 样品 ID	样品描述
SN1	A1	CAN23-0062503-0001.C001	黑色物料

备注:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL= 方法检测限
- (3) ND = 未检出(< MDL)
- (4) "-" = 未规定

欧盟 RoHS 指令 2011/65/EU 附录 II 的修正指令(EU) 2015/863- 铅、汞、镉、六价铬、多溴联苯(PBBs)、多溴二苯醚(PBDEs)、邻苯二甲酸二丁酯 (DBP)、邻苯二甲酸丁苄酯(BBP)、邻苯二甲酸二(2-乙基己基)酯 (DEHP)和邻苯二甲酸二异丁酯(DIBP)

检测方法: 参考 IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 和 IEC 62321-8:2017, 采用 ICP-OES, UV-Vis 和 GC-MS 进行分析。

检测项目	限值	单位	MDL	A1
镉 (Cd)	100	mg/kg	2	ND
铅 (Pb)	1000	mg/kg	2	18
汞 (Hg)	1000	mg/kg	2	ND
六价铬(Cr(VI))	1000	mg/kg	8	ND
多溴联苯之和(PBBs)	1000	mg/kg	-	ND
一溴联苯(MonoBB)	-	mg/kg	5	ND
二溴联苯(DiBB)	-	mg/kg	5	ND
三溴联苯(TriBB)	-	mg/kg	5	ND
四溴联苯(TetraBB)	-	mg/kg	5	ND
五溴联苯(PentaBB)	-	mg/kg	5	ND
六溴联苯(HexaBB)	-	mg/kg	5	ND
七溴联苯(HeptaBB)	-	mg/kg	5	ND
八溴联苯(OctaBB)	-	mg/kg	5	ND
九溴联苯(NonaBB)	-	mg/kg	5	ND
十溴联苯(DecaBB)	-	mg/kg	5	ND
多溴二苯醚之和(PBDEs)	1000	mg/kg	-	ND
一溴二苯醚(MonoBDE)	-	mg/kg	5	ND
二溴二苯醚(DiBDE)	-	mg/kg	5	ND
三溴二苯醚(TriBDE)	-	mg/kg	5	ND
四溴二苯醚(TetraBDE)	-	mg/kg	5	ND
五溴二苯醚(PentaBDE)	-	mg/kg	5	ND
六溴二苯醚(HexaBDE)	-	mg/kg	5	ND
七溴二苯醚(HeptaBDE)	-	mg/kg	5	ND
八溴二苯醚(OctaBDE)	-	mg/kg	5	ND



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检测报告

编号: CANEC23006250301

日期: 2023 年 07 月 20 日

第 3 页, 共 8 页

检测项目	限值	单位	MDL	A1
九溴二苯醚(NonaBDE)	-	mg/kg	5	ND
十溴二苯醚(DecaBDE)	-	mg/kg	5	ND
邻苯二甲酸二丁酯 (DBP)	1000	mg/kg	50	ND
邻苯二甲酸丁苄酯 (BBP)	1000	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯 (DEHP)	1000	mg/kg	50	ND
邻苯二甲酸二异丁酯 (DIBP)	1000	mg/kg	50	ND

备注:

- (1) 最大允许极限值引用自 RoHS 指令(EU) 2015/863。
 - (2) IEC 62321 系列等同于 EN 62321 系列。
 - (3) 2021 年 7 月 22 号开始, DEHP, BBP, DBP 和 DIBP 的限制适用于医疗器械, 包括体外医疗器械, 监控仪表, 包括工业监测和控制仪器。
- 除非另有说明, 参照 ILAC-G8:09/2019, 使用简单接受 ($w=0$) 的二元判定规则进行符合性判定。
- 除非另有说明, 此报告结果仅对检测的样品负责。本报告未经本公司书面许可, 不可部分复制。
- 检测报告仅用于客户科研、教学、内部质量控制、产品研发等目的, 仅供内部参考。



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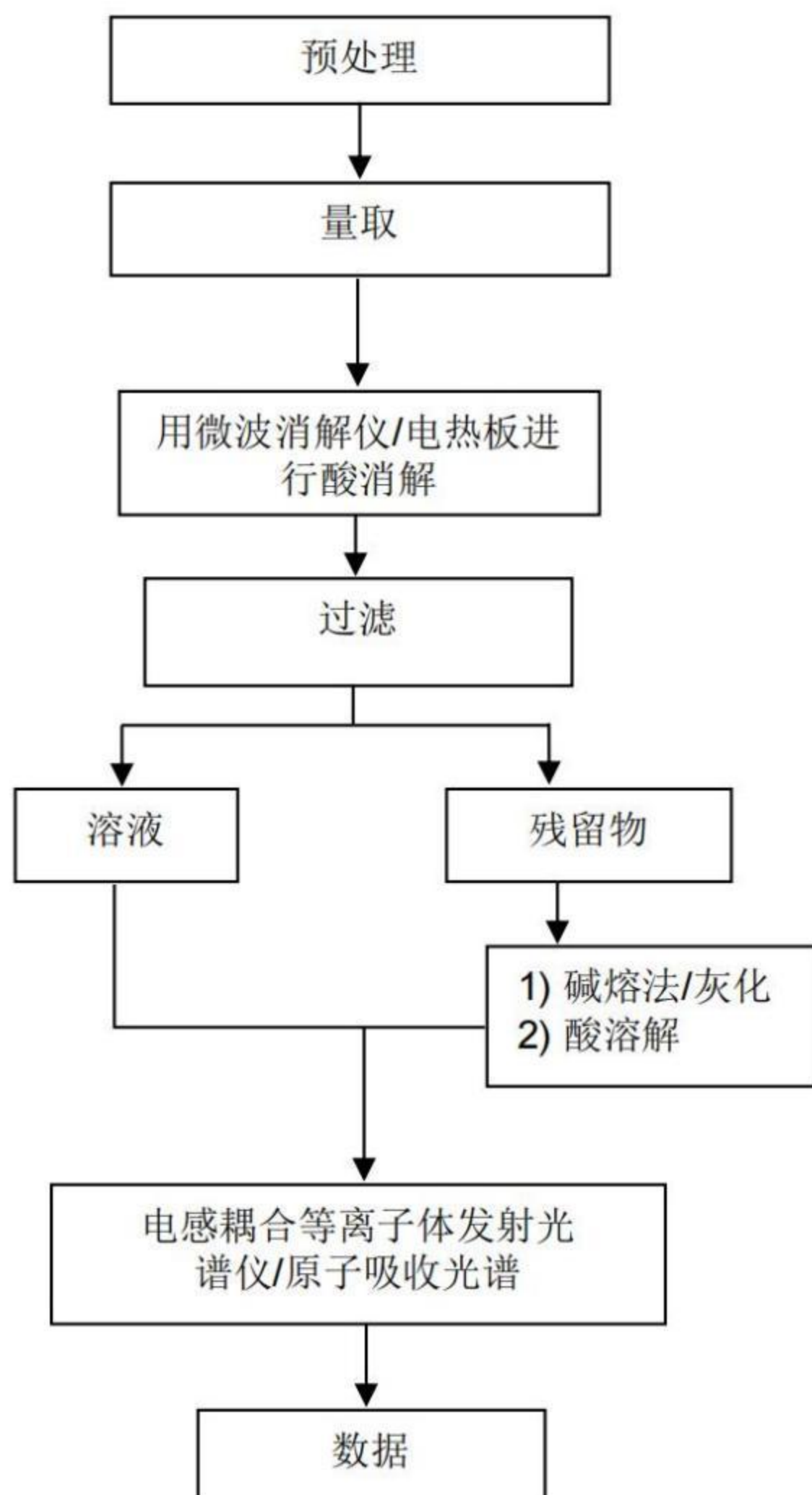
日期: 2023 年 07 月 20 日

第 4 页, 共 8 页

附件

元素检测流程图

样品按照下述流程被完全消解



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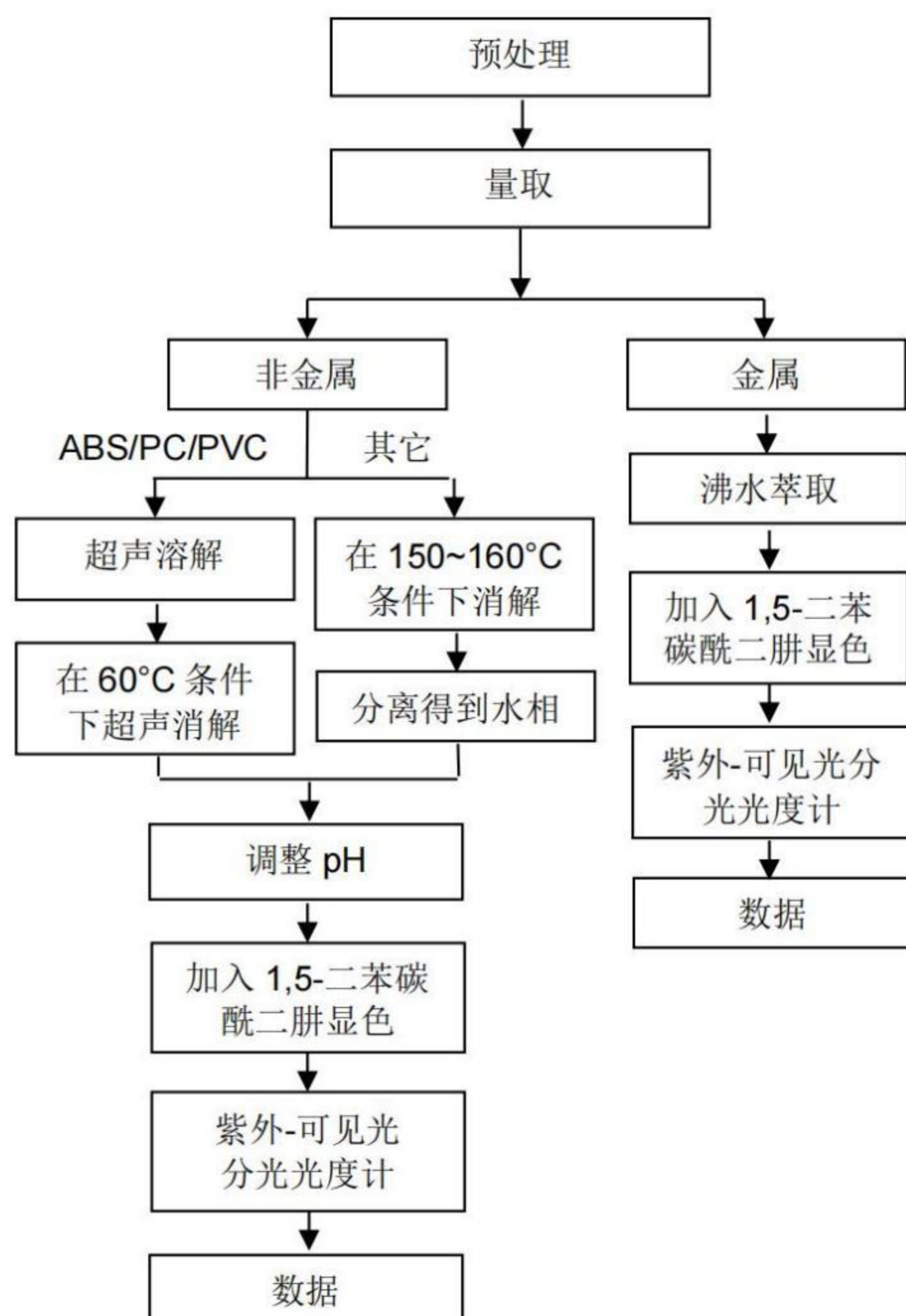
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六价铬检测流程图



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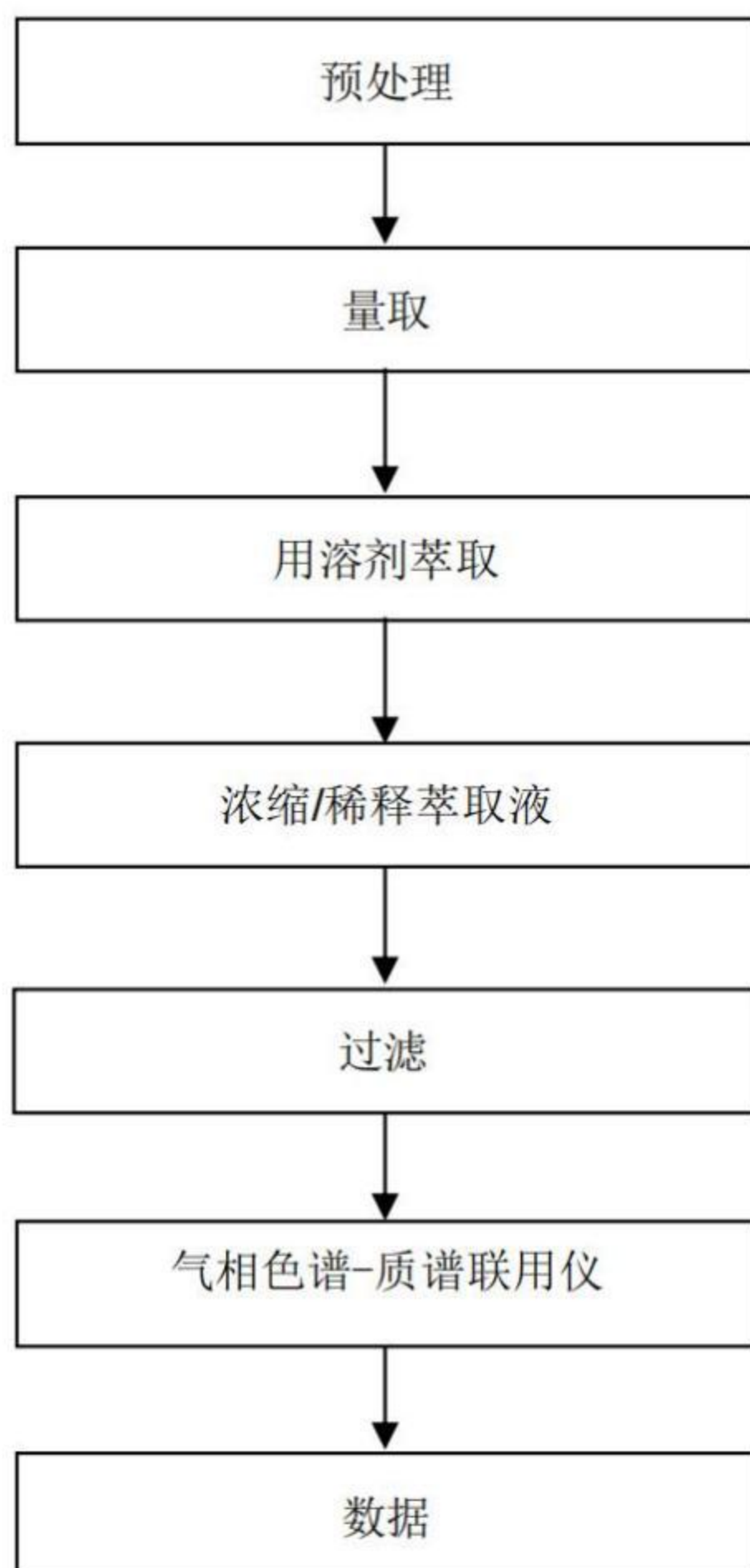
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PBBs/PBDEs 检测流程图



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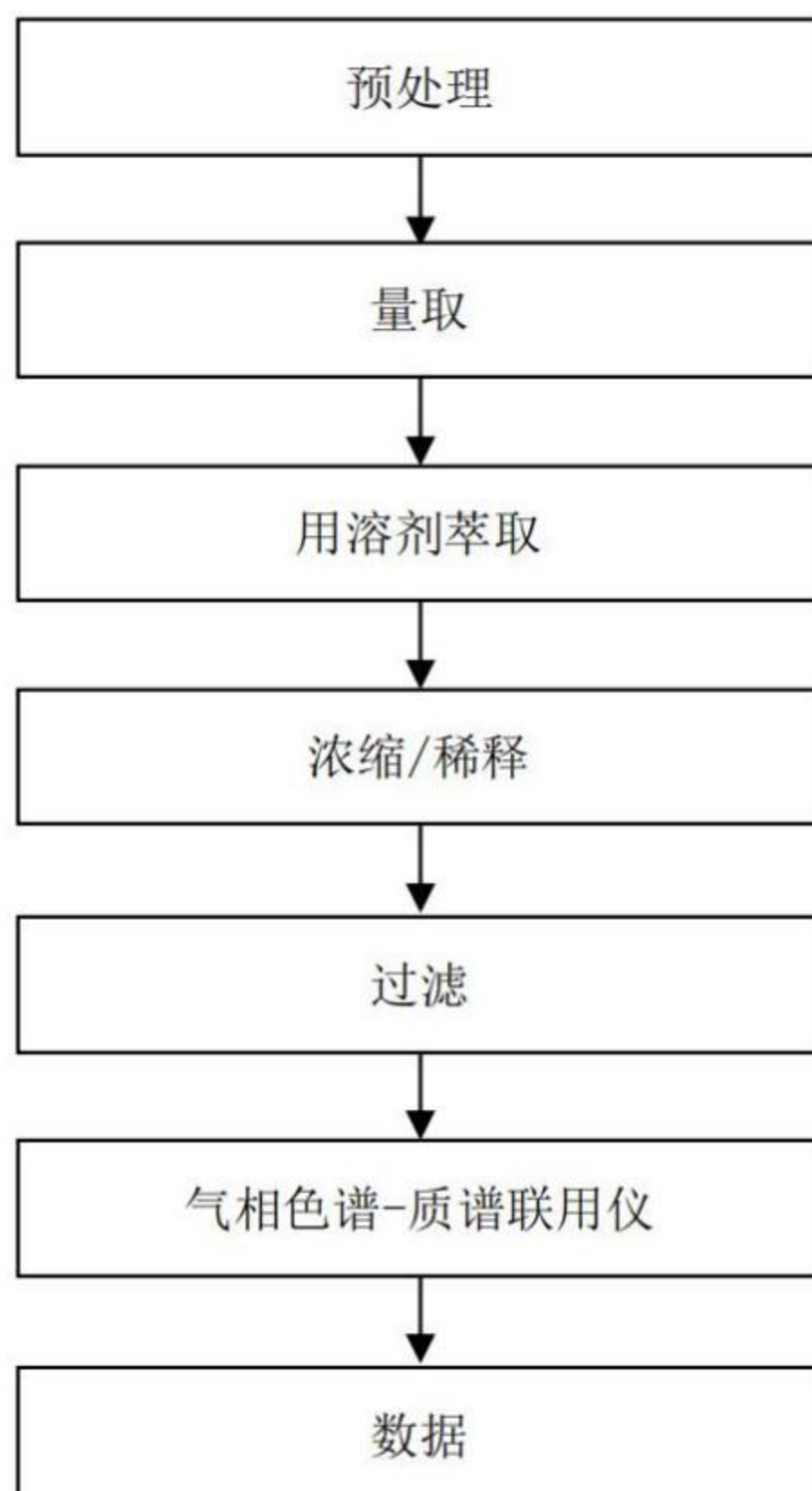
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Phthalates 检测流程图



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检测报告

编号: CANEC23006250301

日期: 2023 年 07 月 20 日

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Test Report

No.: CANEC23006250302

Date: Aug 02, 2023

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Client Name: ZHONG SHAN CITY HUA YANG PLASTIC PIGMENT CO.,LTD.

Client Address: 1 FUYUAN ROAD, WAISHA VILLAGE, SHENWAN TOWN, ZHONGSHAN CITY

Sample Name: Graphene

Model No.: 3113

The above sample(s) and information were provided by the client.

SGS Job No.: GZP23-007305

Sample Receiving Date: Jul 17, 2023

Testing Period: Jul 17, 2023 ~ Jul 20, 2023

Test Requested: Select test(s) as requested by the client.

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

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

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass

Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Zm Guan

Zm Guan
Approved Signatory

scan to see the report



5BEEFF07



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Test Report

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Date: Aug 02, 2023

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Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A1	CAN23-0062503-0001.C001	Black material

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-2:2017, IEC 62321-6:2015 and IEC 62321-8:2017, analysis was performed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A1
Cadmium(Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	18
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI))	1000	mg/kg	8	ND
Polybromobiphenyl (PBBs)	1000	mg/kg	-	ND
Monobromobiphenyl (MonoBB)	-	mg/kg	5	ND
Dibromobiphenyl (DiBB)	-	mg/kg	5	ND
Tribromobiphenyl (TriBB)	-	mg/kg	5	ND
Tetrabromobiphenyl (TetraBB)	-	mg/kg	5	ND
Pentabromobiphenyl (PentaBB)	-	mg/kg	5	ND
Hexabromobiphenyl (HexaBB)	-	mg/kg	5	ND
Heptabromobiphenyl (HeptaBB)	-	mg/kg	5	ND
Octabromobiphenyl (OctaBB)	-	mg/kg	5	ND
Nonabromobiphenyl (NonaBB)	-	mg/kg	5	ND
Decabromobiphenyl (DecaBB)	-	mg/kg	5	ND
Polybromodiphenyl ether(PBDEs)	1000	mg/kg	-	ND
Monobromodiphenylether (MonoBDE)	-	mg/kg	5	ND
Dibromodiphenylether (DiBDE)	-	mg/kg	5	ND
Tribromodiphenylether (TriBDE)	-	mg/kg	5	ND
Tetrabromodiphenylether (TetraBDE)	-	mg/kg	5	ND
Pentabromodiphenylether (PentaBDE)	-	mg/kg	5	ND
Hexabromodiphenylether (HexaBDE)	-	mg/kg	5	ND
Heptabromodiphenylether (HeptaBDE)	-	mg/kg	5	ND
Octabromodiphenylether (OctaBDE)	-	mg/kg	5	ND
Nonabromodiphenylether (NonaBDE)	-	mg/kg	5	ND
Decabromodiphenylether (DecaBDE)	-	mg/kg	5	ND
Dibutyl Phthalate(DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate(BBP)	1000	mg/kg	50	ND



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Test Item(s)	Limit	Unit(s)	MDL	A1
Bis-(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalate(DIBP)	1000	mg/kg	50	ND

Notes:

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series.
- (3) 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.

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule ($w=0$) stated in ILAC-G8:09/2019.



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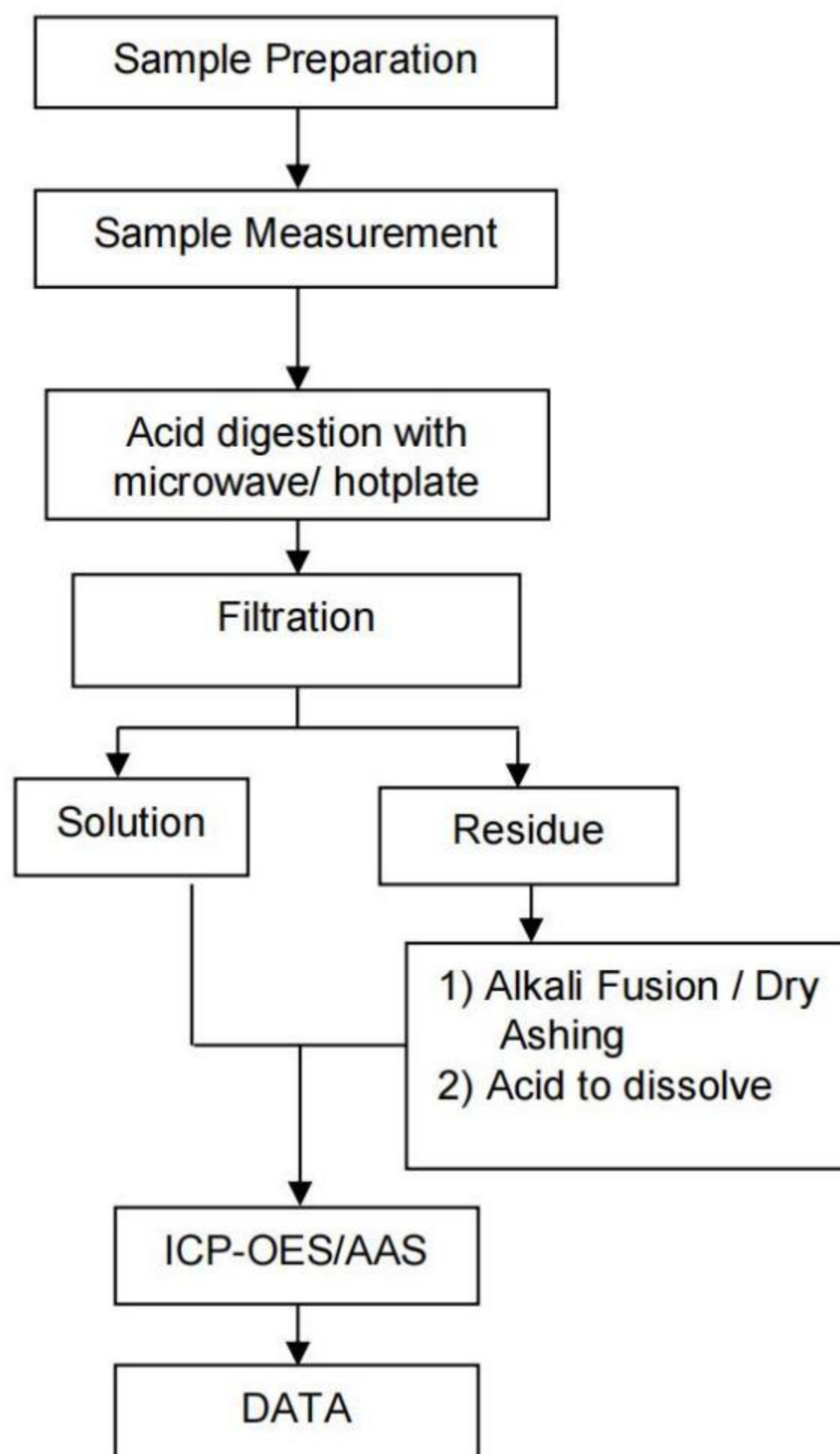
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Elements Testing Flow Chart

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



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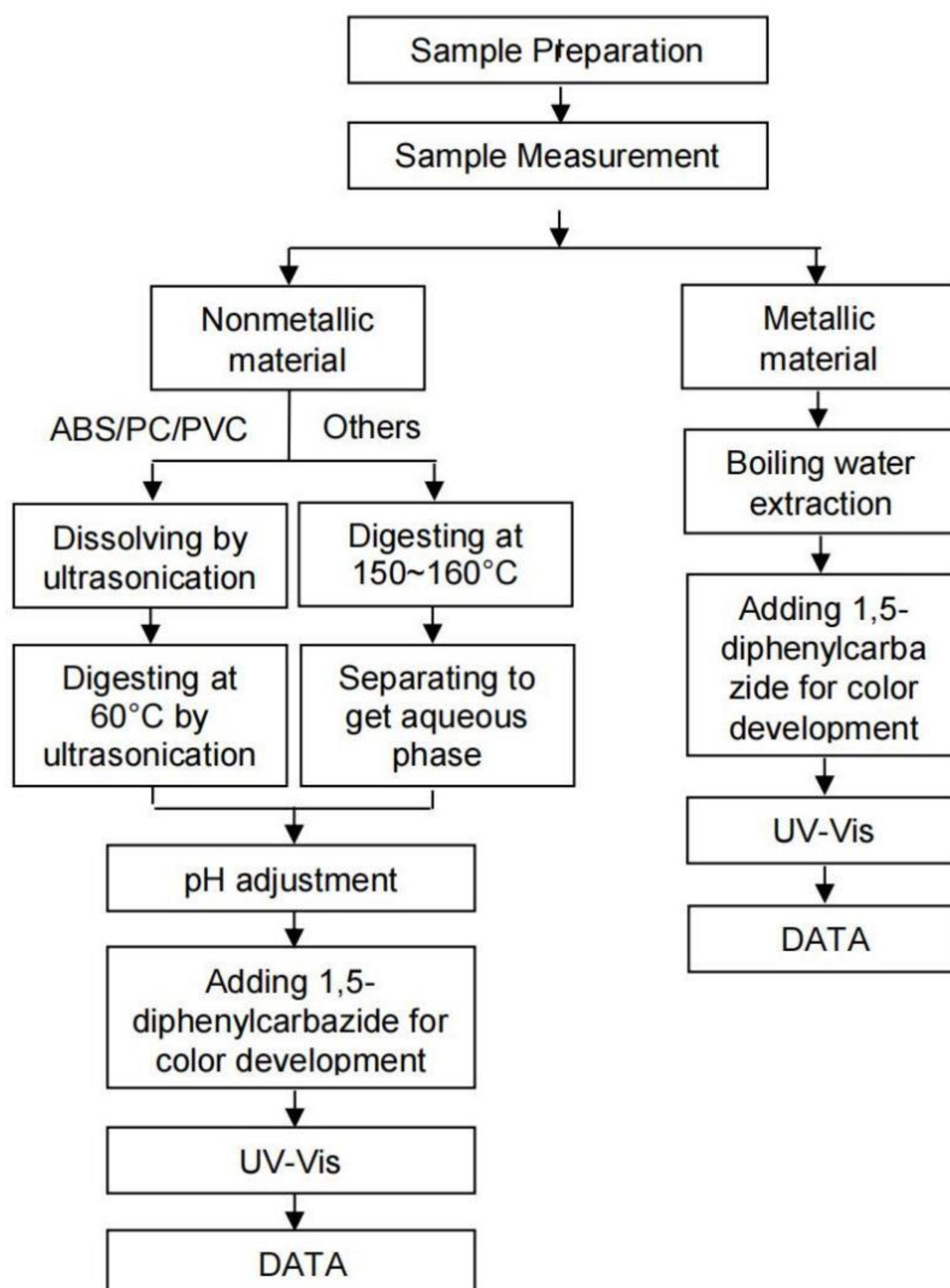
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Hexavalent Chromium (Cr(VI)) Testing Flow Chart



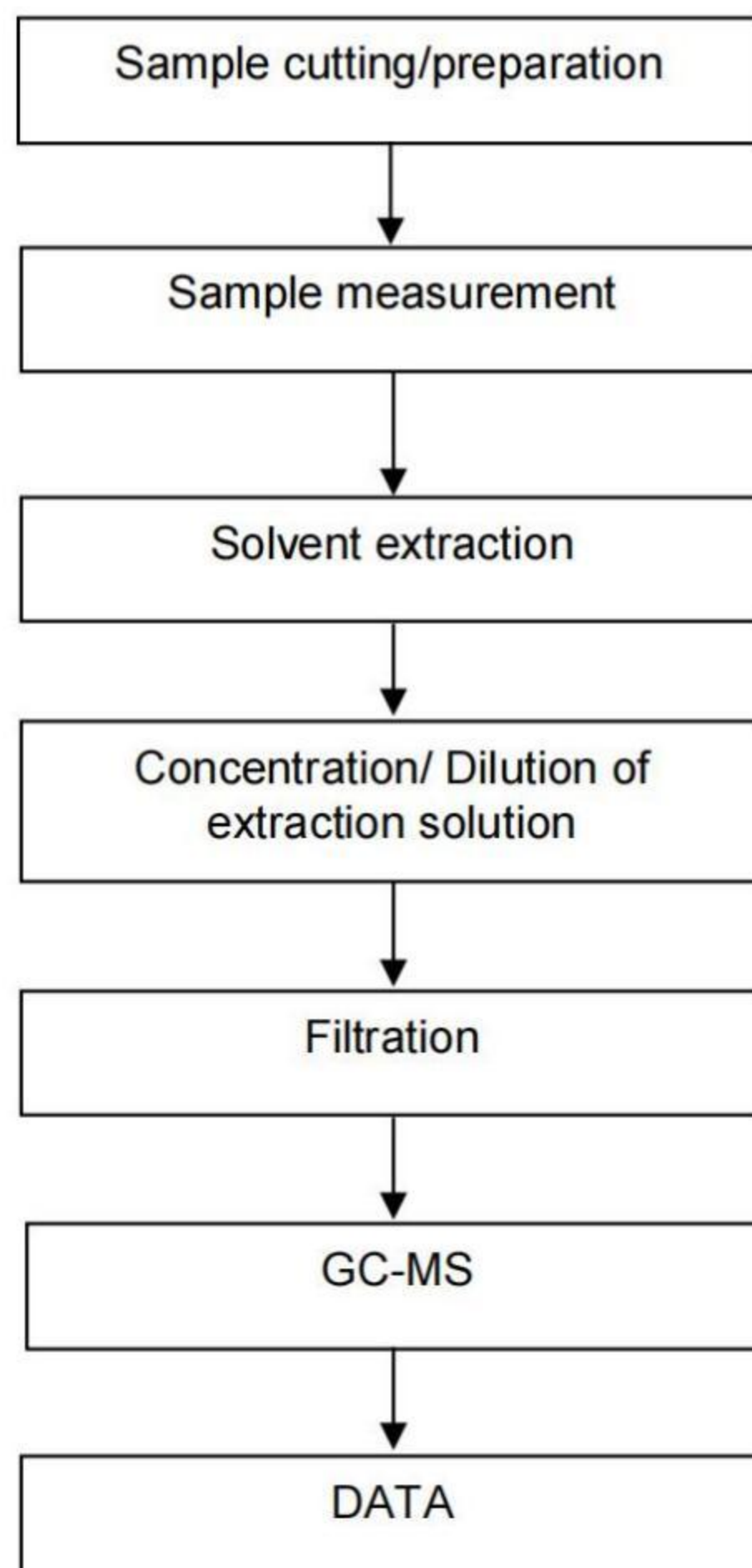
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PBBs/PBDEs Testing Flow Chart



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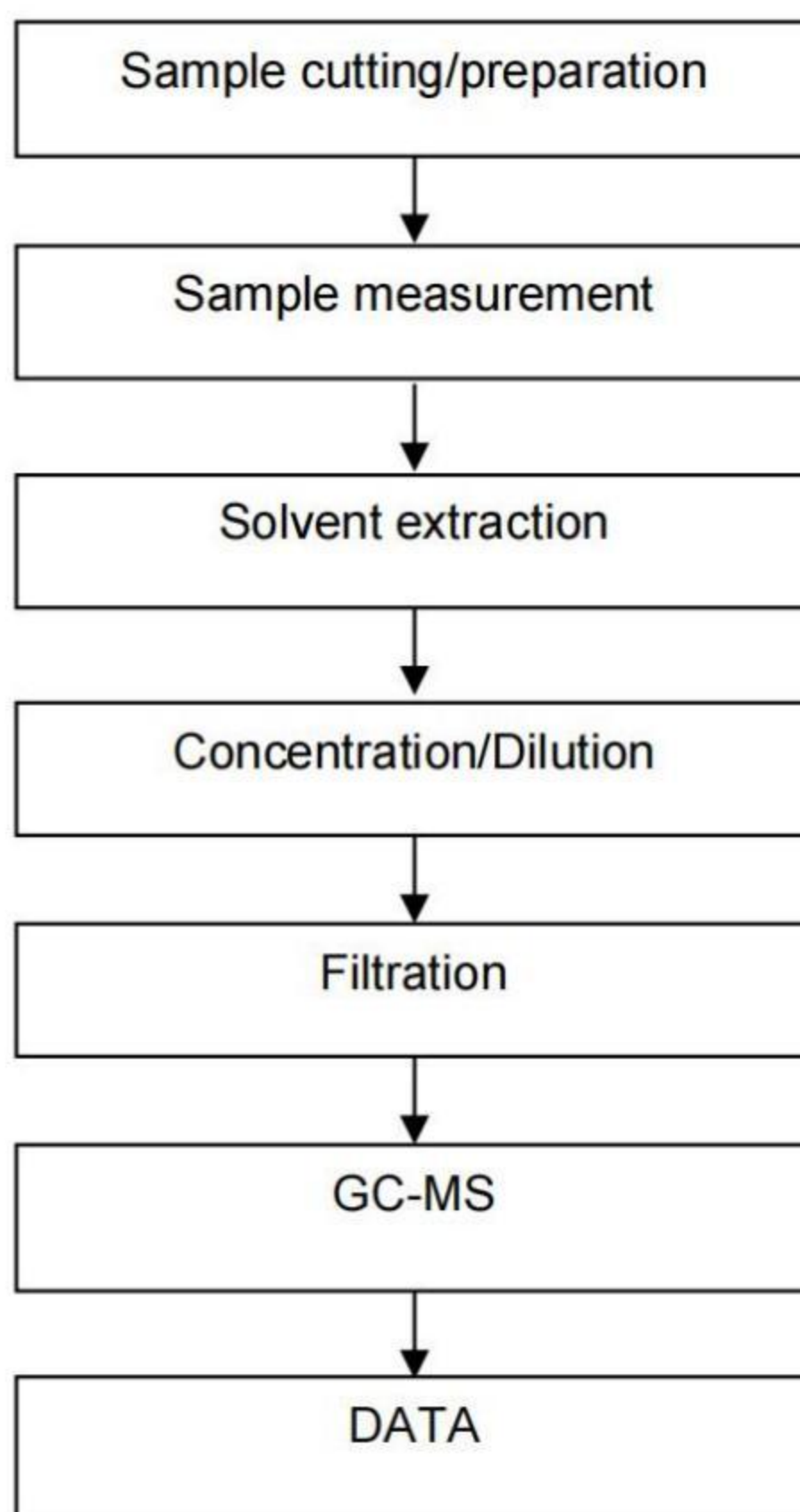
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Phthalates Testing Flow Chart



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Sample Photo:



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