

## 检测报告

编号: SHAEC23016947102

日期: 2023 年 10 月 25 日

第 1 页, 共 17 页

客户名称: 金安国纪科技(杭州)有限公司/国际层压板材有限公司

客户地址: 浙江杭州临安市青山湖街道大康路 188 号

样品名称: FR-4.0 黑色基材覆铜板

以上样品及信息由客户提供。

SGS 工作编号: SHP23-016184

样品接收时间: 2023 年 10 月 19 日

检测周期: 2023 年 10 月 19 日 ~ 2023 年 10 月 25 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
四溴双酚 A (TBBP-A)	见检测结果
中链氯化石蜡(C14-C17) (MCCPs)	见检测结果
石棉	见检测结果
元素	见检测结果
邻苯二甲酸盐(或酯)	见检测结果
红磷	见检测结果
硫 (S)	见检测结果

通标标准技术服务(上海)有限公司

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罗萍

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第 2 页, 共 17 页

检测要求	结论
六溴环十二烷 (HBCDD)	见检测结果
多环芳香烃 (PAHs)	见检测结果

## 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	SHA23-0169471-0001.C001	铜色/黑色固体板

## 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, AAS, 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	10
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



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第 3 页, 共 17 页

检测项目	限值	单位	MDL	A1
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
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。

## 四溴双酚 A (TBBP-A)

检测方法: 参考 SGS 内部方法, 采用 GC-MS 或者 LC-MS 进行分析。

检测项目	CAS No.	单位	MDL	A1
四溴双酚 A (TBBP-A)	79-94-7	mg/kg	5	ND

## 中链氯化石蜡(C14-C17) (MCCPs)

检测方法: 参考 ISO 22818:2021, 采用 GC-NCI-MS 进行分析。

检测项目	CAS No.	单位	MDL	A1
中链氯化石蜡(C14-C17) (MCCPs)	85535-85-9 和其它	mg/kg	50	ND

## 石棉

检测方法: 参考 NIOSH 9000:2015 和 ISO 22262-1:2012, 采用 XRD/PLM.进行分析。

检测项目	CAS No.	单位	MDL	A1
阳起石	77536-66-4	%(m/m)	0.1	阴性
铁石棉	12172-73-5	%(m/m)	0.1	阴性
直闪石	77536-67-5	%(m/m)	0.1	阴性
温石棉	12001-29-5 /132207-32-0	%(m/m)	0.1	阴性
青石棉	12001-28-4	%(m/m)	0.1	阴性
透闪石	77536-68-6	%(m/m)	0.1	阴性



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编号: SHAEC23016947102

日期: 2023 年 10 月 25 日

第 4 页, 共 17 页

## 备注:

(1) 阴性=未检出石棉, 阳性=检出石棉

## 元素

检测方法: 参考 US EPA 3052:1996, 采用 ICP-OES/AAS 进行分析。

检测项目	单位	MDL	A1
锑(Sb)	mg/kg	10	ND

## 邻苯二甲酸盐(或酯)

检测方法: 参考 IEC 62321-8:2017, 采用 GC-MS 进行分析。

检测项目	CAS No.	单位	MDL	A1
邻苯二甲酸二丁酯 (DBP)	84-74-2	mg/kg	50	ND
邻苯二甲酸丁苄酯(BBP)	85-68-7	mg/kg	50	ND
邻苯二甲酸二(2-乙基己基)酯(DEHP)	117-81-7	mg/kg	50	ND
邻苯二甲酸二异壬酯(DINP)	28553-12-0 /68515-48-0	mg/kg	50	ND
邻苯二甲酸二辛酯(DNOP)	117-84-0	mg/kg	50	ND
邻苯二甲酸二异癸酯(DIDP)	26761-40-0 /68515-49-1	mg/kg	50	ND
邻苯二甲酸二异丁酯(DIBP)	84-69-5	mg/kg	50	ND
邻苯二甲酸二正己酯(DnHP)	84-75-3	mg/kg	50	ND

## 红磷

检测方法: 参考 SGS 内部方法, 采用 ICP-OES 和热裂解 GC-MS 进行分析。

检测项目	CAS No.	单位	MDL	A1
红磷	7723-14-0	mg/kg	500	ND

## 备注:

(1) 检测结果基于最坏情况考虑, 并经热裂解 GC-MS 确认。

## 硫(S)

检测方法: 参考 EN 14582:2016, 采用 IC 进行分析。

检测项目	单位	MDL	A1
硫(S)	mg/kg	50	1371

## 六溴环十二烷 (HBCDD)

检测方法: 参考 US EPA 3550C:2007, 采用 GC-MS 进行分析。



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日期: 2023 年 10 月 25 日

第 5 页, 共 17 页

检测项目	CAS No.	单位	MDL	A1
六溴环十二烷 (HBCDD)	134237-50-6 /134237-51-7 /134237-52-8 /25637-99-4 /3194-55-6	mg/kg	10	ND

## 多环芳香烃 (PAHs)

检测方法: 参考 AfPS GS 2019:01 PAK, 采用 GC-MS 进行分析。

检测项目	CAS No.	单位	MDL	A1
苯并(a)芘 (BaP)	50-32-8	mg/kg	0.1	ND
苯并(e)芘 (BeP)	192-97-2	mg/kg	0.1	ND
苯并(a)蒽 (BaA)	56-55-3	mg/kg	0.1	ND
苯并(b)荧蒽 (BbF)	205-99-2	mg/kg	0.1	ND
苯并(j)荧蒽 (BjF)	205-82-3	mg/kg	0.1	ND
苯并(k)荧蒽 (BkF)	207-08-9	mg/kg	0.1	ND
蒽 (CHR)	218-01-9	mg/kg	0.1	ND
二苯并(a,h)蒽 (DBA)	53-70-3	mg/kg	0.1	ND
苯并(g,h,i)花(二萘嵌苯) (BPE)	191-24-2	mg/kg	0.1	ND
茚并(1,2,3-c,d)芘 (IPY)	193-39-5	mg/kg	0.1	ND
菲 (PHE)	85-01-8	mg/kg	0.1	ND
芘 (PYR)	129-00-0	mg/kg	0.1	ND
蒽 (ANT)	120-12-7	mg/kg	0.1	ND
荧蒽 (FLT)	206-44-0	mg/kg	0.1	ND
4 项多环芳香烃总和[菲 (PHE), 芘 (PYR), 蒽 (ANT), 荧蒽 (FLT)]	-	mg/kg	-	ND
萘 (NAP)	91-20-3	mg/kg	0.1	ND
15 项多环芳香烃总和	-	mg/kg	-	ND
材料分类	-	-	-	-

备注:

AfPS(德国产品安全委员会): 认证对多环芳香烃的要求

参数 单位: mg/kg	1 类	2 类		3 类	
	设计意图为放入口中的材料, 或与皮肤长期接触 (超过 30 秒) 的材料用于 -2009/48/EC 定义的玩具, 或 -供 3 岁以下儿童 a,b 使用。	不属于第 1 类, 设计意图或可预见 <sup>d</sup> 与皮肤长期接触 (超过 30 秒) 或短期重复接触 <sup>e</sup> 的材料		不属于第 1 和 2 类, 设计意图或可预见与皮肤短期接触 (不超过 30 秒) 材料	
		a. 供儿童使用的产品	b. 其他产品	a. 供儿童使用的产品	b. 其他产品
苯并(a)芘 (BaP)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
苯并(e)芘 (BeP)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
苯并(a)蒽 (BaA)	< 0.2	< 0.2	< 0.5	< 0.5	< 1



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第 6 页, 共 17 页

苯并(b)荧蒽 (BbF)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
苯并(j)荧蒽 (BjF)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
苯并(k)荧蒽 (BkF)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
蒽 (CHR), mg/kg	< 0.2	< 0.2	< 0.5	< 0.5	< 1
二苯并(a,h)蒽 (DBA)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
苯并(g,h,i)苉(二苯并呋) (BPE)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
茚并(1,2,3-c,d)苉 (IPY)	< 0.2	< 0.2	< 0.5	< 0.5	< 1
菲 (PHE), 苉 (PYR), 蒽 (ANT), 荧蒽 (FLT)	< 1 (总和)	< 5 (总和)	< 10 (总和)	< 20 (总和)	< 50 (总和)
萘 (NAP)	< 1	< 2		< 10	
15 PAH 之和	< 1	< 5	< 10	< 20	< 50

## 注释:

<sup>a</sup> 儿童是指法定年龄未满 14 周岁的人。

<sup>b</sup> 供儿童使用包括儿童的主动接触或被动接触。

<sup>c</sup> “短期重复接触”的定义摘自 REACH 附录 XVII 第 50 条修正案 ( (EC) No. 1272/2013)。

<sup>d</sup> 根据德国产品安全法 (ProdSG) (第一章第 2 条第 28 款) 的定义, “可预见的使用”是指将产品投放市场的人无意但可以合理预见的方式使用产品。

## 备注:

德国产品安全委员会 (AfPS) 于 2020 年 4 月 10 日发布了关于多环芳香烃 (PAHs) 的新文件 (AfPS GS 2019:01 PAK), 该文件将于 2020 年 7 月 1 日起用于 GS-MARK 认证。

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。

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## 检测报告

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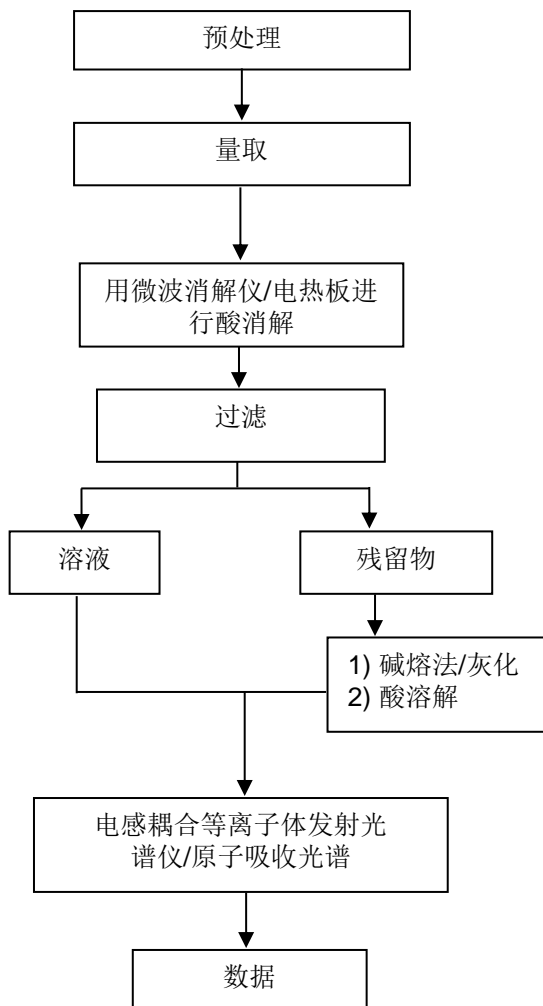
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第 7 页, 共 17 页

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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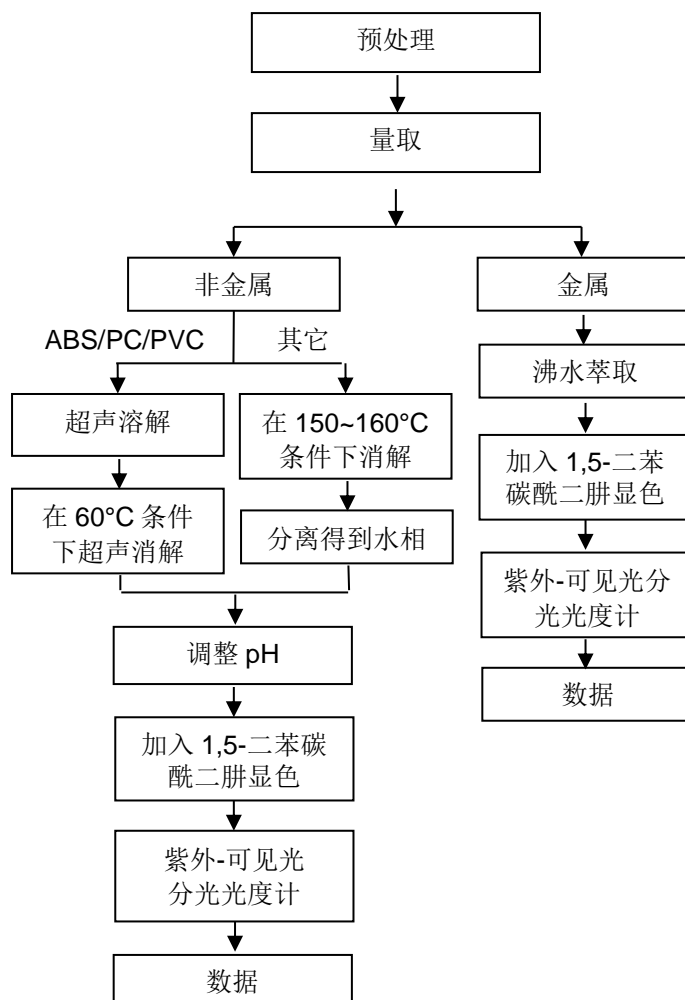
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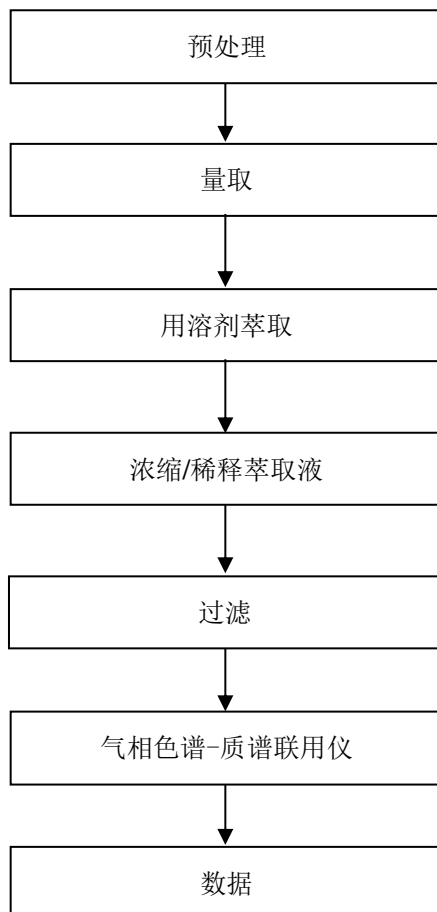
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## 六价铬检测流程图





## PBBs/PBDEs 检测流程图



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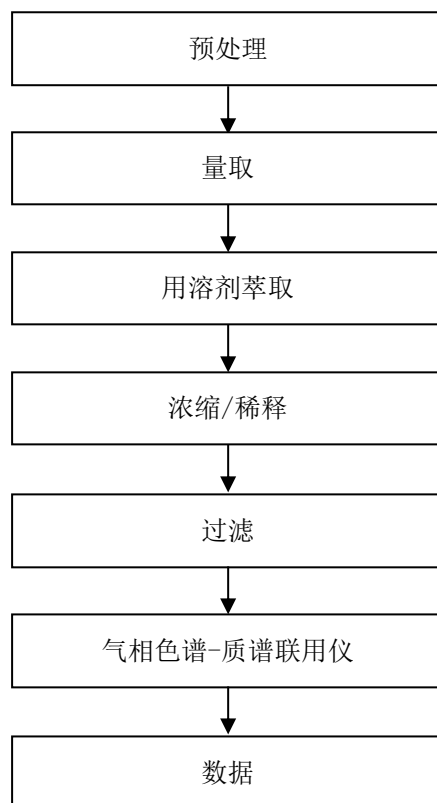
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第 10 页, 共 17 页

## Phthalates 检测流程图



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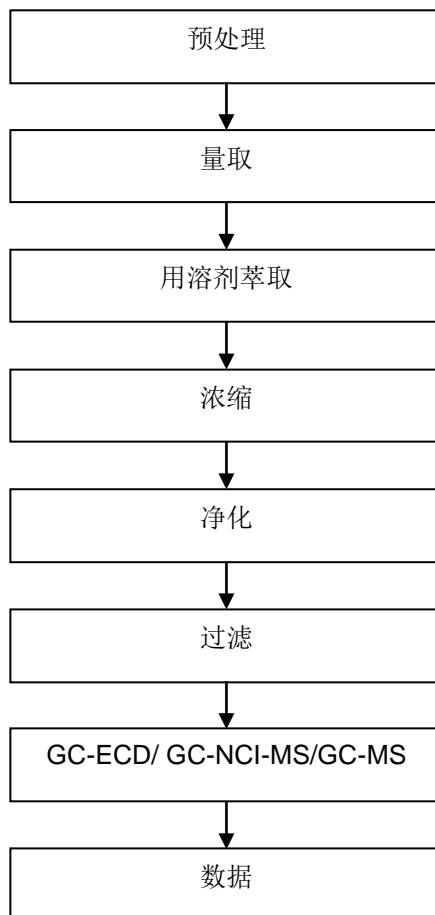
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## 氯化石蜡检测流程图



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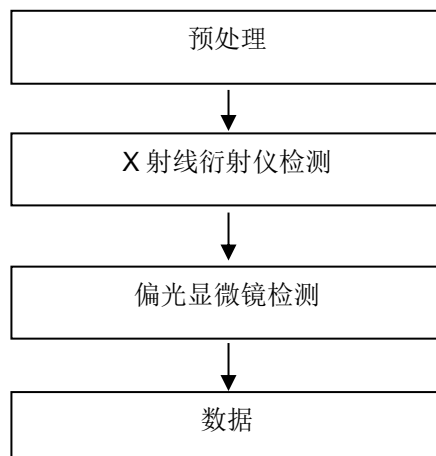
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### Asbestos 检测流程图



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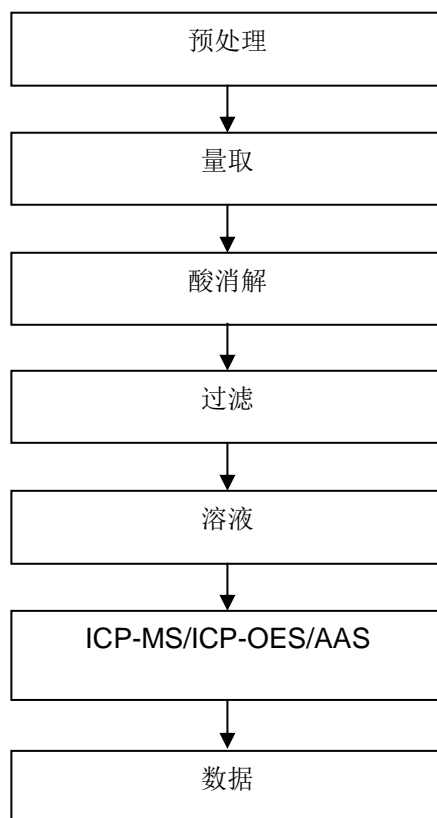
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第 13 页, 共 17 页

## 元素检测流程图



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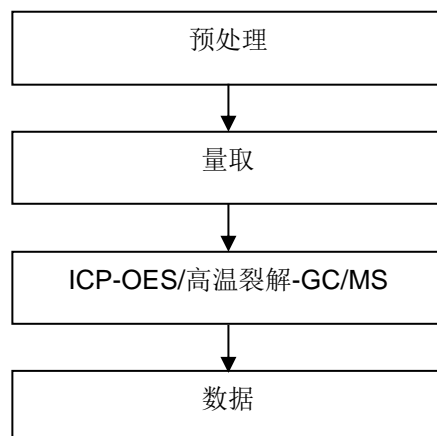
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第 14 页, 共 17 页

## Red Phosphorus 检测流程图



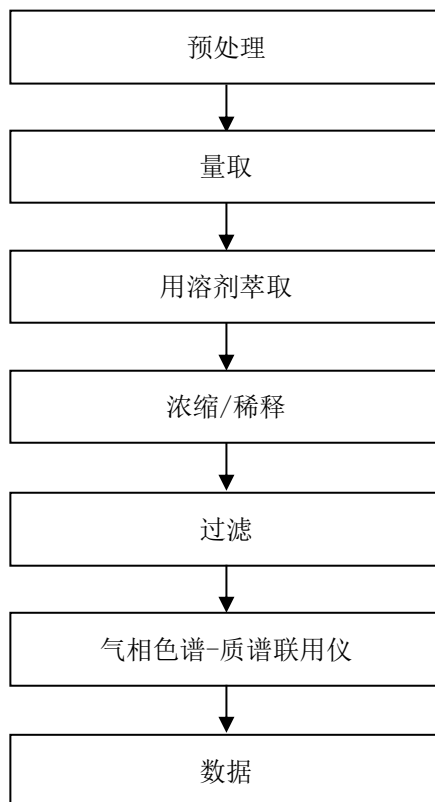
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## HBCDD 检测流程图



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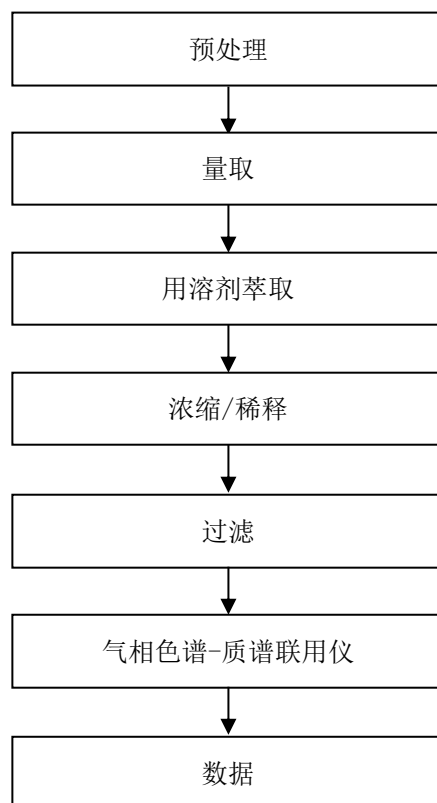
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## PAHs 检测流程图



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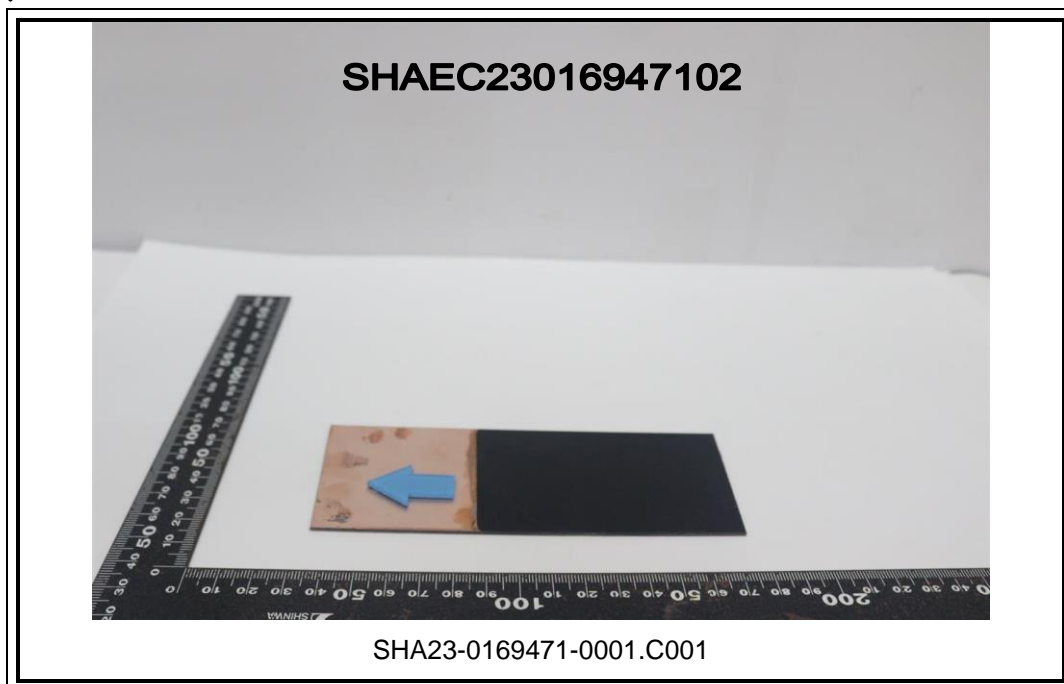
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