**掺杂型四氧化三钴化学分析方法**

**铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈含量的测定**

**电感耦合等离子体原子发射光谱法**

**编 制 说 明**

（送审稿）

浙江华友钴业股份有限公司

2023年10月

一、工作简况

1、任务来源

根据2022年7月国家工业和信息化部下达的《2022年第一批行业标准制修订计划》（工信厅科函﹝2022﹞94号）的要求，有色金属行业标准《掺杂型四氧化三钴化学分析方法 铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈含量的测定 电感耦合等离子体原子发射光谱法》制定项目由全国有色金属标准化技术委员会负责归口，由浙江华友钴业股份有限公司负责起草，项目计划编号2022-0441T-YS，项目周期24个月，计划完成年限2024年。

2、项目的必要性

长期以来，正极材料都是决定锂离子电池性能的重要因素之一。钴酸锂由于较高的压实密度而带来的高能量密度，一直占据3C 市场的主要地位。近年来，智能手机和平板电脑高速发展对电池的轻薄化要求越来越高，一方面需要保证材料压实密度逼近其理论密度，另一方面也对钴酸锂的克比容量提出了更高的要求。传统的钴酸锂正极材料LiCoO2属六方晶系，具有Ｒ-3m 空间群，其二维层状结构属于α-NaFeO2型。Li1-xCoO2充电过程中，当0 ＜ x ＜ 0. 6时存在3 个相变，第1 个相变发生在锂离子脱出7%时，充电电压为3. 94 V，六方晶胞c 轴伸长2%，相应的Co-Co 间距缩短，Co-Co 间距缩短能引起电子能带的分散，造成价带与导带的重叠，电导率迅速提高，材料由半导体转变为金属导体; 在x = 0. 5 左右时，会发生另外两个相变，对应电压为4. 05 和4. 17 V，锂离子由有序向无序转变，紧接着发生晶胞由六方相到单斜相的转变。单斜相的产生，导致电池容量急剧衰减。由上可知，传统LiCoO2最多只有约0. 55 个锂离子可逆脱嵌，少量过充则会影响材料的稳定性，因此长期以来钴酸锂电池的充电电压限制在4. 2 V 以下。提高克比容量的有效方法之一是提高材料的充电电压，让更多的Li 离子释放出来，而通常情况下高脱锂状态的LiCoO2极其不稳定。通过对钴酸锂进行掺杂改性和表面包覆等技术手段，可以有效改变材料的结构稳定性和表面形态，克服材料的缺陷，实现高电压钴酸锂材料的商业化应用。

四氧化三钴是LCO正极材料的前驱体，终端应用领域为大容量手机电池、平板电脑等。大容量手机电池对于LCO有很高要求，通过提高LCO的充电截止电压和压实密度来提高电池的能量密度，相应的前驱体四氧化三钴则有两种发展趋势：① 一是粒径的变化，朝大粒径和小粒径发展，这样制备的LCO大小粒径混搭后压实密度就高；② 二是掺杂方向发展，用于制备高电压钴酸锂。常规四氧化三钴制成的LCO充电截止电压为4.2V，对应的扣电比容量为160mAh/g，如果将充电截止电压提高至4.45V，对应的扣电首次放电比容量可达188mAh/g，但此时钴酸锂结构容易坍塌，容量衰减较快，50圈循环容量只有85%左右。如果在四氧化三钴前驱体里掺入Al或其他金属元素，能使掺杂元素均匀地进入钴酸锂晶格里，提高钴酸锂晶体结构的稳定性，从而使掺杂钴酸锂的容量保持率得到极大提高。

传统固相法将四氧化三钴、掺杂元素化合物、碳酸锂进行混合，然后再进行高温固相法制备掺杂LCO，掺杂元素在钴酸锂中分布不均匀，改善效果不明显。如果在碳酸钴湿法合成阶段掺入目标金属元素，实现原子级别的均匀排布，目标金属元素和钴发生共沉淀得到掺杂碳酸钴，然后再经煅烧得到掺杂四氧化三钴。以掺杂四氧化三钴为原料制备高电压LCO，解决了传统固相法掺杂不均匀的问题。国内正极材料企业研究元素掺杂使得钴酸锂性能有了重大技术突破，中国的钴酸锂品质处于世界先进水平。

掺杂四氧化三钴属于高端材料，是下一代高电压4.45V及以上钴酸锂的重要前驱体，谁先开发成功，谁将占领未来高端市场，因此研究开发掺杂四氧化三钴具有重要意义。

经查询相关资料，目前我国尚无掺杂型四氧化三钴配套的国家或行业化学分析方法标准，行业内无规范统一的掺杂型四氧化三钴化学分析方法标准。因此，为了规范统一，使产品生产有序化程度、标准化程度得到提高，急需制定统一的掺杂型四氧化三钴化学分析方法标准，从而促进行业发展、提升企业和社会经济效益。根据“YS/T 1441-2021 掺杂型四氧化三钴”产品标准，掺杂型四氧化三钴中通常需要检测铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈等杂质元素。

本标准的目的在于建立电感耦合等离子原子发射光谱法（ICP-OES）测定掺杂型四氧化三钴中铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈等杂质元素的化学分析方法。ICP-OES具有多元素同时测定、干扰少、灵敏度高等优点，是近些年新材料化学成分分析的重要手段。

3、主要参加单位和工作成员及其所做的工作

3.1主要参加单位情况

负责起草单位浙江华友钴业股份有限公司成立于2002年，是一家专注于钴、镍、铜有色金属采、选、冶及钴新材料产品的深加工与销售的高新技术企业。公司主要生产四氧化三钴、氧化钴、碳酸钴、氢氧化钴、硫酸钴、氧化亚钴等钴产品及硫酸镍、电镍、电积铜、粗铜等铜产品，钴、镍产品主要用于锂离子电池正极材料、航空航天高温合金、硬质合金、色釉料、磁性材料、橡胶粘合剂和石化催化剂等领域。公司是中国最大的钴化学品生产商之一，钴化学品产量位居世界前列。

浙江华友钴业股份有限公司始终坚持科技创新和科学管理，在钴铜湿法工艺、钴新材料、环境保护领域拥有了国内一流的自主核心技术，通过ISO9001、ISO14001、OHSAS18001、GB/T19022、GB/T15496和AQ/T9006管理体系的认证，为公司做强做大钴产业提供了坚实保障。

浙江华友钴业股份有限公司积极践行“走出去”战略。2006年起在非洲进行钴铜矿资源的开发，通过多年在非洲的经营，已建立起完整的钴铜矿产资源的采、选、冶产业链体系，为公司的长远发展及国内钴新材料产业制造平台的原料供应奠定了坚实基础。

浙江华友钴业股份有限公司始终坚持以钴新材料产业发展为核心，以铜产品为辅助，以境外自有矿产资源为基础，致力建设成为资源节约、环境友好，集境外采选冶、境内新材料深加工为一体的科技型跨国企业。

公司检测中心拥有多台电位滴定仪，具备项目研究所需的仪器设备。标准起草人员多次参与有色行业标准的起草、验证等工作，具有丰富的方法研究经验。

3.2主要工作成员所负责的工作情况

本标准主要起草人及工作职责见表1。

表1 主要起草人及工作职责

| 单位名称 | 人员 | 分工 |
| --- | --- | --- |
| 浙江华友钴业股份有限公司 |  | 负责调研、实验样品的制备、各方协调，方法的起草，各阶段标准文本、编制说明的编写。 |
| 衢州华友钴新材料有限公司 |  | 协助实验样品的制备，负责方法一验工作，提供精密度数据。 |
| 广东邦普循环科技有限公司 |  | 负责方法一验工作，提供精密度数据。 |
| 中伟新材料股份有限公司 |  | 协助实验样品的选择，负责方法一验工作，提供精密度数据。 |
| 深圳中金岭南有色金属股份有限公司 |  | 负责方法一验工作，提供精密度数据。 |
| 格林美股份有限公司 |  | 负责方法一验工作，提供精密度数据。 |
| 金川集团股份有限公司 |  | 负责方法一验工作，提供精密度数据。 |
| 天津巴莫科技有限责任公司 |  | 负责方法二验工作，提供精密度数据。 |
| 国标（北京）检验认证有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 中国有色桂林矿产地质研究院有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 紫金铜业有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 广东佳纳能源科技有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 郴州市商品质量监督检验所 |  | 负责方法二验工作，提供精密度数据。 |
| 大冶有色设计研究院有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 广西分析测试研究中心 |  | 负责方法二验工作，提供精密度数据。 |
| 中国检验认证集团广西有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 国合通用（青岛）测试评价有限公司 |  | 负责方法二验工作，提供精密度数据。 |
| 宜昌邦普循环科技有限公司 |  | 负责方法二验工作，提供精密度数据。 |

4、主要工作过程

4.1 任务落实及起草阶段

（1）任务落实

2022年7月22日，全国有色金属标准化技术委员会在河南省洛阳市召开了《掺杂型四氧化三钴化学分析方法》等5项行业标准任务落实会议。来自浙江华友钴业股份有限公司、广东先导稀材股份有限公司、深圳中金岭南有色金属股份有限公司、北矿检测技术有限公司、深圳市中金岭南有色金属股份有限公司韶关冶炼厂、大冶有色设计研究院有限公司、广东省科学院工业分析检测中心、昆明冶金研究院有限公司、福建紫金矿冶测试技术有限公司、国标（北京）检验认证有限公司、铜陵有色金属股份有限公司、山东恒邦冶炼股份有限公司、郴州市产商品质量监督检验所、中国检验认证集团广西有限公司、长沙矿冶院检测技术有限责任公司等30多家40余位代表参加了现场会议，会议对《掺杂型四氧化三钴化学分析方法》标准进行了任务落实，确定浙江华友钴业股份有限公司为负责起草单位，衢州华友钴新材料有限公司、广东邦普循环科技有限公司、中伟新材料股份有限公司、深圳中金岭南有色金属股份有限公司、格林美股份有限公司、金川集团股份有限公司等6家单位为一验，天津巴莫科技有限责任公司、国标（北京）检验认证有限公司、中国有色桂林矿产地质研究院有限公司、紫金铜业有限公司、广东佳纳能源科技有限公司、郴州市商品质量监督检验所、大冶有色设计研究院有限公司、广西分析测试研究中心、中国检验认证集团广西有限公司、国合通用（青岛）测试评价有限公司、宜昌邦普循环科技有限公司等11家单位为二验。会议明确了项目的各时间节点及进度安排。

（2）样品制备、试验研究

任务落实会议后，负责起草单位成立项目研发组。起草人员对照“YS/T 1441-2021 掺杂型四氧化三钴”产品标准，明确了需要检测的杂质元素、含量范围、梯度设计。

浙江华友钴业股份有限公司联合衢州华友钴新材料有限公司进行实验样品研制的讨论，初步确定研制方案，并安排人员进行研制。

2022年年底，完成实验样品的研制。浙江华友钴业股份有限公司、衢州华友钴新材料有限公司分别对自己研制的样品进行了均匀性试验，试验结果完全满足标准对实验样品的要求。

2023年3月，负责起草单位按照确定的实验方法，包括溶样方式、仪器工作参数、测定介质用酸及酸度、工作曲线、基体干扰、共存元素干扰等的研究，对3个~6个不同梯度的样品进行精密度测试，同时进行了准确度测试，并对数据的平均值和相对标准偏差进行整理汇总。

2023年5月，负责起草单位完成实验报告，并按照GB/T 1.1-2020《标准化工作导则 第1部分：标准化文件的结构和起草规则》的规定撰写了YS/T《掺杂型四氧化三钴化学分析方法 铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈含量的测定 电感耦合等离子原子发射光谱法》标准讨论稿、编制说明。

（3）验证单位验证

2023年6月，负责起草单位将实验样品、标准讨论稿、实验报告发至各验证单位，铬验证单位陆续开始验证工作。

2023年8月，各验证单位陆续完成验证工作并返回验证报告。负责起草单位对所有数据进行了汇总、柯克伦检验、格拉布斯检验，并计算各元素的精密度数据。负责起草单位对《讨论稿》进行修改完善，形成标准文本的《征求意见稿》。

4.2 征求意见阶段

2023年9月25日~28日全国有色金属标准化技术委员会在重庆市召开了本标准的预审会。来自浙江华友钴业股份有限公司、衢州华友钴新材料有限公司、广东邦普循环科技有限公司、中伟新材料股份有限公司、深圳中金岭南有色金属股份有限公司、格林美股份有限公司、金川集团股份有限公司、国标（北京）检验认证有限公司、中国有色桂林矿产地质研究院有限公司、郴州市商品质量监督检验所、大冶有色设计研究院有限公司、中国检验认证集团广西有限公司、国合通用（青岛）测试评价有限公司、宜昌邦普循环科技有限公司、北矿检测技术股份有限公司、防城港市东途矿产检测有限公司、防城海关综合技术服务中心、广东省科学院工业分析检测中心、广东先导稀材股份有限公司、长沙矿冶院检测技术有限责任公司、中国检验认证集团广东有限公司黄埔分公司、株洲冶炼集团股份有限公司、紫金矿业集团股份有限公司等40家单位的50多位专家对标准《预审稿》进行讨论，并提出了宝贵意见。意见如下：

（1）表1的内容按照相同的测定范围进行合并。（采纳）

（2）调整表1中铜、铁的测定下限或者补充实验数据。（采纳）

（3）“5 试剂”改成“5 试剂或材料”。（采纳）

（4）“5 试剂”中增加“可采用市售有证标准贮存溶液”等内容，同时修改相应的条号。（采纳）

（5）“5.3 盐酸”改成“5.3 盐酸溶液”。（采纳）

（6）“5.18 中氧氯化锆”改成“氧化锆”，（不采纳）（GB/T 602有相应规定）

（7）表2中各元素的编写顺序按照封面标题中的顺序。（采纳）

（8）8.4.1 中锆、钛是否改成氢氟酸介质。（不采纳）（实验过程中在盐酸介质中未出现锆、钛的水解现象）

（9）8.5中按内容性质分成8.5.1、8.5.2、8.5.3。（采纳）

（10）“表4 标准系列溶液的移取”改成“表4 标准系列溶液的质量浓度”，并修改表4中的相应内容。（采纳）

（11）10.1、10.2“精密度试验原始数据参见附录A”改成“实验室间试验结果得到的统计数据参见附录A”，并移至段末。（采纳）

2023年9月至 2023年11月，全国有色金属标准化技术委员会将征求意见稿资料在www.cnsmq.com网站上挂网。征求意见的单位包括主要生产、经销、使用、科研、检验等单位及大专院校，征求意见单位广泛且具有代表性，征求意见时间大于2个月。

整个征求意见过程中，标准编制组发送“征求意见稿”的单位数有31个，收到“征求意见稿”后，回函并有建议或意见的单位数有11个，没有未回函的单位。截至2023年9月，编制组共收到11条意见，对收集到的意见进行整理，形成了意见汇总处理表。

根据相关意见，编制组对征求意见稿进行修改，2023年11月底，完成了《掺杂型四氧化三钴化学分析方法 铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈含量的测定 电感耦合等离子体原子发射光谱法》标准送审稿。

4.3 审查阶段

（1）技术专家审查

2023年12月25日~27日在XX召开标准工作会议，对本标准进行了审定。来自XXXXXX等XXX家单位的XX名专家（详见有色金属标准审定会专家签名表）参加了会议，会议对标准送审稿进行了审定，见《审定会会议纪要》。

与会专家对 《掺杂型四氧化三钴化学分析方法 铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈含量的测定 电感耦合等离子体原子发射光谱法》标准的送审稿进行了认真审定，提出多条修改意见，编制小组会后按照专家的修改意见进行了修改，完善了《送审稿》及《送审稿编制说明》。

（2）委员审查

4.4 报批阶段

二、标准编制原则

1. 符合性

本标准是根据GB/T 1.1-2020《标准化工作导则 第1部分:标准化文件的结构和起草规则》和GB/T 20001.4-2015《标准编写规则 第4部分：试验方法标准》的要求进行编写的；并按照GB/T 6379.2-2004《测量方法与结果的准确度》进行数理统计分析。

1. 先进性

本标准采用电感耦合等离子体原子发射光谱法测定掺杂型四氧化三钴中铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈等18种杂质元素含量。本标准在国内外均为首次制定，具有前瞻性和引领性。

1. 适用性

本标准以满足我国掺杂型四氧化三钴产品实际检测需求为原则，宜于应用。标准适用于“YS/T 1441-2021 掺杂型四氧化三钴”产品中杂质元素的测定，对生产企业的技术进步产生积极的促进作用。

1. 合规性

充分考虑国家法律、安全、卫生、环保法规的要求。

三、标准主要内容的确定依据

本标准为首次制定标准。在标准的制定过程中对以下几个方面进行了确认：

1. 生产企业情况

目前我国钴酸锂正极材料品质处于世界先进水平，国内的湖南杉杉、厦门钨业、北大先行和天津巴莫等加大力度开发高电压钴酸锂，掺杂型四氧化三钴目前已成为高电压钴酸锂的主流原料。国外的三星SDI、COSMO、LG正极材料企业也纷纷试用中国的掺杂型四氧化三钴来制备高电压钴酸锂，因此，掺杂型四氧化三钴属于高端材料，是下一代高电压4.45V及以上钴酸锂的重要前驱体。湖南杉杉、北大先行、天津巴莫、北京当升、中信国安等正极材料厂家纷纷制定了高电压LCO的发展规划。相应的掺杂型四氧化三钴将成为主流原料，前景光明。

通过与LCO正极材料企业交流得知，传统固相法将四氧化三钴、掺杂元素化合物、碳酸锂进行混合，然后再进行高温固相反应制备掺杂LCO，掺杂元素在钴酸锂中分布不均匀，改善效果不明显。如果在碳酸钴湿法合成阶段掺入目标金属元素，实现原子尺度的均匀分布，目标金属元素和钴发生共沉淀得到掺杂碳酸钴，然后再经煅烧得到掺杂型四氧化三钴。以掺杂型四氧化三钴为原料制备高电压LCO，解决了传统固相法掺杂不均匀的问题。

1. 元素种类及测定范围

电感耦合等离子体原子发射光谱法（ICP-OES）适用于多元素的同时测定，本方法的制定对应“YS/T 1441-2021 掺杂型四氧化三钴”中涉及到的杂质元素，主要包括铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈等18种杂质元素。铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和铈等18种杂质元素的测定范围见表2。

表2 元素及测定范围

|  |  |
| --- | --- |
| 元 素 | 测 定 范 围  *w*/% |
| 铜、铁、钙、锌、铅、镉、铬、硅 | 0.0005 ~0.02 |
| 钠 | 0.0005 ~0.03 |
| 锰、镍、铝、镁 | 0.0005 ~2.5 |
| 镧、锆、钛、钇、铈 | 0.05 ~2.5 |

1. 溶样方式的选择

分别用盐酸、盐酸+硝酸、盐酸+硝酸+高氯酸、高氯酸四种不同的方式溶解样品．溶解情况见表3：

表3 不同溶样方式溶解样品情况

|  |  |  |
| --- | --- | --- |
| 溶样方式 | 溶解现象 | 备注 |
| 盐酸 | 不能完全溶解，有黑色粉末。 | / |
| 盐酸+硝酸 | 不能完全溶解，有黑色粉末。 | / |
| 盐酸+硝酸+高氯酸 | 能完全溶解 | / |
| 高氯酸 | 能完全溶解 | / |

实验结果表明：该样品需要加入盐酸、硝酸、高氯酸混酸或高氯酸才能完全溶解，从节省成本和操作简便考虑，所以选择加入高氯酸溶解样品。

验证单位同意起草单位的意见。

1. 仪器工作参数

本试验考察了射频发生器功率、雾化气流量、辅助气流量、等离子气流量、进液泵速、观测高度等对被测元素谱线发射强度的影响，本实验室的最佳仪器测量参数，见表6。

表4 仪器测量参数

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| RF功率  W | 雾化气流量  L/min | 辅助气流量  L/min | 等离子气流量L/min | 进液泵速rpm | 观测高度mm | 一次读数时间  s | 稳定时间  s | 进样时间  s |
| 1150 | 0.65 | 1 | 12 | 45 | 10 | 75 | 5 | 20 |

验证单位同意起草单位的意见。

5.测定介质酸及酸度的选择

在含量为5 μg/mL铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、钇和铈、锆和钛的标准溶液中，分别加入不同浓度的酸，其强度结果见表5：

表5 酸及酸度选择实验

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | *φ*(HCl) | | | | *φ*(HNO3) | | | | *φ*(HClO4) | | | |
| 1％ | 2％ | 5％ | 10％ | 1% | 2% | 5% | 10% | 1% | 2% | 5% | 10% |
| Cu | 3072 | 3070 | 3015 | 3003 | 3046 | 3010 | 3031 | 3017 | 3076 | 3075 | 3068 | 2995 |
| Fe | 2284 | 2277 | 2234 | 2219 | 2264 | 2243 | 2262 | 2265 | 2305 | 2305 | 2296 | 2248 |
| Ca | 120083 | 119847 | 117922 | 117373 | 118219 | 117226 | 118565 | 119053 | 119570 | 119906 | 119677 | 117146 |
| Zn | 1458 | 1449 | 1427 | 1416 | 1440 | 1424 | 1419 | 1411 | 1464 | 1456 | 1452 | 1425 |
| Pb | 279 | 277 | 274 | 271 | 280 | 277 | 278 | 275 | 279 | 280 | 278 | 272 |
| Cd | 4987 | 4956 | 4888 | 4847 | 4913 | 4854 | 4860 | 4820 | 5002 | 4988 | 4966 | 4869 |
| Cr | 4187 | 4168 | 4108 | 4084 | 4173 | 4127 | 4174 | 4169 | 4202 | 4193 | 4185 | 4106 |
| Na | 2971 | 2956 | 2951 | 2927 | 2989 | 2958 | 2907 | 2878 | 3069 | 3098 | 3347 | 3634 |
| Si | 689 | 678 | 678 | 679 | 695 | 686 | 684 | 684 | 694 | 689 | 687 | 679 |
| Mn | 2797 | 2785 | 2742 | 2727 | 2762 | 2740 | 2762 | 2766 | 2811 | 2813 | 2804 | 2741 |
| Ni | 335 | 333 | 328 | 326 | 333 | 329 | 331 | 329 | 336 | 334 | 333 | 326 |
| Al | 1251 | 1246 | 1223 | 1207 | 1234 | 1220 | 1236 | 1239 | 1247 | 1242 | 1237 | 1211 |
| Mg | 113797 | 113366 | 111616 | 110736 | 112057 | 111153 | 111887 | 111847 | 114248 | 114370 | 114018 | 111775 |
| La | 1809 | 1802 | 1774 | 1766 | 1793 | 1774 | 1786 | 1791 | 1801 | 1803 | 1796 | 1758 |
| Y | 18777 | 18720 | 18368 | 18267 | 18570 | 18400 | 18571 | 18549 | 18516 | 18527 | 18468 | 18076 |
| Ce | 1210 | 1206 | 1186 | 1179 | 1184 | 1168 | 1184 | 1184 | 1217 | 1216 | 1208 | 1182 |
| Zr | 3902 | 3856 | 3846 | 3837 | 3947 | 3895 | 3877 | 3845 | 3935 | 3860 | 3905 | 3813 |
| Ti | 9220 | 9153 | 9156 | 9015 | 9404 | 9303 | 9222 | 9156 | 9377 | 9182 | 9292 | 9040 |

实验结果表明，不同的酸种类、不同的酸度，在酸度不大于10 ％的情况下对各元素的测定强度变化不明显，为了达到方便、快速溶解样品及适当降低成本，选择2 %盐酸作为测定介质。

验证单位同意起草单位的意见。

6. 工作曲线

按拟定分析步骤8.5配制工作曲线，工作曲线中各元素浓度及线性相关系数见表6。

表6 工作曲线

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 工作曲线 | | 工作曲线浓度/μg/mL | | | | | | 相关系数 |
| Ⅰ | Cu | 0 | 1 | 5 | 10 | 20 | 40 | 0.9998 |
| Fe | 0 | 1 | 5 | 10 | 20 | 40 | 0.9997 |
| Ca | 0 | 1 | 5 | 10 | 20 | 40 | 0.9990 |
| Zn | 0 | 1 | 5 | 10 | 20 | 40 | 0.9991 |
| Pb | 0 | 1 | 5 | 10 | 20 | 40 | 0.9997 |
| Cd | 0 | 1 | 5 | 10 | 20 | 40 | 0.9990 |
| Cr | 0 | 1 | 5 | 10 | 20 | 40 | 0.9997 |
| Si | 0 | 1 | 5 | 10 | 20 | 40 | 0.9999 |
| Mn | 0 | 1 | 5 | 10 | 20 | 40 | 0.9996 |
| Ni | 0 | 1 | 5 | 10 | 20 | 40 | 0.9997 |
| Al | 0 | 1 | 5 | 10 | 20 | 40 | 0.9999 |
| Mg | 0 | 1 | 5 | 10 | 20 | 40 | 0.9990 |
| La | 0 | 1 | 5 | 10 | 20 | 40 | 0.9998 |
| Y | 0 | 1 | 5 | 10 | 20 | 40 | 0.9997 |
| Ce | 0 | 1 | 5 | 10 | 20 | 40 | 0.9998 |
| Ⅱ | Zr | 0 | 1 | 5 | 10 | 20 | 40 | 0.9999 |
| Ti | 0 | 1 | 5 | 10 | 20 | 40 | 0.9999 |
| Na | 0 | 1 | 5 | 10 | 20 | 40 | 0.9999 |  |

实验结果表明，各元素工作曲线的相关系数均大于0.999，能够满足分析的要求。

验证单位同意起草单位的意见。

1. 仪器检出限及检测下限

测定11次试剂空白溶液，计算标准偏差，以3倍的标准偏差为检出限，5倍的检出限为检测下限，结果见表7。

表7 仪器检出限和检测下限

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| 元素 | Cu | Fe | Ca | Zn | Pb | Cd |
| 检出限  μg/mL | 0.0023 | 0.0039 | 0.0001 | 0.0021 | 0.0110 | 0.0007 |
| 检测下限  μg/mL | 0.0038 | 0.0064 | 0.0002 | 0.0035 | 0.0184 | 0.0011 |
| 元素 | Cr | Na | Si | Mn | Ni | Al |
| 检出限  μg/mL | 0.0014 | 0.0131 | 0.0051 | 0.0015 | 0.0067 | 0.0085 |
| 检测下限  μg/mL | 0.0023 | 0.0218 | 0.0085 | 0.0025 | 0.0111 | 0.0141 |
| 元素 | Mg | La | Y | Ce | Zr | Ti |
| 检出限  μg/mL | 0.0002 | 0.0026 | 0.0003 | 0.0125 | 0.0014 | 0.0009 |
| 检测下限  μg/mL | 0.0004 | 0.0044 | 0.0005 | 0.0209 | 0.0023 | 0.0014 |

实验结果表明：各元素的测定下限均能满足方法中的最低浓度要求。

验证单位同意起草单位的意见。

1. 钴基体干扰实验

掺杂四氧化三钴产品的钴含量一般不大于73 %。在含量分别为0.5 μg/mL、1 μg/mL、2 μg/mL、5 μg/mL、20 μg/mL铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、钇和铈、锆和钛的标准溶液中加入0.73 g钴，测定各元素的质量浓度。结果见表8和表9。

表8 钴基体干扰实验（1）

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 元素 | 0.5 μg/mL | | | 1 μg/mL | | | 2 μg/mL | | |
| 不加钴 | 加钴 | 回收率  % | 不加钴 | 加钴 | 回收率  % | 不加钴 | 加钴 | 回收率  % |
| Cu | 0.524 | 0.515 | 98.3 | 1.039 | 1.030 | 99.1 | 2.059 | 2.051 | 99.6 |
| Fe | 0.528 | 0.526 | 99.6 | 1.040 | 1.042 | 100.2 | 2.065 | 2.067 | 100.1 |
| Ca | 0.532 | 0.524 | 98.5 | 1.048 | 1.045 | 99.7 | 2.076 | 2.074 | 99.9 |
| Zn | 0.541 | 0.535 | 98.9 | 1.064 | 1.061 | 99.7 | 2.109 | 2.111 | 100.1 |
| Pb | 0.539 | 0.534 | 99.1 | 1.053 | 1.045 | 99.2 | 2.094 | 2.099 | 100.2 |
| Cd | 0.524 | 0.518 | 98.8 | 1.035 | 1.030 | 99.5 | 2.063 | 2.060 | 99.9 |
| Cr | 0.522 | 0.517 | 99.0 | 1.032 | 1.033 | 100.1 | 2.068 | 2.066 | 99.9 |
| Na | 0.556 | 0.552 | 99.3 | 1.037 | 1.043 | 100.6 | 2.079 | 2.065 | 99.3 |
| Si | 0.502 | 0.524 | 104.4 | 0.978 | 1.002 | 102.4 | 1.893 | 1.929 | 101.9 |
| Mn | 0.524 | 0.520 | 99.2 | / | / | / | / | / | / |
| Ni | 0.535 | 0.534 | 99.8 | / | / | / | / | / | / |
| Al | 0.510 | 0.505 | 99.0 | / | / | / | / | / | / |
| Mg | 0.556 | 0.551 | 99.1 | / | / | / | / | / | / |

表9 钴基体干扰实验（2）

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 元素 | 1 μg/mL | | | 5 μg/mL | | | 20 μg/mL | | |
| 不加钴 | 加钴 | 回收率  % | 不加钴 | 加钴 | 回收率% | 不加钴 | 加钴 | 回收率  % |
| Mn | 1.050 | 1.065 | 101.4 | 5.136 | 5.131 | 99.9 | 20.448 | 20.844 | 101.9 |
| Ni | 1.047 | 1.083 | 103.4 | 5.158 | 5.115 | 99.2 | 20.342 | 20.790 | 102.2 |
| Al | 1.017 | 1.033 | 101.5 | 4.955 | 4.952 | 99.9 | 20.164 | 20.521 | 101.8 |
| Mg | 1.101 | 1.115 | 101.2 | 5.251 | 5.237 | 99.7 | 19.788 | 20.131 | 101.7 |
| La | 1.025 | 1.035 | 100.9 | 5.015 | 4.994 | 99.6 | 20.284 | 20.659 | 101.8 |
| Y | 1.035 | 1.046 | 101.0 | 5.033 | 5.012 | 99.6 | 20.083 | 20.389 | 101.5 |
| Ce | 1.038 | 1.055 | 101.6 | 5.031 | 5.023 | 99.8 | 20.352 | 20.727 | 101.8 |
| Zr | 1.025 | 1.027 | 100.2 | 5.007 | 5.001 | 99.9 | 19.989 | 20.018 | 100.1 |
| Ti | 1.035 | 1.037 | 100.2 | 5.047 | 5.042 | 99.9 | 19.923 | 20.127 | 101.0 |

实验结果表明，钴基体的干扰影响可以接受。

验证单位同意起草单位的意见。

1. 共存离子干扰实验

掺杂四氧化三钴产品的钴含量一般不大于73 %。分别在不同含量杂质浓度的标准溶液中加入0.73 g钴，测定各元素的质量浓度。结果见表10。

表10 共存离子的干扰实验

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| μg/mL | 加标值 | 测得值 | 回收率  % | 加标值 | 测得值 | 回收率% | 加标值 | 测得值 | 回收率  % |
| Cu | 0.5 | 0.506 | 101.2 | 1 | 1.045 | 104.5 | 2 | 2.046 | 102.3 |
| Fe | 0.5 | 0.517 | 103.4 | 1 | 1.059 | 105.9 | 2 | 2.065 | 103.3 |
| Ca | 0.5 | 0.533 | 106.6 | 1 | 1.086 | 108.6 | 2 | 2.154 | 107.7 |
| Zn | 0.5 | 0.520 | 104.0 | 1 | 1.046 | 104.6 | 2 | 2.091 | 104.6 |
| Pb | 0.5 | 0.532 | 106.4 | 1 | 1.066 | 106.6 | 2 | 2.112 | 105.6 |
| Cd | 0.5 | 0.523 | 104.6 | 1 | 1.061 | 106.1 | 2 | 2.085 | 104.3 |
| Cr | 0.5 | 0.490 | 98.0 | 1 | 1.030 | 103.0 | 2 | 2.067 | 103.4 |
| Na | 0.5 | 0.582 | 116.4 | 1 | 1.028 | 102.8 | 2 | 2.023 | 101.2 |
| Si | 0.5 | 0.564 | 112.8 | 1 | 0.982 | 98.2 | 2 | 2.084 | 104.2 |
| Ni | 1 | 1.058 | 105.8 | 5 | 5.209 | 104.2 | 20 | 20.437 | 102.2 |
| Al | 1 | 1.027 | 102.7 | 5 | 5.133 | 102.7 | 20 | 20.399 | 102.0 |
| Mn | 1 | 1.070 | 107.0 | 5 | 5.262 | 105.2 | 20 | 20.398 | 102.0 |
| Mg | 1 | 1.163 | 116.3 | 5 | 5.659 | 113.2 | 20 | 21.117 | 105.6 |
| La | 0.5 | 0.513 | 102.6 | 2.5 | 2.607 | 104.2 | 10 | 10.151 | 101.5 |
| Y | 1 | 1.002 | 100.2 | 5 | 5.002 | 100.0 | 20 | 19.982 | 99.9 |
| Ce | 1 | 1.058 | 105.8 | 5 | 5.108 | 102.2 | 20 | 20.463 | 102.3 |
| Zr | 1 | 1.095 | 109.5 | 5 | 4.912 | 98.2 | 20 | 19.951 | 99.8 |
| Ti | 1 | 1.070 | 107.0 | 5 | 5.029 | 100.6 | 20 | 20.106 | 100.5 |

实验结果表明，共存待测元素之间干扰影响可以忽略，是可以实现多元素同时测定。

验证单位同意起草单位的意见。

10、精密度

2023年由18家实验室对3个~6个不同水平样品进行共同试验确定的。每个实验室对每个水平的样品在重复性条件下独立测定7次~11次。测量的原始数据见附录A。

在对原始测定数据进行柯克伦检验及格拉布斯检验，剔除离群值后，进行精密度数据计算，从而确定重复性限和再现性限。各杂质元素统计分析后结果可接受的实验室个数、可接受的数据个数、平均值、重复性限、再现性限见表11。

表11 不同水平统计结果表

| 元素 | 水平 | 结果可接受的  实验室个数  实验室个数 | 可接受的数据个数 | 平均值  *w*/% | 重复性限  *r*/% | 再现性限  *R*/% |
| --- | --- | --- | --- | --- | --- | --- |
| Cu | 1 | 8 | 80 | 0.0005 | 0.0002 | 0.0002 |
| 2 | 18 | 170 | 0.0035 | 0.0004 | 0.0004 |
| 3 | 17 | 163 | 0.019 | 0.002 | 0.005 |
| 4 | 16 | 156 | 0.036 | 0.003 | 0.008 |
| Fe | 1 | 8 | 80 | 0.0015 | 0.0003 | 0.0005 |
| 2 | 15 | 141 | 0.0046 | 0.0006 | 0.0012 |
| 3 | 18 | 170 | 0.032 | 0.003 | 0.005 |
| 4 | 17 | 163 | 0.054 | 0.005 | 0.008 |
| Ca | 1 | 17 | 163 | 0.0019 | 0.0004 | 0.0008 |
| 2 | 18 | 170 | 0.019 | 0.002 | 0.004 |
| 3 | 18 | 170 | 0.036 | 0.003 | 0.006 |
| Zn | 1 | 18 | 170 | 0.0014 | 0.0003 | 0.0007 |
| 2 | 18 | 170 | 0.014 | 0.002 | 0.004 |
| 3 | 18 | 170 | 0.027 | 0.003 | 0.008 |
| Pb | 1 | 14 | 126 | 0.0010 | 0.0003 | 0.0005 |
| 2 | 16 | 148 | 0.012 | 0.002 | 0.004 |
| 3 | 16 | 148 | 0.023 | 0.003 | 0.006 |
| Cd | 1 | 17 | 163 | 0.0010 | 0.0002 | 0.0004 |
| 2 | 17 | 163 | 0.0077 | 0.0006 | 0.0009 |
| 3 | 17 | 163 | 0.015 | 0.003 | 0.005 |
| Cr | 1 | 16 | 152 | 0.0013 | 0.0003 | 0.0006 |
| 2 | 18 | 170 | 0.016 | 0.002 | 0.005 |
| 3 | 16 | 148 | 0.030 | 0.003 | 0.006 |
| Na | 1 | 15 | 145 | 0.0046 | 0.0007 | 0.0014 |
| 2 | 15 | 141 | 0.020 | 0.003 | 0.006 |
| 3 | 16 | 142 | 0.031 | 0.004 | 0.008 |
| 4 | 16 | 142 | 0.042 | 0.005 | 0.010 |
| Si | 1 | 8 | 87 | 0.0004 | 0.0002 | 0.0003 |
| 2 | 8 | 76 | 0.0063 | 0.0010 | 0.0015 |
| 3 | 9 | 87 | 0.0097 | 0.0021 | 0.0036 |
| Mn | 1 | 17 | 163 | 0.0030 | 0.0004 | 0.0006 |
| 2 | 18 | 170 | 0.015 | 0.002 | 0.004 |
| 3 | 18 | 170 | 0.029 | 0.003 | 0.005 |
| 4 | 18 | 170 | 0.056 | 0.005 | 0.008 |
| 5 | 16 | 152 | 0.53 | 0.03 | 0.05 |
| 6 | 14 | 130 | 2.34 | 0.06 | 0.14 |
| Ni | 1 | 18 | 170 | 0.0029 | 0.0003 | 0.0007 |
| 2 | 17 | 159 | 0.017 | 0.002 | 0.005 |
| 3 | 17 | 159 | 0.029 | 0.003 | 0.006 |
| 4 | 17 | 163 | 0.057 | 0.004 | 0.008 |
| 5 | 17 | 163 | 0.55 | 0.05 | 0.07 |
| 6 | 13 | 119 | 2.43 | 0.06 | 0.14 |
| Al | 1 | 17 | 159 | 0.0023 | 0.0005 | 0.0010 |
| 2 | 18 | 170 | 0.012 | 0.002 | 0.004 |
| 3 | 18 | 170 | 0.024 | 0.003 | 0.005 |
| 4 | 17 | 159 | 0.055 | 0.004 | 0.006 |
| 5 | 17 | 163 | 0.53 | 0.03 | 0.04 |
| 6 | 17 | 163 | 2.54 | 0.11 | 0.23 |
| Mg | 1 | 16 | 148 | 0.0021 | 0.0003 | 0.0004 |
| 2 | 18 | 170 | 0.015 | 0.002 | 0.004 |
| 3 | 18 | 170 | 0.030 | 0.003 | 0.007 |
| 4 | 18 | 170 | 0.063 | 0.004 | 0.008 |
| 5 | 18 | 170 | 0.58 | 0.04 | 0.08 |
| 6 | 16 | 152 | 2.41 | 0.11 | 0.22 |
| La | 1 | 16 | 156 | 0.049 | 0.003 | 0.006 |
| 2 | 17 | 163 | 0.46 | 0.03 | 0.05 |
| 3 | 16 | 152 | 2.37 | 0.07 | 0.15 |
| Zr | 1 | 18 | 170 | 0.051 | 0.009 | 0.014 |
| 2 | 18 | 170 | 0.55 | 0.03 | 0.06 |
| 3 | 17 | 163 | 2.53 | 0.11 | 0.19 |
| Ti | 1 | 16 | 156 | 0.051 | 0.003 | 0.005 |
| 2 | 18 | 170 | 0.57 | 0.03 | 0.08 |
| 3 | 16 | 152 | 2.54 | 0.07 | 0.13 |
| Y | 1 | 18 | 170 | 0.059 | 0.003 | 0.008 |
| 2 | 18 | 170 | 0.58 | 0.03 | 0.07 |
| 3 | 15 | 141 | 2.55 | 0.08 | 0.16 |
| Ce | 1 | 18 | 170 | 0.049 | 0.004 | 0.008 |
| 2 | 17 | 159 | 0.51 | 0.03 | 0.06 |
| 3 | 16 | 152 | 2.33 | 0.06 | 0.14 |

四、标准中涉及专利的情况

本标准不涉及专利和知识产权问题。

五、标准预期达到的社会效益

（一）目的和意义

标准符合我国目前法律、法规的规定；符合现在行业的需要，具备可操作性、可行性、全面性。

标准内容能够满足当前和未来相当长时间内行业技术和产业发展的需要。

通过10几家单位的验证能够保证建立的分析方法具有可操作性并易于推广应用。

（二）标准预期的作用和效益

分析方法服务于产业制造，浙江华友钴业股份有限公司、衢州华友钴新材料有限公司、广东邦普循环科技有限公司、中伟新材料股份有限公司、格林美股份有限公司、金川集团股份有限公司等企业是国内生产掺杂型四氧化三钴产品的公司。标准颁布实施后，掺杂型四氧化三钴的生产及使用单位均可采用本标准对其中的杂质元素进行定量分析，掌控和提升产品质量。同时，在第三方检测机构中，ICP-OES已经成为微量分析的主要仪器设备，本标准的颁布实施，扩展了ICP-OES的应用领域，有助于各检测机构实现标准化检测，提高数据的准确度。

六、采用国际标准和国外先进标准的情况

本标准为我国首次制定。经查，本标准与国内外现行标准及制定中的标准无重复交叉情况。本标准未采用（包括等同采用、修改采用及非等效采用）国际标准或国外先进标准。

七、与现行法律、法规、强制性国家标准及相关标准的关系

本标准属于化学分析方法标准，领域内没有强制性国家标准。本标准与现行法律、法规和相关标准相协调、无冲突。

八、重大分歧意见的处理和依据

无重大分歧。

九、标准作为强制性或推荐性国家（或行业）标准的建议

建议本标准为推荐性行业标准。

十、贯彻标准的要求和措施建议

本标准涉及掺杂型四氧化三钴中铜、铁、钙、锌、铅、镉、铬、钠、硅、锰、镍、铝、镁、镧、锆、钛、钇和含量的同时测定，采用的检测设备为电感耦合等离子原子发射光谱仪。该设备目前在各高校院所、企事业单位均具有较高的市场占有率。建议掺杂型四氧化三钴的生产和使用单位及各检测机构积极组织本标准的学习与宣贯，并向企业、公司和科研院校（所）推荐本标准。标准使用过程中出现疑问，标准的起草单位有义务进行必要的解释，可通过网络会议、讲座等形式进行标准内容的讲解。建议标准发布6个月后实施。同时，标准要与时俱进，标准颁布实施后要定期进行复审，必要时启动修订程序。

十一、废止现行有关标准的建议

本标准为首次制定，不涉及相关标准的废止。

十二、其它应予说明的事项

本标准为掺杂型四氧化三钴中杂质元素分析方法标准，标准技术先进，具有充分的可操作性、适应性，完全能够满足国内外用户、市场的需求

。

**附件A：**各实验室原始数据

表1 0#样品精密度统计

|  |  |  |  |
| --- | --- | --- | --- |
| 0#样 | | Ni | Na |
| 1浙江华友 | 测定值% | 0.0025、0.0028、0.0027、0.0027、0.0027、0.0025、0.0026、0.0024、0.026、0.0025、0.0025 | 0.0041、0.0044、0.0043、0.0053、0.0045、0.0049、0.0051、0.0052、0.0048、0.0051、0.0052 |
| 均值% | 0.0026 | 0.0048 |
| s | 0.000122 | 0.000418 |
| RSD% | 4.69 | 8.71 |
| 2衢州华友 | 测定值% | 0.0027、0.0025、0.0026、0.0028、0.0028、0.0026、0.0029、0.0026、0.0026、0.0026、0.0026 | - |
| 均值% | 0.0027 | - |
| s | 0.000121 | - |
| RSD% | 4.52 | - |
| 3广东邦普 | 测定值% | 0.0024、0.0025、0.0026、0.0025、0.0027、0.0027、0.0023、0.0029、0.0024、0.0026、0.0024 | 0.0048、0.0040、0.0046、0.0043、0.0045、0.0040、0.0046、0.0051、0.0042、0.0048、0.0050 |
| 均值% | 0.0025 | 0.0045 |
| s | 0.000175 | 0.000378 |
| RSD% | 6.89 | 8.32 |
| 4中金岭南 | 测定值% | 0.0038, 0.0037, 0.0036, 0.0033, 0.0034, 0.0036, 0.0035, 0.0034, 0.0033, 0.0032, 0.0035 | 0.0047, 0.0047, 0.0045, 0.0044, 0.0046, 0.0045, 0.0047, 0.0044, 0.0043, 0.0045, 0.0046 |
| 均值% | 0.0035 | 0.0045 |
| s | 0.000183 | 0.000136 |
| RSD% | 5.27 | 3.00 |
| 5荆门格林美 | 测定值% | 0.0026、0.0026、0.0027、0.0026、0.0026、0.0025、0.0028、0.0028、0.0028、0.0027、0.0027 | 0.0042、0.0046、0.0046、0.0047、0.0049、0.0048、0.0049、0.0046、0.0048、0.0044、0.0047 |
| 均值% | 0.0027 | 0.0047 |
| s | 0.000089 | 0.000210 |
| RSD% | 3.34 | 4.50 |
| 6甘肃金川 | 测定值% | 0.0029、0.0026、0.0025、0.0028、0.0027、0.0026、0.0026、0.0026、0.0027、0.0028、0.0026 | 0.0051、0.0047、0.0052、0.0048、0.0047、0.0050、0.0047、0.0051、0.0052、0.0050、0.0052 |
| 均值% | 0.0027 | 0.0050 |
| s | 0.000114 | 0.000201 |
| RSD% | 4.25 | 4.03 |
| 7湖南中伟 | 测定值% | 0.0037、0.0037、0.0037、0.0037、0.0037、0.0037、0.0037、0.0037、0.0037、0.0037、0.0037 | 0.0039、0.0039、0.0039、0.0039、0.0039、0.0040\*、0.0039、0.0039、0.0039、0.0040\*、0.0040\* |
| 均值% | 0.0037 | 0.0039 |
| s | 0 | 0.000039 |
| RSD% | 0 | 0.01 |
| 8天津巴莫 | 测定值% | 0.0033、0.0033、0.0033、0.0033、0.0033、0.0033、0.0033 | 0.0046、0.0049、0.0048、0.0047、0.0051、0.0050、0.0052 |
| 均值% | 0.0033 | 0.0049 |
| s | 0 | 0.000216 |
| RSD% | 0 | 4.41 |
| 9国标北京 | 测定值% | 0.0031、0.0029、0.0030、0.0029、0.0031、0.0031、0.0029 | 0.0045、0.0041、0.0046、0.0043、0.0041、0.0040、0.0045 |
| 均值% | 0.0030 | 0.0043 |
| s | 0.000100 | 0.000238 |
| RSD% | 3.33 | 5.54 |
| 10桂林地矿 | 测定值% | 0.0026、0.0026、0.0025、0.0027、0.0025、0.0025、0.0028 | 0.0050、0.0051、0.0049、0.0043、0.0049、0.0041、0.0048 |
| 均值% | 0.0026 | 0.0048 |
| s | 0.000115 | 0.000418 |
| RSD% | 4.44 | 8.71 |
| 11紫金铜业 | 测定值% | 0.0025、0.0027、0.0027、0.0026、0.0028、0.0026、0.0026 | 0.0047、0.0042、0.0048、0.0043、0.0043、0.0044、0.0049 |
| 均值% | 0.0026 | 0.0045 |
| s | 0.000096 | 0.000279 |
| RSD% | 3.69 | 6.19 |
| 12广东佳纳 | 测定值% | 0.0040、0.0039、0.0040、0.0041、0.0040、0.0039、0.0040 | 0.0034、0.0033、0.0034、0.0033、0.0033、0.0034、0.0034 |
| 均值% | 0.0040 | 0.0034 |
| s | 0.000069 | 0.000053 |
| RSD% | 1.73 | 1.59 |
| 13郴州质检 | 测定值% | 0.0034、0.0031、0.0035、0.0032、0.0030、0.0031、0.0031 | 0.0051••、0.0046••、0.0047••、0.0065••、0.0048••、0.0050••、0.0055•• |
| 均值% | 0.0032 | 0.0052 |
| s | 0.000178 | 0.000655 |
| RSD% | 5.57 | 12.71 |
| 14大冶有色 | 测定值% | 0.0028、0.0028、0.0026、0.0026、0.0029、0.0028、0.0027、0.0028、0.0028、0.0027、0.0028 | 0.0052、0.0056、0.0049、0.0047、0.0053、0.0057、0.0055、0.0049、0.0048、0.0047、0.0053 |
| 均值% | 0.0028 | 0.0051 |
| s | 0.000093 | 0.000364 |
| RSD% | 3.34 | 7.14 |
| 15广西测试 | 测定值% | 0.0029、0.0030、0.0030、0.0028、0.0029、0.0029、0.0028 | - |
| 均值% | 0.0029 | - |
| s | 0.000082 | - |
| RSD% | 2.83 | - |
| 16中检广西 | 测定值% | 0.0026、0.0028、0.0028、0.0026、0.0026、0.0028、0.0027、0.0026、0.0027、0.0026、0.0028 | 0.0051、0.0050、0.0050、0.0049、0.0051、0.0051、0.0050、0.0050、0.0050、0.0051、0.0050 |
| 均值% | 0.0027 | 0.0050 |
| s | 0.000095 | 0.000064 |
| RSD% | 3.51 | 1.29 |
| 17国标青岛 | 测定值% | 0.0027、0.0029、0.0027、0.0026、0.0028、0.0027、0.0028、0.0028、0.028、0.0027、0.0026 | 0.0047、0.0047、0.0051、0.0048、0.0044、0.0044、0.0048、0.0047、0.0047、0.0047、0.0049 |
| 均值% | 0.0027 | 0.0047 |
| s | 0.000092 | 0.000199 |
| RSD% | 3.41 | 5.49 |
| 18宜昌邦普 | 测定值% | 0.0030、0.0028、0.0026、0.0030、0.0026、0.0028、0.0025、0.0028、0.0028、0.0027、0.0029 | 0.0051、0.0053、0.0045、0.0048、0.0044、0.0045、0.0041、0.0050、0.0053、0.0051、0.0052 |
| 均值% | 0.0028 | 0.0048 |
| s | 0.000162 | 0.000411 |
| RSD% | 5.84 | 8.48 |

表2 1#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1#样 | | Cu | Fe | Ca | Zn | Pb | Cd | Cr | Na | Si | Mn | Al | Mg |
| 1浙江华友 | 测定值% | 0.0036 | 0.0042 | 0.0017 | 0.0012 | 0.00099 | 0.0010 | 0.0010\* | 0.020 | 0.00022 | 0.0028 | 0.0019 | 0.0020 |
| 0.0037 | 0.0042 | 0.0017 | 0.0013 | 0.0011 | 0.0010 | 0.0012 | 0.021 | 0.00038 | 0.0029 | 0.0020 | 0.0020 |
| 0.0037 | 0.0042 | 0.0016 | 0.0013 | 0.0010 | 0.0010 | 0.0013 | 0.021 | 0.00039 | 0.0030 | 0.0025 | 0.0021 |
| 0.0036 | 0.0043 | 0.0019 | 0.0013 | 0.00096 | 0.0010 | 0.0014 | 0.024 | 0.00040 | 0.0028 | 0.0029 | 0.0021 |
| 0.0038 | 0.0043 | 0.0016 | 0.0013 | 0.0010 | 0.0010 | 0.0014 | 0.021 | 0.00035 | 0.0030 | 0.0022 | 0.0021 |
| 0.0036 | 0.0044 | 0.0019 | 0.0012 | 0.0010 | 0.0010 | 0.0013 | 0.021 | 0.00028 | 0.0030 | 0.0020 | 0.0020 |
| 0.0036 | 0.0049 | 0.0017 | 0.0013 | 0.0010 | 0.0010 | 0.0012 | 0.019 | 0.00033 | 0.0030 | 0.0022 | 0.0021 |
| 0.0037 | 0.0043 | 0.0016 | 0.0014 | 0.00080\* | 0.0010 | 0.0013 | 0.018 | 0.00042 | 0.0031 | 0.0026 | 0.0021 |
| 0.0037 | 0.0041 | 0.0015 | 0.0011\* | 0.0010 | 0.0010 | 0.0014 | 0.018 | 0.00045 | 0.0032 | 0.0022 | 0.0020 |
| 0.0036 | 0.0054\* | 0.0017 | 0.0013 | 0.00097 | 0.0010 | 0.0013 | 0.019 | 0.00038 | 0.0031 | 0.0022 | 0.0021 |
| 0.0037 | 0.0041 | 0.0015 | 0.0012 | 0.00096 | 0.0010 | 0.0012 | 0.018 | 0.00029 | 0.0031 | 0.0022 | 0.0020 |
| 均% | 0.0037 | 0.0044 | 0.0017 | 0.0013 | 0.00098 | 0.0010 | 0.0013 | 0.020 | 0.00035 | 0.0030 | 0.0023 | 0.0021 |
| s | 0.000067 | 0.000397 | 0.000135 | 0.000081 | 0.000071 | 0 | 0.000119 | 0.001844 | 0.000068 | 0.000126 | 0.000294 | 0.000052 |
| CV% | 1.81 | 9.02 | 7.94 | 6.23 | 7.25 | 0 | 9.15 | 9.22 | 19.43 | 4.20 | 12.78 | 2.48 |
| 2衢州华友 | 测定值% | 0.0039 | 0.0064•• | 0.0019 | 0.0015 | - | 0.0010 | 0.0016•• | - | - | 0.0036 | 0.0022 | 0.0022 |
| 0.0034 | 0.0062•• | 0.0018 | 0.0013 | - | 0.0009 | 0.0012•• | - | - | 0.0032 | 0.0021 | 0.0021 |
| 0.0033 | 0.0052•• | 0.0018 | 0.0012 | - | 0.0008 | 0.0010•• | - | - | 0.0030 | 0.0019 | 0.0020 |
| 0.0034 | 0.0052•• | 0.0017 | 0.0013 | - | 0.0008 | 0.0011•• | - | - | 0.0031 | 0.0019 | 0.0019 |
| 0.0035 | 0.0049•• | 0.0018 | 0.0012 | - | 0.0008 | 0.0010•• | - | - | 0.0032 | 0.0019 | 0.0019 |
| 0.0035 | 0.0058•• | 0.0019 | 0.0012 | - | 0.0008 | 0.0006•• | - | - | 0.0033 | 0.0021 | 0.0021 |
| 0.0035 | 0.0049•• | 0.0020 | 0.0011 | - | 0.0008 | 0.0007•• | - | - | 0.0029 | 0.0017 | 0.0018 |
| 0.0036 | 0.0050•• | 0.0019 | 0.0010 | - | 0.0008 | 0.0005•• | - | - | 0.0031 | 0.0017 | 0.0018 |
| 0.0034 | 0.0060•• | 0.0019 | 0.0013 | - | 0.0008 | 0.0012•• | - | - | 0.0030 | 0.0020 | 0.0020 |
| 0.0033 | 0.0047•• | 0.0018 | 0.0011 | - | 0.0008 | 0.0005•• | - | - | 0.0033 | 0.0017 | 0.0019 |
| 0.0036 | 0.0048•• | 0.0018 | 0.0011 | - | 0.0009 | 0.0011•• | - | - | 0.0029 | 0.0016 | 0.0018 |
| 均% | 0.0035 | 0.0054•• | 0.0018 | 0.0012 | - | 0.0008 | 0.0010•• | - | - | 0.0031 | 0.0019 | 0.0020 |
| s | 0.000170 | 0.000612 | 0.000082 | 0.000138 | - | 0.000070 | 0.000346 | - | - | 0.000207 | 0.000197 | 0.000137 |
| CV% | 4.87 | 11.39 | 4.44 | 11.37 | - | 8.06 | 36.10 | - | - | 6.57 | 10.43 | 7.00 |
| 3广东邦普 | 测定值% | 0.0038 | 0.0033 | 0.0018 | 0.0016 | 0.0008 | 0.0008 | 0.0012 | 0.020•• | 0.00033 | 0.0034 | 0.0028 | 0.0021 |
| 0.0035 | 0.0042 | 0.0016 | 0.0016 | 0.0011 | 0.0011 | 0.0013 | 0.021•• | 0.00031 | 0.0030 | 0.0021 | 0.0021 |
| 0.0036 | 0.0043 | 0.0015 | 0.0020 | 0.0008 | 0.0009 | 0.0015 | 0.025•• | 0.00031 | 0.0033 | 0.0025 | 0.0022 |
| 0.0038 | 0.0045 | 0.0015 | 0.0017 | 0.0008 | 0.0009 | 0.0012 | 0.025•• | 0.00040 | 0.0032 | 0.0025 | 0.0021 |
| 0.0035 | 0.0042 | 0.0019 | 0.0017 | 0.0009 | 0.0011 | 0.0015 | 0.025•• | 0.00040 | 0.0031 | 0.0022 | 0.0019 |
| 0.0037 | 0.0043 | 0.0018 | 0.0015 | 0.0012 | 0.0009 | 0.0010 | 0.019•• | 0.00030 | 0.0030 | 0.0027 | 0.0021 |
| 0.0035 | 0.0038 | 0.0018 | 0.0016 | 0.0011 | 0.0009 | 0.0012 | 0.017•• | 0.00037 | 0.0028 | 0.0026 | 0.0020 |
| 0.0035 | 0.0042 | 0.0017 | 0.0017 | 0.0009 | 0.0008 | 0.0014 | 0.024•• | 0.00039 | 0.0030 | 0.0028 | 0.0019 |
| 0.0037 | 0.0030 | 0.0018 | 0.0017 | 0.0008 | 0.0008 | 0.0010 | 0.017•• | 0.00037 | 0.0031 | 0.0024 | 0.0022 |
| 0.0036 | 0.0040 | 0.0018 | 0.0017 | 0.0011 | 0.0010 | 0.0011 | 0.021•• | 0.00026 | 0.0030 | 0.0020 | 0.0021 |
| 0.0038 | 0.0037 | 0.0016 | 0.0016 | 0.0012 | 0.0010 | 0.0015 | 0.020•• | 0.00039 | 0.0029 | 0.0027 | 0.0021 |
| 均% | 0.0036 | 0.0040 | 0.0017 | 0.0017 | 0.0010 | 0.0009 | 0.0013 | 0.021 | 0.00035 | 0.0031 | 0.0025 | 0.0021 |
| s | 0.000129 | 0.000463 | 0.000138 | 0.000127 | 0.000168 | 0.000110 | 0.000191 | 0.003069 | 0.000048 | 0.000174 | 0.000279 | 0.000101 |
| CV% | 3.54 | 11.72 | 8.05 | 7.60 | 17.26 | 11.90 | 15.13 | 14.43 | 13.71 | 5.65 | 11.23 | 4.87 |
| 4中金岭南 | 测定值% | 0.0027 | 0.0049 | 0.0024 | 0.0009 | - | 0.0009 | 0.0010 | 0.021 | 0.00058 | 0.0029 | 0.0044•• | 0.0028•• |
| 0.0030 | 0.0048 | 0.0022 | 0.0010 | - | 0.0008 | 0.0009 | 0.018 | 0.00053 | 0.0028 | 0.0043•• | 0.0030•• |
| 0.0027 | 0.0046 | 0.0027 | 0.0012 | - | 0.0007 | 0.0010 | 0.018 | 0.00045 | 0.0029 | 0.0041•• | 0.0026•• |
| 0.0029 | 0.0048 | 0.0022 | 0.0013 | - | 0.0008 | 0.0010 | 0.020 | 0.00042 | 0.0031 | 0.0041•• | 0.0026•• |
| 0.0031 | 0.0045 | 0.0024 | 0.0010 | - | 0.0008 | 0.0011 | 0.020 | 0.00050 | 0.0029 | 0.0048•• | 0.0028•• |
| 0.0030 | 0.0046 | 0.0024 | 0.0011 | - | 0.0009 | 0.0011 | 0.021 | 0.00048 | 0.0029 | 0.0048•• | 0.0026•• |
| 0.0031 | 0.0048 | 0.0025 | 0.0010 | - | 0.0010 | 0.0009 | 0.019 | 0.00055 | 0.0030 | 0.0044•• | 0.0027•• |
| 0.0029 | 0.0045 | 0.0022 | 0.0012 | - | 0.0010 | 0.0010 | 0.019 | 0.00040 | 0.0028 | 0.0047•• | 0.0027•• |
| 0.0031 | 0.0046 | 0.0021 | 0.0012 | - | 0.0008 | 0.0011 | 0.020 | 0.00052 | 0.0031 | 0.0041•• | 0.0029•• |
| 0.0030 | 0.0045 | 0.0023 | 0.0013 | - | 0.0009 | 0.0010 | 0.021 | 0.00048 | 0.0030 | 0.0041•• | 0.0026•• |
| 0.0028 | 0.0047 | 0.0023 | 0.0011 | - | 0.0009 | 0.0011 | 0.019 | 0.00040 | 0.0030 | 0.0043•• | 0.0026•• |
| 均% | 0.0029 | 0.0047 | 0.0023 | 0.0011 | - | 0.0009 | 0.0010 | 0.020 | 0.00048 | 0.0029 | 0.0044•• | 0.0027•• |
| s | 0.000150 | 0.000143 | 0.000169 | 0.000133 | - | 0.000092 | 0.000075 | 0.001120 | 0.000060 | 0.000104 | 0.000280 | 0.000140 |
| CV% | 5.11 | 3.07 | 7.23 | 11.88 | - | 10.70 | 7.37 | 5.70 | 12.54 | 3.52 | 6.39 | 5.16 |
| 5荆门格林美 | 测定值% | 0.0034 | 0.0043 | 0.0018 | 0.0014 | 0.0011 | 0.0009 | 0.0014 | 0.021 | 0.0004 | 0.0034 | 0.0025 | 0.0020 |
| 0.0034 | 0.0042 | 0.0019 | 0.0014 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0004 | 0.0034 | 0.0024 | 0.0020 |
| 0.0034 | 0.0041 | 0.0019 | 0.0014 | 0.0010 | 0.0009 | 0.0014 | 0.023 | 0.0004 | 0.0033 | 0.0026 | 0.0020 |
| 0.0031 | 0.0042 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0004 | 0.0031 | 0.0024 | 0.0020 |
| 0.0031 | 0.0042 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.024 | 0.0004 | 0.0031 | 0.0023 | 0.0019 |
| 0.0031 | 0.0042 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0004 | 0.0031 | 0.0022 | 0.0019 |
| 0.0031 | 0.0042 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.023 | 0.0004 | 0.0032 | 0.0022 | 0.0019 |
| 0.0031 | 0.0043 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0004 | 0.0032 | 0.0024 | 0.0019 |
| 0.0031 | 0.0042 | 0.0017 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0004 | 0.0031 | 0.0024 | 0.0019 |
| 0.0032 | 0.0043 | 0.0019 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0005 | 0.0033 | 0.0022 | 0.0020 |
| 0.0032 | 0.0043 | 0.0019 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.021 | 0.0005 | 0.0033 | 0.0025 | 0.0020 |
| 均% | 0.0032 | 0.0043 | 0.0018 | 0.0013 | 0.0011 | 0.0009 | 0.0014 | 0.022 | 0.0005 | 0.0033 | 0.0024 | 0.0020 |
| s | 0.000099 | 0.000065 | 0.000046 | 0.000024 | 0.000018 | 0.000009 | 0.000007 | 0.000914 | 0.000043 | 0.000103 | 0.000133 | 0.000019 |
| CV% | 3.10 | 1.53 | 2.52 | 1.80 | 1.64 | 1.05 | 0.54 | 4.10 | 10.39 | 3.22 | 5.60 | 0.98 |
| 6甘肃金川 | 测定值% | 0.0031 | 0.0043 | 0.0019 | 0.0016 | 0.0010 | 0.0011 | 0.0013 | 0.021 | - | 0.0022 | 0.0019 | 0.0031•• |
| 0.0032 | 0.0045 | 0.0018 | 0.0015 | 0.00094 | 0.0011 | 0.0012 | 0.021 | - | 0.0024 | 0.0019 | 0.0032•• |
| 0.0031 | 0.0047 | 0.0023 | 0.0013 | 0.0010 | 0.0011 | 0.0013 | 0.019 | - | 0.0024 | 0.0022 | 0.0031•• |
| 0.0034 | 0.0044 | 0.0022 | 0.0012 | 0.00074 | 0.0011 | 0.0012 | 0.020 | - | 0.0023 | 0.0020 | 0.0034•• |
| 0.0030 | 0.0045 | 0.0019 | 0.0012 | 0.00085 | 0.0012 | 0.0013 | 0.021 | - | 0.0020 | 0.0021 | 0.0030•• |
| 0.0030 | 0.0043 | 0.0018 | 0.0015 | 0.00069 | 0.0012 | 0.0014 | 0.021 | - | 0.0021 | 0.0020 | 0.0030•• |
| 0.0035 | 0.0049 | 0.0020 | 0.0016 | 0.0010 | 0.0011 | 0.0013 | 0.019 | - | 0.0021 | 0.0022 | 0.0035•• |
| 0.0033 | 0.0048 | 0.0018 | 0.0014 | 0.00094 | 0.0011 | 0.0012 | 0.018 | - | 0.0022 | 0.0023 | 0.0033•• |
| 0.0036 | 0.0047 | 0.0023 | 0.0015 | 0.00100 | 0.0010 | 0.0013 | 0.019 | - | 0.0023 | 0.0021 | 0.0036•• |
| 0.0034 | 0.0046 | 0.0021 | 0.0015 | 0.00082 | 0.0010 | 0.0014 | 0.018 | - | 0.0020 | 0.0024 | 0.0034•• |
| 0.0033 | 0.0046 | 0.0023 | 0.0015 | 0.00068 | 0.0010 | 0.0013 | 0.019 | - | 0.0021 | 0.0023 | 0.0033•• |
| 均% | 0.0033 | 0.0046 | 0.0020 | 0.0014 | 0.00088 | 0.0011 | 0.0013 | 0.020 | - | 0.0022 | 0.0021 | 0.0033•• |
| s | 0.000192 | 0.000186 | 0.000201 | 0.000137 | 0.000121 | 0.000067 | 0.000067 | 0.001150 | - | 0.000138 | 0.000160 | 0.000192 |
| CV% | 5.89 | 4.08 | 9.89 | 9.52 | 13.87 | 6.13 | 5.18 | 5.86 | - | 6.30 | 7.53 | 5.89 |
| 7湖南中伟 | 测定值% | 0.0038 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0016 | 0.016 | - | 0.0031 | 0.0023 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0008 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0022 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0021 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0022 | 0.0020 |
| 0.0038 | 0.0048 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0022 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0008 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0022 | 0.0020 |
| 0.0037 | 0.0048 | 0.0022 | 0.0012 | 0.0008 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0023 | 0.0020 |
| 0.0038 | 0.0048 | 0.0022 | 0.0012 | 0.0007 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0022 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0023 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0010 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0023 | 0.0020 |
| 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0024 | 0.0020 |
| 均% | 0.0037 | 0.0049 | 0.0022 | 0.0012 | 0.0009 | 0.0010 | 0.0015 | 0.016 | - | 0.0031 | 0.0023 | 0.0020 |
| s | 0.000019 | 0.000029 | 0 | 0 | 0.000070 | 0 | 0.000019 | 0 | - | 0 | 0.000067 | 0 |
| CV% | 0.01 | 0.01 | 0 | 0 | 0.08 | 0 | 0.01 | 0 | - | 0 | 0.03 | 0 |
| 8天津巴莫 | 测定值% | 0.0023 | 0.0027•• | 0.0033•• | 0.0017 | - | - | 0.0009 | 0.024 | - | 0.0033 | 0.0026 | 0.0020 |
| 0.0023 | 0.0027•• | 0.0033•• | 0.0018 | - | - | 0.0009 | 0.023 | - | 0.0033 | 0.0026 | 0.0020 |
| 0.0023 | 0.0026•• | 0.0033•• | 0.0017 | - | - | 0.0010 | 0.023 | - | 0.0032 | 0.0026 | 0.0019 |
| 0.0023 | 0.0026•• | 0.0034•• | 0.0017 | - | - | 0.0009 | 0.024 | - | 0.0033 | 0.0025 | 0.0020 |
| 0.0022 | 0.0027•• | 0.0033•• | 0.0017 | - | - | 0.0009 | 0.024 | - | 0.0033 | 0.0026 | 0.0020 |
| 0.0023 | 0.0027•• | 0.0034•• | 0.0017 | - | - | 0.0009 | 0.023 | - | 0.0033 | 0.0025 | 0.0020 |
| 0.0023 | 0.0027•• | 0.0034•• | 0.0017 | - | - | 0.0009 | 0.024 | - | 0.0033 | 0.0026 | 0.0020 |
| 均% | 0.0023 | 0.0027 •• | 0.0033 •• | 0.0017 | - | - | 0.0009 | 0.024 | - | 0.0033 | 0.0026 | 0.0020 |
| s | 0.000038 | 0.000049 | 0.000054 | 0.000038 | - | - | 0.000038 | 0.000207 | - | 0.000038 | 0.000049 | 0.000038 |
| CV% | 1.65 | 1.83 | 1.60 | 2.20 | - | - | 4.13 | 0.88 | - | 1.15 | 1.90 | 1.90 |
| 9国标北京 | 测定值% | 0.0039 | 0.0045 | 0.0017 | 0.0017 | 0.00093 | 0.0014 | 0.0011•• | 0.015 | 0.00027 | 0.0034•• | 0.0019 | 0.0025 |
| 0.0041 | 0.0044 | 0.0013 | 0.0018 | 0.00094 | 0.0012 | 0.0016•• | 0.016 | 0.00026 | 0.0031•• | 0.0021 | 0.0021 |
| 0.0043 | 0.0047 | 0.0014 | 0.0016 | 0.00099 | 0.0015 | 0.0017•• | 0.014 | 0.00023 | 0.0029•• | 0.0023 | 0.0023 |
| 0.0042 | 0.0043 | 0.0018 | 0.0016 | 0.0011 | 0.0014 | 0.0015•• | 0.017 | 0.00025 | 0.0036•• | 0.0021 | 0.0024 |
| 0.0040 | 0.0041 | 0.0016 | 0.0013 | 0.0010 | 0.0016 | 0.0013•• | 0.018 | 0.00029 | 0.0025•• | 0.0018 | 0.0027 |
| 0.0038 | 0.0047 | 0.0015 | 0.0015 | 0.0012 | 0.0011 | 0.0011•• | 0.016 | 0.00024 | 0.0035•• | 0.0017 | 0.0024 |
| 0.0038 | 0.0044 | 0.0016 | 0.0014 | 0.00095 | 0.0011 | 0.0012•• | 0.015 | 0.00023 | 0.0030•• | 0.0022 | 0.0023 |
| 均% | 0.0040 | 0.0044 | 0.0016 | 0.0016 | 0.0010 | 0.0013 | 0.0014•• | 0.0159 | 0.00025 | 0.0031•• | 0.0020 | 0.0024 |
| s | 0.000195 | 0.000215 | 0.000172 | 0.000172 | 0.000099 | 0.000198 | 0.000244 | 0.001345 | 0.000022 | 0.000387 | 0.000219 | 0.000186 |
| CV% | 0.0039 | 0.0045 | 0.0017 | 0.0017 | 0.00093 | 0.0014 | 0.0011 | 0.015 | 0.00027 | 0.0034 | 0.0019 | 0.0025 |
| 10桂林地矿 | 测定值% | 0.0036 | 0.0050 | 0.0017 | 0.0014 | 0.0011 | 0.0010 | 0.0011 | 0.021 | - | 0.0027 | 0.0018 | 0.0022 |
| 0.0037 | 0.0049 | 0.0017 | 0.0013 | 0.0010 | 0.0010 | 0.0012 | 0.021 | - | 0.0030 | 0.0019 | 0.0022 |
| 0.0037 | 0.0043 | 0.0016 | 0.0014 | 0.0011 | 0.0010 | 0.0012 | 0.020 | - | 0.0029 | 0.0020 | 0.0021 |
| 0.0038 | 0.0042 | 0.0016 | 0.0014 | 0.0009 | 0.0010 | 0.0013 | 0.022 | - | 0.0028 | 0.0023 | 0.0021 |
| 0.0036 | 0.0042 | 0.0018 | 0.0011 | 0.0010 | 0.0010 | 0.0012 | 0.019 | - | 0.0029 | 0.0021 | 0.0021 |
| 0.0038 | 0.0046 | 0.0019 | 0.0013 | 0.0010 | 0.0011 | 0.0012 | 0.019 | - | 0.0028 | 0.0021 | 0.0021 |
| 0.0037 | 0.0040 | 0.0016 | 0.0012 | 0.0009 | 0.0010 | 0.0011 | 0.018 | - | 0.0027 | 0.0020 | 0.0020 |
| 均% | 0.0037 | 0.0045 | 0.0017 | 0.0013 | 0.0010 | 0.0010 | 0.0012 | 0.020 | - | 0.0028 | 0.0020 | 0.0021 |
| s | 0.000082 | 0.000388 | 0.000112 | 0.000115 | 0.000082 | 0.000048 | 0.000070 | 0.00141 | - | 0.000110 | 0.000158 | 0.000059 |
| CV% | 2.21 | 8.62 | 6.60 | 8.88 | 8.16 | 4.78 | 5.82 | 7.07 | - | 3.93 | 7.90 | 2.80 |
| 11紫金铜业 | 测定值% | 0.0034 | 0.0037 | 0.0020 | 0.0010 | 0.0011 | 0.0011 | 0.0010 | 0.018 | 0.00041 | 0.0030 | 0.0020 | 0.0020 |
| 0.0035 | 0.0038 | 0.0019 | 0.0011 | 0.0012 | 0.0010 | 0.0011 | 0.020 | 0.00032 | 0.0032 | 0.0020 | 0.0019 |
| 0.0037 | 0.0040 | 0.0021 | 0.0012 | 0.00094 | 0.0012 | 0.0010 | 0.022 | 0.00034 | 0.0031 | 0.0025 | 0.0022 |
| 0.0034 | 0.0041 | 0.0018 | 0.0012 | 0.0011 | 0.0011 | 0.0012 | 0.023 | 0.00039 | 0.0029 | 0.0021 | 0.0020 |
| 0.0037 | 0.0044 | 0.0017 | 0.0011 | 0.0010 | 0.00092 | 0.0012 | 0.020 | 0.00036 | 0.0034 | 0.0025 | 0.0020 |
| 0.0035 | 0.0037 | 0.0017 | 0.0012 | 0.0011 | 0.0011 | 0.0012 | 0.022 | 0.00040 | 0.0036 | 0.0022 | 0.0022 |
| 0.0036 | 0.0044 | 0.0018 | 0.0010 | 0.0012 | 0.0010 | 0.0012 | 0.019 | 0.00037 | 0.0033 | 0.0021 | 0.0020 |
| 均% | 0.0035 | 0.0040 | 0.0018 | 0.0011 | 0.0011 | 0.0011 | 0.0011 | 0.021 | 0.00037 | 0.0032 | 0.0022 | 0.0020 |
| s | 0.000126 | 0.000301 | 0.000147 | 0.000089 | 0.000097 | 0.000096 | 0.000093 | 0.001850 | 0.000033 | 0.000240 | 0.000216 | 0.000111 |
| CV% | 3.59 | 7.53 | 8.14 | 8.07 | 8.78 | 8.74 | 8.43 | 8.81 | 8.83 | 7.50 | 9.81 | 5.55 |
| 12广东佳纳 | 测定值% | 0.0022 | 0.0052 | 0.0023 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.021 | 0.0002 | 0.0035 | 0.0025 | 0.0022 |
| 0.0022 | 0.0054 | 0.0023 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.020 | 0.0002 | 0.0035 | 0.0025 | 0.0022 |
| 0.0023 | 0.0053 | 0.0023 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.020 | 0.0001 | 0.0036 | 0.0026 | 0.0023 |
| 0.0021 | 0.0052 | 0.0024 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.021 | 0.0001 | 0.0037 | 0.0026 | 0.0021 |
| 0.0022 | 0.0053 | 0.0024 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.020 | 0.0002 | 0.0036 | 0.0026 | 0.0022 |
| 0.0023 | 0.0052 | 0.0023 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.020 | 0.0002 | 0.0036 | 0.0027 | 0.0023 |
| 0.0023 | 0.0052 | 0.0025 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.021 | 0.0001 | 0.0035 | 0.0025 | 0.0023 |
| 均% | 0.0022 | 0.0053 | 0.0024 | 0.0013 | 0.0012 | 0.0010 | 0.0014 | 0.020 | 0.0002 | 0.0036 | 0.0026 | 0.0022 |
| s | 0.000076 | 0.000079 | 0.000079 | 0 | 0 | 0 | 0 | 0.000535 | 0.000053 | 0.000076 | 0.000076 | 0.000127 |
| CV% | 3.39 | 1.50 | 3.34 | 0 | 0 | 0 | 0 | 2.62 | 34.02 | 2.12 | 2.94 | 5.67 |
| 13郴州质检 | 测定值% | 0.0036 | 0.0044 | 0.0019 | 0.0014 | 0.0013 | 0.0010 | 0.0010 | 0.026 | - | 0.0031 | 0.0027 | 0.0024 |
| 0.0037 | 0.0046 | 0.0018 | 0.0016 | 0.0011 | 0.0010 | 0.0011 | 0.025 | - | 0.0032 | 0.0030 | 0.0022 |
| 0.0037 | 0.0044 | 0.0018 | 0.0014 | 0.0013 | 0.0010 | 0.0012 | 0.025 | - | 0.0033 | 0.0032 | 0.0021 |
| 0.0036 | 0.0044 | 0.0017 | 0.0015 | 0.0014 | 0.0010 | 0.0011 | 0.025 | - | 0.0030 | 0.0032 | 0.0024 |
| 0.0038 | 0.0045 | 0.0016 | 0.0015 | 0.0012 | 0.0010 | 0.0010 | 0.024 | - | 0.0030 | 0.0029 | 0.0022 |
| 0.0036 | 0.0044 | 0.0018 | 0.0015 | 0.0011 | 0.0010 | 0.0011 | 0.025 | - | 0.0033 | 0.0028 | 0.0023 |
| 0.0036 | 0.0046 | 0.0017 | 0.0014 | 0.0011 | 0.0009 | 0.0011 | 0.024 | - | 0.0030 | 0.0030 | 0.0024 |
| 均% | 0.0037 | 0.0045 | 0.0018 | 0.0015 | 0.0012 | 0.0010 | 0.0011 | 0.025 | - | 0.0031 | 0.0030 | 0.0023 |
| s | 0.000067 | 0.000094 | 0.000081 | 0.000088 | 0.000114 | 0.000023 | 0.000031 | 0.000654 | - | 0.000129 | 0.000182 | 0.000114 |
| CV% | 1.81 | 2.09 | 4.63 | 6.01 | 9.37 | 2.40 | 2.98 | 2.64 | - | 4.14 | 6.10 | 4.97 |
| 14大冶有色 | 测定值% | 0.0043 | 0.0045 | 0.0020 | 0.0013 | 0.0014 | 0.0010 | 0.0016 | 0.021 | - | 0.0032 | 0.0018 | 0.0020 |
| 0.0043 | 0.0044 | 0.0021 | 0.0013 | 0.0013 | 0.0010 | 0.0011 | 0.021 | - | 0.0032 | 0.0017 | 0.0021 |
| 0.0042 | 0.0042 | 0.0022 | 0.0013 | 0.0011 | 0.0010 | 0.0012 | 0.019 | - | 0.0028 | 0.0021 | 0.0021 |
| 0.0038 | 0.0045 | 0.0019 | 0.0013 | 0.0012 | 0.0010 | 0.0010 | 0.019 | - | 0.0027 | 0.0025 | 0.0020 |
| 0.0039 | 0.0047 | 0.0019 | 0.0011 | 0.0011 | 0.0010 | 0.0010 | 0.018 | - | 0.0027 | 0.0018 | 0.0018 |
| 0.0039 | 0.0049 | 0.0020 | 0.0011 | 0.0012 | 0.0010 | 0.0011 | 0.018 | - | 0.0027 | 0.0023 | 0.0018 |
| 0.0038 | 0.0050 | 0.0021 | 0.0010 | 0.0010 | 0.0010 | 0.0013 | 0.023 | - | 0.0032 | 0.0024 | 0.0020 |
| 0.0038 | 0.0048 | 0.0022 | 0.0010 | 0.0010 | 0.0010 | 0.0013 | 0.022 | - | 0.0031 | 0.0021 | 0.0020 |
| 0.0039 | 0.0049 | 0.0021 | 0.0011 | 0.0010 | 0.0010 | 0.0013 | 0.022 | - | 0.0031 | 0.0020 | 0.0019 |
| 0.0039 | 0.0051 | 0.0020 | 0.0011 | 0.0011 | 0.0010 | 0.0014 | 0.020 | - | 0.0031 | 0.0024 | 0.0020 |
| 0.0038 | 0.0044 | 0.0020 | 0.0012 | 0.0010 | 0.0010 | 0.0013 | 0.020 | - | 0.0030 | 0.0022 | 0.0021 |
| 均% | 0.0040 | 0.0047 | 0.0020 | 0.0012 | 0.0011 | 0.0010 | 0.0012 | 0.020 | - | 0.0030 | 0.0021 | 0.0020 |
| s | 0.000201 | 0.000290 | 0.000104 | 0.000121 | 0.000135 | 0.000000 | 0.000180 | 0.001679 | - | 0.000214 | 0.000271 | 0.000108 |
| CV% | 5.03 | 6.17 | 5.20 | 10.08 | 12.27 | 0.00 | 15.00 | 8.40 | - | 7.13 | 12.90 | 5.40 |
| 15广西测试 | 测定值% | 0.0042 | 0.0054 | 0.0018 | 0.0011 | - | 0.0010 | 0.0012 | - | - | 0.0030 | 0.0027 | 0.0019 |
| 0.0042 | 0.0054 | 0.0020 | 0.0012 | - | 0.0010 | 0.0011 | - | - | 0.0028 | 0.0025 | 0.0021 |
| 0.0042 | 0.0052 | 0.0017 | 0.0011 | - | 0.0010 | 0.0012 | - | - | 0.0030 | 0.0026 | 0.0019 |
| 0.0042 | 0.0052 | 0.0020 | 0.0010 | - | 0.0010 | 0.0012 | - | - | 0.0030 | 0.0028 | 0.0020 |
| 0.0043 | 0.0054 | 0.0018 | 0.0011 | - | 0.0010 | 0.0011 | - | - | 0.0030 | 0.0026 | 0.0019 |
| 0.0042 | 0.0054 | 0.0018 | 0.0012 | - | 0.0010 | 0.0012 | - | - | 0.0028 | 0.0028 | 0.0017 |
| 0.0043 | 0.0053 | 0.0017 | 0.0010 | - | 0.0010 | 0.0012 | - | - | 0.0029 | 0.0026 | 0.0019 |
| 均% | 0.0042 | 0.0053 | 0.0018 | 0.0011 | - | 0.0010 | 0.0012 | - | - | 0.0029 | 0.0027 | 0.0019 |
| s | 0.000049 | 0.000095 | 0.000125 | 0.000082 | - | 0 | 0.000049 | - | - | 0.000095 | 0.000113 | 0.000121 |
| CV% | 1.17 | 1.79 | 6.94 | 7.45 | - | 0.00 | 4.08 | - | - | 3.28 | 4.19 | 6.37 |
| 16中检广西 | 测定值% | 0.0038 | 0.0044 | 0.0018 | 0.0014 | 0.00092 | 0.0011 | 0.0014 | 0.020 | 0.00032 | 0.0030 | 0.0026 | 0.0021 |
| 0.0037 | 0.0044 | 0.0019 | 0.0013 | 0.00095 | 0.0010 | 0.0013 | 0.021 | 0.00038 | 0.0031 | 0.0025 | 0.0021 |
| 0.0039 | 0.0045 | 0.0019 | 0.0013 | 0.00093 | 0.0010 | 0.0014 | 0.020 | 0.00038 | 0.0032 | 0.0027 | 0.0020 |
| 0.0038 | 0.0045 | 0.0018 | 0.0013 | 0.00095 | 0.0010 | 0.0014 | 0.020 | 0.00038 | 0.0030 | 0.0026 | 0.0021 |
| 0.0038 | 0.0046 | 0.0017 | 0.0014 | 0.00096 | 0.0011 | 0.0013 | 0.021 | 0.00039 | 0.0032 | 0.0025 | 0.0020 |
| 0.0038 | 0.0044 | 0.0019 | 0.0013 | 0.00095 | 0.0011 | 0.0013 | 0.021 | 0.00036 | 0.0031 | 0.0026 | 0.0020 |
| 0.0039 | 0.0045 | 0.0019 | 0.0013 | 0.00096 | 0.0011 | 0.0014 | 0.020 | 0.00039 | 0.0030 | 0.0027 | 0.0021 |
| 0.0037 | 0.0045 | 0.0019 | 0.0014 | 0.00097 | 0.0010 | 0.0014 | 0.020 | 0.00039 | 0.0031 | 0.0026 | 0.0021 |
| 0.0038 | 0.0044 | 0.0019 | 0.0013 | 0.00096 | 0.0011 | 0.0013 | 0.020 | 0.00035 | 0.0031 | 0.0026 | 0.0021 |
| 0.0038 | 0.0045 | 0.0018 | 0.0013 | 0.00096 | 0.0011 | 0.0013 | 0.021 | 0.00036 | 0.0030 | 0.0025 | 0.0020 |
| 0.0038 | 0.0045 | 0.0019 | 0.0014 | 0.00096 | 0.0010 | 0.0014 | 0.021 | 0.00036 | 0.0032 | 0.0026 | 0.0021 |
| 均% | 0.0038 | 0.0045 | 0.0019 | 0.0013 | 0.00095 | 0.0011 | 0.0014 | 0.020 | 0.00037 | 0.0031 | 0.0026 | 0.0021 |
| s | 0.000063 | 0.000065 | 0.000071 | 0.000049 | 0.000015 | 0.000054 | 0.000054 | 0.000510 | 0.000022 | 0.000083 | 0.000070 | 0.000051 |
| CV% | 1.66 | 1.45 | 3.71 | 3.78 | 1.55 | 4.95 | 3.86 | 2.55 | 5.87 | 2.69 | 2.70 | 2.44 |
| 17国标青岛 | 测定值% | 0.0032 | 0.0046 | 0.0020 | 0.0012 | 0.00076 | 0.0010 | 0.0016 | 0.019 | 0.00048•• | 0.0031 | 0.0016 | 0.0021 |
| 0.0032 | 0.0048 | 0.0021 | 0.0013 | 0.0010 | 0.0010 | 0.0016 | 0.020 | 0.00061•• | 0.0031 | 0.0019 | 0.0021 |
| 0.0029 | 0.0046 | 0.0022 | 0.0013 | 0.00089 | 0.0010 | 0.0016 | 0.020 | 0.00050•• | 0.0031 | 0.0021 | 0.0020 |
| 0.0031 | 0.0048 | 0.0021 | 0.0013 | 0.00075 | 0.0010 | 0.0017 | 0.020 | 0.00045•• | 0.0031 | 0.0021 | 0.0021 |
| 0.0031 | 0.0048 | 0.0023 | 0.0013 | 0.00081 | 0.0010 | 0.0020 | 0.020 | 0.00036•• | 0.0029 | 0.0018 | 0.0021 |
| 0.0030 | 0.0049 | 0.0021 | 0.0013 | 0.00089 | 0.0010 | 0.0018 | 0.020 | 0.00051•• | 0.0032 | 0.0019 | 0.0019 |
| 0.0033 | 0.0047 | 0.0020 | 0.0013 | 0.00073 | 0.0010 | 0.0013 | 0.021 | 0.00021•• | 0.0031 | 0.0022 | 0.0021 |
| 0.0031 | 0.0048 | 0.0024 | 0.0014 | 0.00063 | 0.0010 | 0.0016 | 0.021 | 0.00055•• | 0.0026 | 0.0023 | 0.0021 |
| 0.0033 | 0.0050 | 0.0024 | 0.0014 | 0.00068 | 0.0010 | 0.0014 | 0.020 | 0.00046•• | 0.0029 | 0.0019 | 0.0020 |
| 0.0032 | 0.0048 | 0.0020 | 0.0014 | 0.00075 | 0.0010 | 0.0016 | 0.021 | 0.00037•• | 0.0031 | 0.0018 | 0.0019 |
| 0.0033 | 0.0046 | 0.0022 | 0.0014 | 0.00075 | 0.0010 | 0.0017 | 0.019 | 0.00023•• | 0.0027 | 0.0020 | 0.0021 |
| 均% | 0.0032 | 0.0048 | 0.0022 | 0.0013 | 0.00078 | 0.0010 | 0.0016 | 0.020 | 0.00043•• | 0.0030 | 0.0020 | 0.0020 |
| s | 0.000129 | 0.000129 | 0.000157 | 0.000065 | 0.000105 | 0 | 0.000185 | 0.000701 | 0.000126 | 0.000192 | 0.000201 | 0.000082 |
| CV% | 4.03 | 2.69 | 1.36 | 5.00 | 13.46 | 0 | 11.56 | 3.51 | 29.30 | 6.40 | 10.05 | 4.10 |
| 18宜昌邦普 | 测定值% | 0.0032 | 0.0031•• | 0.0018 | 0.0018 | 0.0012 | 0.0011 | 0.0012 | 0.019• | 0.00033 | 0.0029 | 0.0024 | 0.0021 |
| 0.0032 | 0.0033•• | 0.0017 | 0.0020 | 0.0009 | 0.0008 | 0.0014 | 0.020• | 0.00038 | 0.0034 | 0.0025 | 0.0021 |
| 0.0029 | 0.0045•• | 0.0019 | 0.0018 | 0.0012 | 0.0008 | 0.0010 | 0.020• | 0.00033 | 0.0033 | 0.0025 | 0.0020 |
| 0.0031 | 0.0039•• | 0.0019 | 0.0020 | 0.0009 | 0.0009 | 0.0013 | 0.020• | 0.00040 | 0.0030 | 0.0025 | 0.0021 |
| 0.0031 | 0.0043•• | 0.0017 | 0.0020 | 0.0009 | 0.0010 | 0.0015 | 0.020• | 0.00037 | 0.0030 | 0.0024 | 0.0021 |
| 0.0030 | 0.0032•• | 0.0018 | 0.0016 | 0.0012 | 0.0009 | 0.0015 | 0.020• | 0.00031 | 0.0032 | 0.0028 | 0.0019 |
| 0.0033 | 0.0030•• | 0.0017 | 0.0016 | 0.0009 | 0.0009 | 0.0012 | 0.021• | 0.00028 | 0.0033 | 0.0021 | 0.0021 |
| 0.0031 | 0.0040 •• | 0.0019 | 0.0016 | 0.0008 | 0.0009 | 0.0014 | 0.021• | 0.00029 | 0.0029 | 0.0023 | 0.0021 |
| 0.0033 | 0.0043•• | 0.0020 | 0.0017 | 0.0009 | 0.0008 | 0.0015 | 0.020• | 0.00030 | 0.0032 | 0.0027 | 0.0020 |
| 0.0032 | 0.0032•• | 0.0016 | 0.0017 | 0.0010 | 0.0009 | 0.0011 | 0.021• | 0.00029 | 0.0030 | 0.0022 | 0.0019 |
| 0.0033 | 0.0042•• | 0.0017 | 0.0017 | 0.0010 | 0.0009 | 0.0012 | 0.019• | 0.00037 | 0.0028 | 0.0025 | 0.0021 |
| 均% | 0.0037 | 0.0037•• | 0.0018 | 0.0018 | 0.0010 | 0.0009 | 0.0013 | 0.021• | 0.00033 | 0.0031 | 0.0024 | 0.0021 |
| s | 0.000113 | 0.000569 | 0.000122 | 0.000162 | 0.000145 | 0.000089 | 0.000173 | 0.002541 | 0.000042 | 0.000197 | 0.000202 | 0.000087 |
| CV% | 3.09 | 15.28 | 6.82 | 9.13 | 14.59 | 9.94 | 13.32 | 11.89 | 12.63 | 6.38 | 8.25 | 4.20 |

表3 3#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 3#样 | | Cu | Fe | Ca | Zn | Pb | Cd | Cr | Na | Si | Mn | Ni | Al | Mg |
| 1浙江华友 | 测定值% | 0.019 | 0.032 | 0.018 | 0.013 | 0.012 | 0.0076 | 0.017 | 0.031 | 0.0066 | 0.015 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.013 | 0.011\* | 0.0076 | 0.016 | 0.032 | 0.0062 | 0.015 | 0.016 | 0.013 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.013 | 0.011\* | 0.0076 | 0.016 | 0.031 | 0.0065 | 0.015 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.019 | 0.013 | 0.012 | 0.0076 | 0.017 | 0.031 | 0.0064 | 0.015 | 0.015 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.019 | 0.013 | 0.012 | 0.0076 | 0.013 | 0.031 | 0.0061 | 0.015 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.019 | 0.013 | 0.012 | 0.0076 | 0.014 | 0.032 | 0.0056 | 0.015 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.019 | 0.012 | 0.012 | 0.0077 | 0.017 | 0.034 | 0.0059 | 0.015 | 0.018\* | 0.014 | 0.016 |
| 0.019 | 0.032 | 0.019 | 0.012 | 0.012 | 0.0077 | 0.017 | 0.029 | 0.0061 | 0.015 | 0.017 | 0.014 | 0.015 |
| 0.019 | 0.032 | 0.019 | 0.013 | 0.012 | 0.0077 | 0.018 | 0.035 | 0.0064 | 0.015 | 0.017 | 0.015 | 0.016 |
| 0.019 | 0.032 | 0.020 | 0.013 | 0.012 | 0.0078 | 0.017 | 0.031 | 0.0065 | 0.015 | 0.017 | 0.014 | 0.016 |
| 0.019 | 0.032 | 0.019 | 0.012 | 0.012 | 0.0078 | 0.017 | 0.030 | 0.0062 | 0.015 | 0.016 | 0.014 | 0.016 |
| 均% | 0.019 | 0.032 | 0.019 | 0.013 | 0.012 | 0.0077 | 0.016 | 0.032 | 0.0062 | 0.015 | 0.016 | 0.013 | 0.015 |
| s | 0 | 0 | 0.000568 | 0.000483 | 0.000421 | 0.000082 | 0.001549 | 0.001776 | 0.000285 | 0 | 0.000843 | 0.001135 | 0.000516 |
| CV% | 0 | 0 | 2.99 | 3.72 | 3.52 | 1.06 | 9.68 | 5.55 | 4.6 | 0 | 5.27 | 8.73 | 3.44 |
| 2衢州华友 | 测定值% | 0.017 | 0.032 | 0.019 | 0.013 | 0.011 | 0.0071 | 0.017 | - | - | 0.015 | 0.014 | 0.011 | 0.014 |
| 0.017 | 0.032 | 0.018 | 0.013 | 0.011 | 0.0070 | 0.013 | - | - | 0.015 | 0.015 | 0.011 | 0.014 |
| 0.017 | 0.032 | 0.018 | 0.013 | 0.011 | 0.0069 | 0.014 | - | - | 0.014 | 0.015 | 0.010 | 0.014 |
| 0.018 | 0.032 | 0.020 | 0.013 | 0.011 | 0.0071 | 0.015 | - | - | 0.015 | 0.015 | 0.010 | 0.014 |
| 0.018 | 0.033 | 0.019 | 0.014 | 0.011 | 0.0073 | 0.017 | - | - | 0.015 | 0.015 | 0.011 | 0.014 |
| 0.017 | 0.032 | 0.016 | 0.013 | 0.011 | 0.0072 | 0.017 | - | - | 0.014 | 0.015 | 0.011 | 0.014 |
| 0.018 | 0.033 | 0.019 | 0.013 | 0.011 | 0.0070 | 0.013 | - | - | 0.015 | 0.015 | 0.011 | 0.014 |
| 0.018 | 0.032 | 0.017 | 0.013 | 0.011 | 0.0069 | 0.011 | - | - | 0.014 | 0.015 | 0.010 | 0.013 |
| 0.017 | 0.032 | 0.019 | 0.013 | 0.010 | 0.0069 | 0.016 | - | - | 0.015 | 0.015 | 0.011 | 0.014 |
| 0.017 | 0.034 | 0.019 | 0.015 | 0.011 | 0.0081 | 0.018 | - | - | 0.015 | 0.016 | 0.012 | 0.015 |
| 0.017 | 0.034 | 0.019 | 0.015 | 0.011 | 0.0080 | 0.014 | - | - | 0.016 | 0.016 | 0.011 | 0.015 |
| 均% | 0.017 | 0.033 | 0.018 | 0.013 | 0.011 | 0.0072 | 0.015 | - | - | 0.015 | 0.015 | 0.011 | 0.014 |
| s | 0.000505 | 0.000802 | 0.001128 | 0.000820 | 0.000300 | 0.000427 | 0.002147 | - | - | 0.000441 | 0.000610 | 0.000659 | 0.000536 |
| CV% | 2.91 | 2.46 | 6.11 | 37.17 | 2.73 | 5.91 | 14.30 | - | - | 2.99 | 4.07 | 6.10 | 3.80 |
| 3广东邦普 | 测定值% | 0.017 | 0.035 | 0.019 | 0.012 | 0.010 | 0.0078 | 0.014 | 0.030 | 0.0065 | 0.016 | 0.016•• | 0.014 | 0.017 |
| 0.018 | 0.032 | 0.018 | 0.014 | 0.010 | 0.0078 | 0.013 | 0.029 | 0.0065 | 0.013 | 0.016•• | 0.013 | 0.016 |
| 0.018 | 0.034 | 0.020 | 0.014 | 0.010 | 0.0076 | 0.016 | 0.032 | 0.0065 | 0.014 | 0.019•• | 0.010 | 0.015 |
| 0.017 | 0.033 | 0.017 | 0.012 | 0.010 | 0.0079 | 0.015 | 0.034 | 0.0063 | 0.013 | 0.018•• | 0.014 | 0.017 |
| 0.016 | 0.034 | 0.017 | 0.013 | 0.011 | 0.0074 | 0.015 | 0.034 | 0.0058 | 0.015 | 0.019•• | 0.013 | 0.015 |
| 0.018 | 0.030 | 0.018 | 0.014 | 0.010 | 0.0079 | 0.016 | 0.035 | 0.0056 | 0.016 | 0.020•• | 0.011 | 0.014 |
| 0.016 | 0.035 | 0.018 | 0.014 | 0.012 | 0.0074 | 0.014 | 0.031 | 0.0055 | 0.014 | 0.015•• | 0.010 | 0.016 |
| 0.017 | 0.033 | 0.018 | 0.013 | 0.012 | 0.0080 | 0.013 | 0.029 | 0.0064 | 0.015 | 0.015•• | 0.014 | 0.018 |
| 0.018 | 0.031 | 0.017 | 0.014 | 0.010 | 0.0080 | 0.017 | 0.036 | 0.0066 | 0.016 | 0.019•• | 0.011 | 0.015 |
| 0.015 | 0.033 | 0.017 | 0.014 | 0.010 | 0.0080 | 0.014 | 0.033 | 0.0061 | 0.017 | 0.018•• | 0.011 | 0.014 |
| 0.016 | 0.031 | 0.019 | 0.012 | 0.010 | 0.0079 | 0.018 | 0.036 | 0.0063 | 0.017 | 0.018•• | 0.010 | 0.017 |
| 均% | 0.017 | 0.033 | 0.018 | 0.013 | 0.010 | 0.0078 | 0.015 | 0.033 | 0.0062 | 0.015 | 0.018•• | 0.012 | 0.016 |
| s | 0.001044 | 0.001662 | 0.001000 | 0.000905 | 0.000820 | 0.000226 | 0.001612 | 0.002618 | 0.000388 | 0.001446 | 0.001753 | 0.001700 | 0.001328 |
| CV% | 6.18 | 5.07 | 5.56 | 6.81 | 7.85 | 2.90 | 10.75 | 8.02 | 6.27 | 9.58 | 9.99 | 14.28 | 8.40 |
| 4中金岭南 | 测定值% | 0.017 | 0.032 | 0.018 | 0.013 | 0.015 | 0.0072 | 0.014 | 0.033 | 0.0040•• | 0.015 | 0.019 | 0.012 | 0.015 |
| 0.018 | 0.033 | 0.018 | 0.013 | 0.015 | 0.0078 | 0.013 | 0.031 | 0.0042•• | 0.014 | 0.021 | 0.011 | 0.015 |
| 0.018 | 0.034 | 0.019 | 0.011 | 0.015 | 0.0080 | 0.013 | 0.029 | 0.0043•• | 0.015 | 0.019 | 0.014 | 0.014 |
| 0.019 | 0.034 | 0.019 | 0.011 | 0.015 | 0.0076 | 0.015 | 0.030 | 0.0045•• | 0.014 | 0.018 | 0.012 | 0.014 |
| 0.019 | 0.033 | 0.018 | 0.013 | 0.014 | 0.0073 | 0.015 | 0.031 | 0.0048•• | 0.014 | 0.019 | 0.011 | 0.014 |
| 0.017 | 0.032 | 0.019 | 0.013 | 0.014 | 0.0079 | 0.014 | 0.031 | 0.0044•• | 0.015 | 0.020 | 0.011 | 0.013 |
| 0.018 | 0.032 | 0.017 | 0.012 | 0.015 | 0.0078 | 0.014 | 0.030 | 0.0046•• | 0.015 | 0.020 | 0.013 | 0.015 |
| 0.019 | 0.034 | 0.018 | 0.012 | 0.014 | 0.0077 | 0.015 | 0.032 | 0.0045•• | 0.014 | 0.019 | 0.013 | 0.014 |
| 0.017 | 0.033 | 0.019 | 0.013 | 0.015 | 0.0076 | 0.013 | 0.033 | 0.0047•• | 0.015 | 0.018 | 0.014 | 0.013 |
| 0.017 | 0.032 | 0.019 | 0.012 | 0.014 | 0.0076 | 0.014 | 0.030 | 0.0048•• | 0.015 | 0.018 | 0.011 | 0.014 |
| 0.018 | 0.032 | 0.018 | 0.011 | 0.015 | 0.0078 | 0.013 | 0.032 | 0.0047•• | 0.014 | 0.019 | 0.012 | 0.015 |
| 均% | 0.018 | 0.033 | 0.018 | 0.012 | 0.015 | 0.0077 | 0.014 | 0.031 | 0.0046•• | 0.015 | 0.019 | 0.012 | 0.014 |
| s | 0.000831 | 0.000874 | 0.000674 | 0.000874 | 0.000505 | 0.000209 | 0.000831 | 0.001300 | 0.0045 | 0.000522 | 0.000944 | 0.001168 | 0.000751 |
| CV% | 4.64 | 2.66 | 3.67 | 7.17 | 3.52 | 2.72 | 5.98 | 4.18 | 0.025 | 3.59 | 4.94 | 9.59 | 5.29 |
| 5荆门格林美 | 测定值% | 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.017 | 0.032 | 0.0058 | 0.016 | 0.016 | 0.013 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.015 | 0.011 | 0.0079 | 0.017 | 0.033 | 0.0059 | 0.016 | 0.016 | 0.013 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.030 | 0.0063 | 0.016 | 0.016 | 0.013 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.016 | 0.030 | 0.0060 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.016 | 0.031 | 0.0060 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.014 | 0.011 | 0.0078 | 0.016 | 0.031 | 0.0060 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.017 | 0.033 | 0.0073 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.015 | 0.011 | 0.0079 | 0.017 | 0.033 | 0.0072 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.017 | 0.031 | 0.0072 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.017 | 0.032 | 0.0073 | 0.016 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.033 | 0.018 | 0.014 | 0.011 | 0.0078 | 0.017 | 0.030 | 0.0072 | 0.016 | 0.016 | 0.012 | 0.015 |
| 均% | 0.019 | 0.033 | 0.018 | 0.015 | 0.011 | 0.0078 | 0.017 | 0.031 | 0.0065 | 0.016 | 0.016 | 0.012 | 0.015 |
| s | 0 | 0.000126 | 0 | 0.000035 | 0 | 0.000040 | 0.000240 | 0.001083 | 0.000641 | 0 | 0 | 0.000275 | 0 |
| CV% | 0 | 0.39 | 0 | 0.24 | 0 | 0.51 | 1.43 | 3.45 | 9.79 | 0 | 0 | 2.26 | 0 |
| 6甘肃金川 | 测定值% | 0.018 | 0.033 | 0.017 | 0.014 | 0.012 | 0.0078 | 0.015 | 0.029 | - | 0.017 | 0.015 | 0.015 | 0.018 |
| 0.018 | 0.033 | 0.019 | 0.014 | 0.011 | 0.0078 | 0.016 | 0.030 | - | 0.016 | 0.015 | 0.015 | 0.018 |
| 0.019 | 0.035 | 0.018 | 0.015 | 0.014 | 0.0086 | 0.016 | 0.030 | - | 0.018 | 0.012 | 0.014 | 0.019 |
| 0.019 | 0.035 | 0.018 | 0.015 | 0.014 | 0.0080 | 0.017 | 0.030 | - | 0.017 | 0.012 | 0.015 | 0.019 |
| 0.018 | 0.034 | 0.019 | 0.015 | 0.010 | 0.0075 | 0.018 | 0.029 | - | 0.018 | 0.013 | 0.014 | 0.018 |
| 0.018 | 0.036 | 0.017 | 0.013 | 0.011 | 0.0079 | 0.019 | 0.030 | - | 0.017 | 0.011 | 0.013 | 0.018 |
| 0.018 | 0.036 | 0.017 | 0.013 | 0.011 | 0.0081 | 0.018 | 0.031 | - | 0.018 | 0.012 | 0.014 | 0.018 |
| 0.018 | 0.033 | 0.018 | 0.014 | 0.012 | 0.0080 | 0.016 | 0.033 | - | 0.016 | 0.013 | 0.015 | 0.018 |
| 0.018 | 0.033 | 0.018 | 0.012 | 0.011 | 0.0085 | 0.015 | 0.032 | - | 0.016 | 0.014 | 0.013 | 0.018 |
| 0.018 | 0.034 | 0.017 | 0.014 | 0.012 | 0.0075 | 0.017 | 0.034 | - | 0.017 | 0.012 | 0.014 | 0.018 |
| 0.018 | 0.034 | 0.018 | 0.012 | 0.013 | 0.0079 | 0.016 | 0.03 | - | 0.019 | 0.013 | 0.015 | 0.018 |
| 均% | 0.018 | 0.034 | 0.018 | 0.014 | 0.012 | 0.0080 | 0.017 | 0.031 | - | 0.017 | 0.013 | 0.014 | 0.018 |
| s | 0.000386 | 0.001113 | 0.000716 | 0.001052 | 0.001240 | 0.000331 | 0.001226 | 0.001543 | - | 0.000936 | 0.001240 | 0.000750 | 0.000386 |
| CV% | 2.13 | 3.26 | 4.02 | 7.67 | 10.41 | 4.16 | 7.38 | 5.02 | - | 5.45 | 9.60 | 5.26 | 2.13 |
| 7湖南中伟 | 测定值% | 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.023 | - | 0.015 | 0.018 | 0.011 | 0.014 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.018 | 0.023 | - | 0.015 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.023 | - | 0.015 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0076 | 0.018 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.023 | - | 0.015 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0076 | 0.017 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0076 | 0.017 | 0.023 | - | 0.015 | 0.018 | 0.011 | 0.014 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0076 | 0.017 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.035 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.018 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 0.0020 | 0.035 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.018 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| 均% | 0.0020 | 0.034 | 0.019 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.023 | - | 0.016 | 0.018 | 0.011 | 0.015 |
| s | 0 | 0.000168 | 0 | 0 | 0 | 0.000019 | 0.000100 | 0 | - | 0.000066 | 0 | 0 | 0.000056 |
| CV% | 0 | 0.49 | 0 | 0 | 0 | 0.25 | 0.01 | 0 | - | 0.42 | 0 | 0 | 0.38 |
| 8天津巴莫 | 测定值% | 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.010 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 0.020 | 0.034 | 0.020 | 0.018 | - | - | 0.010 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.011 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.010 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 0.020 | 0.033 | 0.020 | 0.017 | - | - | 0.011 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.010 | 0.031 | - | 0.017 | 0.020 | 0.0123 | 0.015 |
| 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.010 | 0.032 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| 均% | 0.020 | 0.034 | 0.020 | 0.017 | - | - | 0.010 | 0.031 | - | 0.017 | 0.020 | 0.012 | 0.015 |
| s | 0 | 0.000358 | 0 | 0.000378 | - | - | 0.000107 | 0.000298 | - | 0 | 0 | 0 | 0 |
| CV% | 0 | 1.06 | 0 | 2.20 | - | - | 1.02 | 0.96 | - | 0 | 0 | 0 | 0 |
| 9国标北京 | 测定值% | 0.023 | 0.029 | 0.023 | 0.016 | 0.012 | 0.0076 | 0.022 | 0.034 | 0.0066 | 0.015 | 0.016 | 0.012 | 0.013 |
| 0.024 | 0.029 | 0.023 | 0.016 | 0.011 | 0.0077 | 0.019 | 0.033 | 0.0064 | 0.016 | 0.014 | 0.010 | 0.013 |
| 0.025 | 0.028 | 0.024 | 0.015 | 0.012 | 0.0081 | 0.020 | 0.031 | 0.0071 | 0.017 | 0.015 | 0.0098 | 0.012 |
| 0.024 | 0.027 | 0.022 | 0.014 | 0.011 | 0.0079 | 0.021 | 0.034 | 0.0073 | 0.018 | 0.015 | 0.011 | 0.014 |
| 0.024 | 0.028 | 0.022 | 0.015 | 0.010 | 0.0080 | 0.023 | 0.035 | 0.0068 | 0.018 | 0.014 | 0.013 | 0.011 |
| 0.025 | 0.028 | 0.021 | 0.015 | 0.010 | 0.0077 | 0.022 | 0.035 | 0.0073 | 0.019 | 0.015 | 0.01 | 0.013 |
| 0.025 | 0.029 | 0.024 | 0.016 | 0.011 | 0.0078 | 0.021 | 0.034 | 0.0071 | 0.018 | 0.015 | 0.0097 | 0.011 |
| 均% | 0.024 | 0.028 | 0.023 | 0.015 | 0.011 | 0.0080 | 0.021 | 0.034 | 0.0070 | 0.017 | 0.015 | 0.011 | 0.012 |
| s | 0.000756 | 0.000756 | 0.001113 | 0.000756 | 0.000816 | 0.000180 | 0.001345 | 0.001380 | 0.000351 | 0.001380 | 0.000690 | 0.001279 | 0.001134 |
| CV% | 3.11 | 2.67 | 4.90 | 4.95 | 7.42 | 2.30 | 6.36 | 4.09 | 5.05 | 7.98 | 4.64 | 11.85 | 9.12 |
| 10桂林地矿 | 测定值% | 0.019 | 0.032 | 0.017 | 0.012 | 0.013 | 0.0075 | 0.018 | 0.031 | - | 0.014 | 0.016 | 0.013 | 0.014 |
| 0.019 | 0.032 | 0.018 | 0.013 | 0.013 | 0.0077 | 0.016 | 0.033 | - | 0.015 | 0.016 | 0.015 | 0.016 |
| 0.019 | 0.031 | 0.019 | 0.013 | 0.012 | 0.0076 | 0.015 | 0.032 | - | 0.015 | 0.015 | 0.012 | 0.014 |
| 0.019 | 0.032 | 0.018 | 0.012 | 0.011 | 0.0075 | 0.017 | 0.032 | - | 0.014 | 0.016 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.013 | 0.012 | 0.0078 | 0.016 | 0.032 | - | 0.015 | 0.017 | 0.014 | 0.015 |
| 0.020 | 0.033 | 0.017 | 0.013 | 0.012 | 0.0078 | 0.014 | 0.032 | - | 0.015 | 0.016 | 0.014 | 0.016 |
| 0.019 | 0.032 | 0.019 | 0.011 | 0.012 | 0.0076 | 0.014 | 0.030 | - | 0.015 | 0.016 | 0.013 | 0.015 |
| 均% | 0.019 | 0.032 | 0.018 | 0.012 | 0.012 | 0.0076 | 0.016 | 0.032 | - | 0.015 | 0.016 | 0.013 | 0.015 |
| s | 0.000374 | 0.000576 | 0.000709 | 0.000760 | 0.000682 | 0.000126 | 0.001523 | 0.000960 | - | 0.000498 | 0.000578 | 0.001089 | 0.000816 |
| CV% | 1.97 | 1.80 | 3.94 | 6.33 | 5.68 | 1.66 | 9.52 | 3.00 | - | 3.32 | 3.61 | 8.38 | 5.44 |
| 11紫金铜业 | 测定值% | 0.019•• | 0.032 | 0.018 | 0.013 | 0.012 | 0.0077 | 0.016 | 0.032 | 0.0061 | 0.015 | 0.017 | 0.013 | 0.017 |
| 0.020•• | 0.033 | 0.017 | 0.013 | 0.011 | 0.0078 | 0.014 | 0.030 | 0.0068 | 0.014 | 0.015 | 0.014 | 0.016 |
| 0.019•• | 0.034 | 0.016 | 0.013 | 0.011 | 0.0080 | 0.016 | 0.033 | 0.0064 | 0.017 | 0.016 | 0.014 | 0.015 |
| 0.022•• | 0.031 | 0.019 | 0.013 | 0.012 | 0.0075 | 0.015 | 0.033 | 0.0063 | 0.016 | 0.017 | 0.012 | 0.014 |
| 0.019•• | 0.032 | 0.018 | 0.013 | 0.012 | 0.0077 | 0.017 | 0.031 | 0.0065 | 0.017 | 0.014 | 0.014 | 0.014 |
| 0.023•• | 0.035 | 0.019 | 0.012 | 0.010 | 0.0076 | 0.016 | 0.030 | 0.0060 | 0.015 | 0.015 | 0.013 | 0.015 |
| 0.018•• | 0.030 | 0.017 | 0.013 | 0.011 | 0.0080 | 0.015 | 0.033 | 0.0064 | 0.015 | 0.016 | 0.014 | 0.016 |
| 均% | 0.020•• | 0.032 | 0.017 | 0.013 | 0.011 | 0.0078 | 0.016 | 0.032 | 0.0064 | 0.016 | 0.016 | 0.013 | 0.015 |
| s | 0.001826 | 0.001696 | 0.001068 | 0.000381 | 0.000737 | 0.000191 | 0.001003 | 0.001392 | 0.000266 | 0.001165 | 0.001133 | 0.000762 | 0.001092 |
| CV% | 9.13 | 5.30 | 6.28 | 2.93 | 6.70 | 2.45 | 6.27 | 4.35 | 4.15 | 7.28 | 7.08 | 5.86 | 7.28 |
| 12广东佳纳 | 测定值% | 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.027 | - | 0.015 | 0.018 | 0.014 | 0.014 |
| 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.026 | - | 0.016 | 0.017 | 0.014 | 0.014 |
| 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.027 | - | 0.015 | 0.018 | 0.014 | 0.014 |
| 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0077 | 0.018 | 0.027 | - | 0.016 | 0.018 | 0.014 | 0.014 |
| 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.026 | - | 0.015 | 0.017 | 0.014 | 0.014 |
| 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.027 | - | 0.015 | 0.017 | 0.014 | 0.014 |
| 0.015 | 0.034 | 0.019 | 0.014 | 0.012 | 0.0077 | 0.018 | 0.026 | - | 0.015 | 0.018 | 0.014 | 0.014 |
| 均% | 0.015 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0076 | 0.018 | 0.026 | - | 0.015 | 0.017 | 0.014 | 0.014 |
| s | 0 | 0.000127 | 0 | 0 | 0 | 0.000049 | 0 | 0.000318 | - | 0.000206 | 0.000151 | 0 | 0 |
| CV% | 0 | 0.38 | 0.60 | 0 | 0 | 0.64 | 0 | 1.20 | - | 1.35 | 0.87 | 0 | 0 |
| 13郴州质检 | 测定值% | 0.020 | 0.032 | 0.021 | 0.014 | 0.016 | 0.0078 | 0.013 | 0.035 | 0.0062 | 0.014 | 0.018 | 0.011 | 0.017 |
| 0.021 | 0.032 | 0.020 | 0.014 | 0.015 | 0.0079 | 0.012 | 0.034 | 0.0060 | 0.014 | 0.019 | 0.012 | 0.017 |
| 0.022 | 0.032 | 0.020 | 0.015 | 0.016 | 0.0080 | 0.013 | 0.033 | 0.0057 | 0.014 | 0.019 | 0.016 | 0.016 |
| 0.020 | 0.032 | 0.020 | 0.015 | 0.016 | 0.0080 | 0.013 | 0.037 | 0.0060 | 0.014 | 0.019 | 0.012 | 0.019 |
| 0.023 | 0.031 | 0.021 | 0.015 | 0.014 | 0.0078 | 0.014 | 0.033 | 0.0058 | 0.014 | 0.017 | 0.013 | 0.018 |
| 0.022 | 0.031 | 0.023 | 0.014 | 0.015 | 0.0079 | 0.014 | 0.034 | 0.0063 | 0.015 | 0.018 | 0.014 | 0.018 |
| 0.020 | 0.032 | 0.023 | 0.015 | 0.015 | 0.0079 | 0.013 | 0.033 | 0.0065 | 0.014 | 0.018 | 0.013 | 0.019 |
| 均% | 0.021 | 0.032 | 0.021 | 0.015 | 0.015 | 0.0079 | 0.013 | 0.034 | 0.0061 | 0.014 | 0.018 | 0.013 | 0.018 |
| s | 0.001125 | 0.000401 | 0.001404 | 0.000233 | 0.000837 | 0.000064 | 0.000472 | 0.001596 | 0.000261 | 0.000261 | 0.000538 | 0.001482 | 0.000981 |
| CV% | 5.32 | 1.27 | 6.58 | 1.60 | 5.49 | 0.81 | 3.56 | 4.66 | 4.29 | 1.82 | 2.97 | 11.42 | 5.57 |
| 14大冶有色 | 测定值% | 0.019 | 0.033 | 0.019 | 0.014 | 0.011 | 0.0078 | 0.016 | 0.030 | - | 0.016 | 0.017 | 0.013 | 0.016 |
| 0.018 | 0.033 | 0.018 | 0.014 | 0.011 | 0.0078 | 0.016 | 0.030 | - | 0.016 | 0.017 | 0.013 | 0.016 |
| 0.018 | 0.032 | 0.020 | 0.013 | 0.011 | 0.0077 | 0.018 | 0.031 | - | 0.014 | 0.015 | 0.013 | 0.015 |
| 0.018 | 0.032 | 0.020 | 0.012 | 0.011 | 0.0077 | 0.017 | 0.031 | - | 0.014 | 0.015 | 0.013 | 0.015 |
| 0.018 | 0.032 | 0.018 | 0.013 | 0.011 | 0.0076 | 0.017 | 0.030 | - | 0.014 | 0.016 | 0.015 | 0.014 |
| 0.019 | 0.032 | 0.018 | 0.013 | 0.011 | 0.0078 | 0.017 | 0.030 | - | 0.014 | 0.016 | 0.014 | 0.014 |
| 0.019 | 0.033 | 0.019 | 0.014 | 0.011 | 0.0078 | 0.016 | 0.032 | - | 0.016 | 0.017 | 0.014 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.014 | 0.011 | 0.0078 | 0.018 | 0.030 | - | 0.016 | 0.017 | 0.013 | 0.015 |
| 0.019 | 0.033 | 0.020 | 0.014 | 0.011 | 0.0076 | 0.017 | 0.032 | - | 0.015 | 0.016 | 0.014 | 0.014 |
| 0.019 | 0.033 | 0.020 | 0.014 | 0.011 | 0.0077 | 0.017 | 0.031 | - | 0.015 | 0.016 | 0.014 | 0.014 |
| 0.018 | 0.033 | 0.018 | 0.013 | 0.011 | 0.0078 | 0.018 | 0.031 | - | 0.015 | 0.017 | 0.015 | 0.015 |
| 均% | 0.019 | 0.033 | 0.019 | 0.013 | 0.011 | 0.0077 | 0.017 | 0.031 | - | 0.015 | 0.016 | 0.014 | 0.015 |
| s | 0.000522 | 0.000522 | 0.000944 | 0.000688 | 0 | 0.000081 | 0.000775 | 0.000786 | - | 0.000894 | 0.000786 | 0.000786 | 0.000751 |
| CV% | 2.75 | 1.58 | 4.97 | 5.29 | 0 | 1.05 | 4.56 | 2.54 | - | 5.96 | 4.91 | 5.61 | 5.01 |
| 15广西测试 | 测定值% | 0.022 | 0.032 | 0.018 | 0.013 | - | 0.0073 | 0.017 | - | - | 0.015 | 0.016 | 0.012 | 0.014 |
| 0.022 | 0.032 | 0.018 | 0.013 | - | 0.0073 | 0.017 | - | - | 0.015 | 0.016 | 0.013 | 0.014 |
| 0.022 | 0.032 | 0.018 | 0.013 | - | 0.0074 | 0.017 | - | - | 0.015 | 0.016 | 0.012 | 0.014 |
| 0.022 | 0.032 | 0.018 | 0.013 | - | 0.0073 | 0.015 | - | - | 0.015 | 0.016 | 0.013 | 0.014 |
| 0.022 | 0.032 | 0.016 | 0.013 | - | 0.0073 | 0.015 | - | - | 0.015 | 0.016 | 0.013 | 0.014 |
| 0.022 | 0.033 | 0.016 | 0.013 | - | 0.0073 | 0.015 | - | - | 0.015 | 0.016 | 0.013 | 0.014 |
| 0.022 | 0.033 | 0.017 | 0.012 | - | 0.0075 | 0.015 | - | - | 0.014 | 0.015 | 0.013 | 0.014 |
| 均% | 0.022 | 0.032 | 0.017 | 0.013 | - | 0.0073 | 0.016 | - | - | 0.015 | 0.016 | 0.013 | 0.014 |
| s | 0 | 0.000488 | 0.000951 | 0.000378 | - | 0.000079 | 0.001069 | - | - | 0.000378 | 0.000378 | 0.000488 | 0 |
| CV% | 0 | 1.53 | 5.59 | 2.91 | - | 1.08 | 6.68 | - | - | 2.52 | 2.36 | 3.75 | 0 |
| 16中检广西 | 测定值% | 0.018 | 0.031 | 0.018 | 0.014 | 0.014 | 0.0079 | 0.016 | 0.032 | 0.0060 | 0.015 | 0.017 | 0.013 | 0.015 |
| 0.019 | 0.030 | 0.018 | 0.014 | 0.014 | 0.0078 | 0.015 | 0.032 | 0.0059 | 0.015 | 0.015 | 0.012 | 0.015 |
| 0.019 | 0.032 | 0.018 | 0.015 | 0.013 | 0.0078 | 0.015 | 0.032 | 0.0058 | 0.014 | 0.017 | 0.012 | 0.014 |
| 0.018 | 0.031 | 0.019 | 0.015 | 0.014 | 0.0080 | 0.016 | 0.031 | 0.0061 | 0.015 | 0.016 | 0.012 | 0.016 |
| 0.019 | 0.030 | 0.019 | 0.014 | 0.014 | 0.0081 | 0.016 | 0.032 | 0.0062 | 0.016 | 0.017 | 0.011 | 0.015 |
| 0.019 | 0.030 | 0.019 | 0.014 | 0.012 | 0.0080 | 0.016 | 0.031 | 0.0060 | 0.015 | 0.017 | 0.011 | 0.015 |
| 0.019 | 0.030 | 0.017 | 0.014 | 0.012 | 0.0079 | 0.015 | 0.031 | 0.0060 | 0.015 | 0.016 | 0.013 | 0.014 |
| 0.018 | 0.031 | 0.017 | 0.014 | 0.013 | 0.0079 | 0.016 | 0.032 | 0.0061 | 0.015 | 0.017 | 0.013 | 0.014 |
| 0.018 | 0.030 | 0.018 | 0.015 | 0.013 | 0.0078 | 0.016 | 0.031 | 0.0060 | 0.015 | 0.016 | 0.013 | 0.015 |
| 0.019 | 0.030 | 0.018 | 0.014 | 0.013 | 0.0079 | 0.015 | 0.031 | 0.0062 | 0.015 | 0.017 | 0.011 | 0.015 |
| 0.019 | 0.030 | 0.018 | 0.014 | 0.013 | 0.0078 | 0.016 | 0.032 | 0.0060 | 0.015 | 0.017 | 0.012 | 0.015 |
| 均% | 0.019 | 0.030 | 0.018 | 0.014 | 0.013 | 0.0079 | 0.016 | 0.032 | 0.0060 | 0.015 | 0.017 | 0.012 | 0.015 |
| s | 0.000515 | 0.000678 | 0.000697 | 0.000458 | 0.000741 | 0.000010 | 0.000517 | 0.000531 | 0.000119 | 0.000447 | 0.000707 | 0.000824 | 0.000611 |
| CV% | 2.71 | 2.26 | 3.87 | 3.27 | 5.70 | 1.27 | 3.23 | 1.66 | 1.98 | 2.98 | 4.16 | 6.87 | 4.07 |
| 17国标青岛 | 测定值% | 0.016 | 0.032 | 0.018 | 0.013 | 0.010 | 0.0075 | 0.016 | 0.031 | - | 0.015 | 0.015 | 0.011 | 0.014 |
| 0.016 | 0.032 | 0.018 | 0.013 | 0.011 | 0.0076 | 0.014 | 0.031 | - | 0.014 | 0.015 | 0.011 | 0.014 |
| 0.016 | 0.033 | 0.019 | 0.013 | 0.011 | 0.0075 | 0.016 | 0.031 | - | 0.016 | 0.015 | 0.012 | 0.015 |
| 0.016 | 0.033 | 0.019 | 0.013 | 0.009 | 0.0075 | 0.017 | 0.030 | - | 0.015 | 0.016 | 0.011 | 0.014 |
| 0.016 | 0.032 | 0.019 | 0.013 | 0.010 | 0.0076 | 0.016 | 0.031 | - | 0.015 | 0.015 | 0.011 | 0.015 |
| 0.017 | 0.032 | 0.019 | 0.013 | 0.010 | 0.0077 | 0.016 | 0.031 | - | 0.016 | 0.015 | 0.011 | 0.015 |
| 0.017 | 0.033 | 0.020 | 0.013 | 0.011 | 0.0072 | 0.016 | 0.031 | - | 0.015 | 0.017 | 0.012 | 0.015 |
| 0.017 | 0.034 | 0.019 | 0.013 | 0.010 | 0.0075 | 0.017 | 0.032 | - | 0.016 | 0.017 | 0.010 | 0.014 |
| 0.016 | 0.033 | 0.019 | 0.013 | 0.011 | 0.0076 | 0.017 | 0.031 | - | 0.015 | 0.017 | 0.010 | 0.015 |
| 0.017 | 0.033 | 0.019 | 0.013 | 0.011 | 0.0073 | 0.016 | 0.031 | - | 0.016 | 0.017 | 0.012 | 0.014 |
| 0.016 | 0.032 | 0.021 | 0.013 | 0.010 | 0.0076 | 0.014 | 0.030 | - | 0.014 | 0.016 | 0.012 | 0.015 |
| 均% | 0.016 | 0.033 | 0.019 | 0.013 | 0.010 | 0.0075 | 0.016 | 0.031 | - | 0.015 | 0.016 | 0.011 | 0.015 |
| s | 0.000505 | 0.000674 | 0.000831 | 0 | 0.000674 | 0.000145 | 0.001044 | 0.000539 | - | 0.000751 | 0.000944 | 0.000751 | 0.000522 |
| CV% | 3.16 | 2.04 | 0.16 | 0 | 6.74 | 1.93 | 6.53 | 1.74 | - | 5.01 | 5.90 | 6.83 | 3.48 |
| 18宜昌邦普 | 测定值% | 0.015 | 0.035 | 0.017 | 0.012 | 0.010 | 0.0081 | 0.014 | 0.029 | 0.0062 | 0.014 | 0.017 | 0.015 | 0.014 |
| 0.019 | 0.035 | 0.017 | 0.014 | 0.010 | 0.0077 | 0.018 | 0.035 | 0.0065 | 0.013 | 0.018 | 0.013 | 0.014 |
| 0.018 | 0.032 | 0.018 | 0.014 | 0.011 | 0.0078 | 0.014 | 0.032 | 0.0056 | 0.015 | 0.016 | 0.011 | 0.018 |
| 0.018 | 0.031 | 0.017 | 0.013 | 0.010 | 0.0077 | 0.016 | 0.032 | 0.0063 | 0.016 | 0.017 | 0.010 | 0.014 |
| 0.018 | 0.034 | 0.020 | 0.013 | 0.012 | 0.0081 | 0.017 | 0.032 | 0.0064 | 0.016 | 0.017 | 0.011 | 0.014 |
| 0.020 | 0.033 | 0.019 | 0.013 | 0.010 | 0.0078 | 0.014 | 0.030 | 0.0055 | 0.017 | 0.016 | 0.011 | 0.014 |
| 0.019 | 0.031 | 0.018 | 0.013 | 0.010 | 0.0081 | 0.016 | 0.036 | 0.0063 | 0.014 | 0.017 | 0.010 | 0.015 |
| 0.017 | 0.033 | 0.019 | 0.012 | 0.012 | 0.0080 | 0.017 | 0.035 | 0.0062 | 0.014 | 0.015 | 0.015 | 0.016 |
| 0.018 | 0.030 | 0.020 | 0.013 | 0.011 | 0.0075 | 0.013 | 0.035 | 0.0063 | 0.013 | 0.015 | 0.015 | 0.017 |
| 0.018 | 0.033 | 0.019 | 0.014 | 0.012 | 0.0077 | 0.018 | 0.034 | 0.0055 | 0.015 | 0.015 | 0.011 | 0.016 |
| 0.017 | 0.032 | 0.018 | 0.014 | 0.011 | 0.0079 | 0.013 | 0.035 | 0.0060 | 0.017 | 0.016 | 0.013 | 0.018 |
| 均% | 0.018 | 0.033 | 0.018 | 0.013 | 0.011 | 0.0079 | 0.015 | 0.033 | 0.0061 | 0.015 | 0.016 | 0.012 | 0.015 |
| s | 0.001300 | 0.001629 | 0.001120 | 0.000751 | 0.000874 | 0.000202 | 0.001916 | 0.002316 | 0.000369 | 0.001446 | 0.001009 | 0.002005 | 0.001635 |
| CV% | 7.26 | 4.99 | 6.10 | 5.70 | 8.08 | 2.57 | 12.40 | 6.98 | 6.08 | 9.70 | 6.20 | 16.33 | 10.58 |

表4 4#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 4#样 | | Cu | Fe | Ca | Zn | Pb | Cd | Cr | Na | Si | Mn | Ni | Al | Mg |
| 1浙江华友 | 测  定  值  % | 0.036 | 0.053 | 0.036 | 0.026 | 0.023 | 0.014 | 0.029 | 0.055 | 0.010 | 0.028 | 0.027 | 0.023 | 0.029 |
| 0.036 | 0.052 | 0.036 | 0.026 | 0.023 | 0.014 | 0.031 | 0.041 | 0.011 | 0.028 | 0.027 | 0.023 | 0.029 |
| 0.036 | 0.053 | 0.036 | 0.026 | 0.023 | 0.015 | 0.029 | 0.042 | 0.0098 | 0.028 | 0.027 | 0.022 | 0.029 |
| 0.036 | 0.053 | 0.037 | 0.026 | 0.023 | 0.014 | 0.032 | 0.043 | 0.011 | 0.028 | 0.026 | 0.023 | 0.029 |
| 0.036 | 0.053 | 0.037 | 0.026 | 0.023 | 0.015 | 0.029 | 0.043 | 0.0087 | 0.029 | 0.029 | 0.021 | 0.029 |
| 0.036 | 0.055\* | 0.037 | 0.026 | 0.023 | 0.014 | 0.032 | 0.041 | 0.0097 | 0.028 | 0.028 | 0.022 | 0.029 |
| 0.037 | 0.053 | 0.037 | 0.025 | 0.023 | 0.015 | 0.031 | 0.039 | 0.012 | 0.029 | 0.028 | 0.028 | 0.029 |
| 0.036 | 0.052 | 0.036 | 0.025 | 0.023 | 0.015 | 0.033 | 0.041 | 0.0097 | 0.029 | 0.027 | 0.028 | 0.029 |
| 0.036 | 0.053 | 0.037 | 0.025 | 0.023 | 0.015 | 0.033 | 0.040 | 0.013\* | 0.030 | 0.028 | 0.028 | 0.029 |
| 0.037 | 0.054 | 0.038 | 0.026 | 0.023 | 0.015 | 0.031 | 0.041 | 0.011 | 0.030 | 0.029 | 0.027 | 0.030\* |
| 0.037 | 0.053 | 0.037 | 0.026 | 0.023 | 0.015 | 0.033 | 0.041 | 0.0095 | 0.029 | 0.028 | 0.028 | 0.030\* |
| 均% | 0.036 | 0.053 | 0.037 | 0.026 | 0.023 | 0.015 | 0.030 | 0.042 | 0.010 | 0.029 | 0.028 | 0.025 | 0.029 |
| s | 0.000467 | 0.000831 | 0.000647 | 0.000467 | 0 | 0.000505 | 0.001601 | 0.004321 | 0.001245 | 0.000786 | 0.000924 | 0.002926 | 0.000405 |
| CV% | 1.86 | 1.57 | 1.75 | 1.80 | 0 | 3.37 | 5.34 | 10.29 | 12.45 | 2.71 | 3.30 | 11.71 | 1.40 |
| 2衢州华友 | 测定值  % | 0.032 | 0.053 | 0.032 | 0.029 | 0.028 | 0.015 | 0.034 | - | - | 0.029 | 0.029•• | 0.033 | 0.028 |
| 0.031 | 0.052 | 0.032 | 0.029 | 0.028 | 0.015 | 0.035 | - | - | 0.029 | 0.027•• | 0.024 | 0.028 |
| 0.032 | 0.053 | 0.033 | 0.029 | 0.028 | 0.015 | 0.035 | - | - | 0.028 | 0.020•• | 0.026 | 0.028 |
| 0.032 | 0.053 | 0.033 | 0.029 | 0.028 | 0.014 | 0.034 | - | - | 0.029 | 0.027•• | 0.022 | 0.028 |
| 0.032 | 0.053 | 0.033 | 0.029 | 0.028 | 0.015 | 0.034 | - | - | 0.029 | 0.027•• | 0.025 | 0.028 |
| 0.032 | 0.053 | 0.034 | 0.029 | 0.028 | 0.015 | 0.033 | - | - | 0.029 | 0.021•• | 0.025 | 0.028 |
| 0.032 | 0.054 | 0.034 | 0.029 | 0.028 | 0.015 | 0.035 | - | - | 0.029 | 0.027•• | 0.027 | 0.029 |
| 0.032 | 0.053 | 0.033 | 0.030 | 0.028 | 0.015 | 0.036 | - | - | 0.029 | 0.028•• | 0.029 | 0.029 |
| 0.032 | 0.054 | 0.034 | 0.028 | 0.027 | 0.014 | 0.035 | - | - | 0.029 | 0.027•• | 0.026 | 0.029 |
| 0.032 | 0.054 | 0.034 | 0.030 | 0.028 | 0.015 | 0.033 | - | - | 0.029 | 0.029•• | 0.023 | 0.029 |
| 0.032 | 0.053 | 0.033 | 0.030 | 0.028 | 0.015 | 0.035 | - | - | 0.029 | 0.028•• | 0.025 | 0.029 |
| 均% | 0.032 | 0.053 | 0.033 | 0.029 | 0.028 | 0.015 | 0.034 | - | - | 0.029 | 0.026•• | 0.026 | 0.028 |
| s | 0.000302 | 0.000535 | 0.000808 | 0.000406 | 0.000300 | 0.000309 | 0.000862 | - | - | 0.000346 | 0.003018 | 0.003000 | 0.000228 |
| CV% | 0.94 | 1.01 | 2.43 | 1.39 | 1.07 | 2.11 | 2.50 | - | - | 1.20 | 11.40 | 11.64 | 0.81 |
| 3广东邦普 | 测定值  % | 0.035 | 0.055 | 0.039 | 0.027 | 0.022 | 0.015 | 0.035•• | 0.048 | 0.010 | 0.026 | 0.029 | 0.028 | 0.029 |
| 0.037 | 0.052 | 0.037 | 0.024 | 0.023 | 0.014 | 0.034•• | 0.045 | 0.0093 | 0.030 | 0.025 | 0.024 | 0.031 |
| 0.039 | 0.052 | 0.038 | 0.027 | 0.024 | 0.016 | 0.028•• | 0.044 | 0.0085 | 0.030 | 0.025 | 0.024 | 0.028 |
| 0.039 | 0.050 | 0.038 | 0.025 | 0.022 | 0.013 | 0.029•• | 0.045 | 0.0095 | 0.025 | 0.027 | 0.024 | 0.030 |
| 0.036 | 0.050 | 0.038 | 0.024 | 0.021 | 0.013 | 0.030•• | 0.054 | 0.010 | 0.030 | 0.027 | 0.022 | 0.029 |
| 0.037 | 0.053 | 0.039 | 0.026 | 0.023 | 0.015 | 0.029•• | 0.045 | 0.010 | 0.026 | 0.030 | 0.024 | 0.031 |
| 0.035 | 0.053 | 0.035 | 0.026 | 0.021 | 0.015 | 0.034•• | 0.055 | 0.0086 | 0.025 | 0.030 | 0.020 | 0.030 |
| 0.035 | 0.052 | 0.039 | 0.024 | 0.024 | 0.016 | 0.035•• | 0.051 | 0.012 | 0.026 | 0.027 | 0.028 | 0.030 |
| 0.036 | 0.055 | 0.037 | 0.024 | 0.023 | 0.013 | 0.025•• | 0.044 | 0.0091 | 0.030 | 0.030 | 0.020 | 0.032 |
| 0.039 | 0.053 | 0.035 | 0.027 | 0.024 | 0.014 | 0.033•• | 0.046 | 0.013 | 0.027 | 0.029 | 0.021 | 0.028 |
| 0.038 | 0.051 | 0.038 | 0.025 | 0.023 | 0.017 | 0.027•• | 0.054 | 0.012 | 0.029 | 0.025 | 0.028 | 0.032 |
| 均% | 0.037 | 0.052 | 0.038 | 0.025 | 0.023 | 0.015 | 0.031•• | 0.048 | 0.010 | 0.028 | 0.028 | 0.024 | 0.030 |
| s | 0.001640 | 0.001690 | 0.001440 | 0.001286 | 0.001104 | 0.001362 | 0.003516 | 0.004384 | 0.001381 | 0.002157 | 0.002063 | 0.003048 | 0.001414 |
| CV% | 4.44 | 3.23 | 3.83 | 5.07 | 4.86 | 9.30 | 11.41 | 9.08 | 13.55 | 7.81 | 7.46 | 12.75 | 4.71 |
| 4中金岭南 | 测定值  % | 0.036 | 0.052 | 0.038 | 0.027 | 0.027 | 0.016 | 0.026 | 0.040 | - | 0.029 | 0.031 | 0.020 | 0.030 |
| 0.035 | 0.053 | 0.036 | 0.027 | 0.027 | 0.016 | 0.027 | 0.041 | - | 0.029 | 0.033 | 0.020 | 0.028 |
| 0.035 | 0.054 | 0.037 | 0.028 | 0.026 | 0.015 | 0.027 | 0.042 | - | 0.028 | 0.029 | 0.023 | 0.030 |
| 0.034 | 0.053 | 0.037 | 0.026 | 0.026 | 0.016 | 0.029 | 0.041 | - | 0.028 | 0.031 | 0.024 | 0.027 |
| 0.035 | 0.054 | 0.036 | 0.027 | 0.027 | 0.015 | 0.029 | 0.040 | - | 0.029 | 0.028 | 0.024 | 0.028 |
| 0.034 | 0.052 | 0.038 | 0.026 | 0.026 | 0.016 | 0.028 | 0.041 | - | 0.027 | 0.029 | 0.021 | 0.029 |
| 0.035 | 0.052 | 0.038 | 0.028 | 0.027 | 0.015 | 0.029 | 0.041 | - | 0.028 | 0.028 | 0.022 | 0.029 |
| 0.036 | 0.054 | 0.036 | 0.028 | 0.026 | 0.015 | 0.028 | 0.042 | - | 0.029 | 0.030 | 0.022 | 0.030 |
| 0.036 | 0.053 | 0.038 | 0.026 | 0.026 | 0.015 | 0.027 | 0.040 | - | 0.029 | 0.030 | 0.024 | 0.030 |
| 0.035 | 0.053 | 0.037 | 0.026 | 0.026 | 0.016 | 0.027 | 0.040 | - | 0.027 | 0.031 | 0.023 | 0.027 |
| 0.034 | 0.052 | 0.037 | 0.027 | 0.027 | 0.016 | 0.029 | 0.042 | - | 0.028 | 0.029 | 0.023 | 0.028 |
| 均% | 0.035 | 0.053 | 0.037 | 0.027 | 0.026 | 0.016 | 0.028 | 0.041 | - | 0.028 | 0.030 | 0.022 | 0.029 |
| s | 0.000775 | 0.000831 | 0.000831 | 0.000831 | 0.000522 | 0.000522 | 0.001079 | 0.000831 | 0.007091 | 0.000786 | 0.001514 | 0.001502 | 0.001191 |
| CV% | 2.21 | 1.57 | 2.24 | 3.09 | 1.97 | 3.37 | 3.88 | 2.03 | 11.72 | 2.78 | 5.06 | 6.71 | 4.15 |
| 5荆门格林美 | 测定值  % | 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.042 | 0.010 | 0.030 | 0.026 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.044 | 0.010 | 0.030 | 0.027 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.042 | 0.0099 | 0.030 | 0.026 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.044 | 0.011 | 0.031 | 0.027 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.044 | 0.011 | 0.030 | 0.027 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.035 | 0.024 | 0.022 | 0.015 | 0.028 | 0.041 | 0.011 | 0.030 | 0.028 | 0.024 | 0.030 |
| 0.036 | 0.054 | 0.034 | 0.025 | 0.022 | 0.016 | 0.028 | 0.045 | 0.012 | 0.031 | 0.028 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.035 | 0.025 | 0.022 | 0.016 | 0.028 | 0.043 | 0.012 | 0.031 | 0.028 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.044 | 0.012 | 0.031 | 0.027 | 0.024 | 0.030 |
| 0.036 | 0.053 | 0.034 | 0.025 | 0.022 | 0.016 | 0.029 | 0.042 | 0.010 | 0.031 | 0.028 | 0.023 | 0.030 |
| 0.036 | 0.053 | 0.035 | 0.025 | 0.022 | 0.016 | 0.030 | 0.043 | 0.010 | 0.031 | 0.025 | 0.024 | 0.031 |
| 均% | 0.036 | 0.053 | 0.034 | 0.024 | 0.022 | 0.015 | 0.028 | 0.043 | 0.011 | 0.030 | 0.027 | 0.024 | 0.030 |
| s | 0 | 0.000305 | 0.000256 | 0.000110 | 0 | 0.000077 | 0.000512 | 0.001165 | 0.000976 | 0.000204 | 0.000962 | 0.000371 | 0.000154 |
| CV% | 0 | 0.58 | 0.74 | 0.45 | 0 | 0.50 | 1.80 | 2.70 | 8.84 | 0.67 | 3.55 | 1.55 | 0.51 |
| 6甘肃金川 | 测定值  % | 0.035 | 0.058 | 0.034 | 0.028 | 0.025 | 0.017 | 0.032 | 0.041 | - | 0.029 | 0.029 | 0.029 | 0.035 |
| 0.035 | 0.054 | 0.035 | 0.028 | 0.025 | 0.017 | 0.032 | 0.041 | - | 0.028 | 0.028 | 0.026 | 0.035 |
| 0.034 | 0.052 | 0.034 | 0.032 | 0.020 | 0.019 | 0.031 | 0.043 | - | 0.032 | 0.028 | 0.030 | 0.034 |
| 0.037 | 0.056 | 0.035 | 0.030 | 0.022 | 0.019 | 0.032 | 0.044 | - | 0.032 | 0.025 | 0.030 | 0.037 |
| 0.038 | 0.055 | 0.036 | 0.029 | 0.021 | 0.015 | 0.030 | 0.041 | - | 0.030 | 0.026 | 0.028 | 0.038 |
| 0.039 | 0.057 | 0.036 | 0.032 | 0.022 | 0.015 | 0.031 | 0.041 | - | 0.028 | 0.027 | 0.029 | 0.039 |
| 0.034 | 0.058 | 0.035 | 0.031 | 0.023 | 0.015 | 0.032 | 0.040 | - | 0.029 | 0.028 | 0.029 | 0.034 |
| 0.034 | 0.054 | 0.036 | 0.030 | 0.024 | 0.015 | 0.034 | 0.043 | - | 0.031 | 0.029 | 0.028 | 0.034 |
| 0.036 | 0.053 | 0.038 | 0.029 | 0.022 | 0.016 | 0.032 | 0.041 | - | 0.030 | 0.028 | 0.028 | 0.036 |
| 0.035 | 0.055 | 0.038 | 0.030 | 0.024 | 0.017 | 0.033 | 0.041 | - | 0.029 | 0.029 | 0.029 | 0.035 |
| 0.034 | 0.054 | 0.037 | 0.032 | 0.021 | 0.016 | 0.034 | 0.043 | - | 0.028 | 0.030 | 0.027 | 0.034 |
| 均% | 0.036 | 0.055 | 0.036 | 0.030 | 0.023 | 0.016 | 0.032 | 0.042 | - | 0.030 | 0.028 | 0.028 | 0.036 |
| s | 0.001671 | 0.001881 | 0.001336 | 0.001443 | 0.001611 | 0.001437 | 0.001164 | 0.001213 | - | 0.001432 | 0.001379 | 0.001157 | 0.001671 |
| CV% | 4.70 | 3.42 | 3.73 | 4.80 | 7.12 | 8.74 | 3.63 | 2.91 | - | 4.83 | 4.94 | 4.07 | 4.70 |
| 7湖南中伟 | 测定值  % | 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.016 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.021 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.016 | 0.034 | 0.031 | - | 0.030 | 0.032 | 0.020 | 0.028 |
| 0.038 | 0.058 | 0.037 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.031 | 0.032 | 0.020 | 0.029 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.032 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.037 | 0.028 | 0.024 | 0.016 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.037 | 0.056 | 0.036 | 0.028 | 0.024 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.024 | 0.016 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 0.038 | 0.057 | 0.036 | 0.028 | 0.024 | 0.015 | 0.031 | 0.031 | - | 0.030 | 0.031 | 0.018 | 0.028 |
| 均% | 0.038 | 0.057 | 0.036 | 0.028 | 0.023 | 0.015 | 0.034 | 0.031 | - | 0.030 | 0.031 | 0.019 | 0.028 |
| s | 0.000259 | 0.000378 | 0.000238 | 0 | 0.000138 | 0.000049 | 0 | 0 | - | 0.000188 | 0.000107 | 0.000893 | 0.000171 |
| CV% | 0.01 | 0.01 | 0.01 | 0 | 0.01 | 0.00 | 0 | 0 | - | 0.01 | 0.00 | 0.05 | 0.01 |
| 8天津巴莫 | 测定值  % | 0.038 | 0.058 | 0.038 | 0.034 | - | - | 0.024 | 0.042 | - | 0.032 | 0.033 | 0.024 | 0.030 |
| 0.037 | 0.057 | 0.038 | 0.033 | - | - | 0.024 | 0.042 | - | 0.032 | 0.034 | 0.024 | 0.029 |
| 0.037 | 0.057 | 0.038 | 0.034 | - | - | 0.024 | 0.042 | - | 0.032 | 0.034 | 0.024 | 0.029 |
| 0.037 | 0.057 | 0.038 | 0.034 | - | - | 0.023 | 0.041 | - | 0.032 | 0.034 | 0.024 | 0.029 |
| 0.037 | 0.058 | 0.037 | 0.034 | - | - | 0.024 | 0.042 | - | 0.032 | 0.033 | 0.024 | 0.029 |
| 0.037 | 0.057 | 0.038 | 0.034 | - | - | 0.023 | 0.042 | - | 0.032 | 0.033 | 0.024 | 0.029 |
| 0.037 | 0.059 | 0.037 | 0.034 | - | - | 0.023 | 0.042 | - | 0.032 | 0.033 | 0.023 | 0.029 |
| 均% | 0.037 | 0.058 | 0.038 | 0.034 | - | - | 0.023 | 0.042 | - | 0.032 | 0.033 | 0.024 | 0.029 |
| s | 0.000351 | 0.000645 | 0.000370 | 0.000353 | - | - | 0.000244 | 0.000337 | - | 0 | 0.000082 | 0.000095 | 0.000095 |
| CV% | 0.95 | 1.12 | 0.98 | 1.04 | - | - | 1.04 | 0.81 | - | 0 | 0.24 | 0.40 | 0.32 |
| 9国标北京 | 测定值  % | 0.041•• | 0.058 | 0.031 | 0.031 | 0.021 | 0.014 | 0.025 | 0.045 | 0.0096 | 0.031 | 0.027 | 0.027 | 0.034 |
| 0.044•• | 0.054 | 0.034 | 0.031 | 0.019 | 0.013 | 0.021 | 0.040 | 0.0095 | 0.033 | 0.023 | 0.022 | 0.035 |
| 0.045•• | 0.059 | 0.033 | 0.028 | 0.018 | 0.015 | 0.022 | 0.041 | 0.010 | 0.035 | 0.023 | 0.025 | 0.031 |
| 0.041•• | 0.057 | 0.031 | 0.033 | 0.017 | 0.017 | 0.026 | 0.047 | 0.011 | 0.035 | 0.027 | 0.030 | 0.037 |
| 0.042•• | 0.056 | 0.036 | 0.032 | 0.022 | 0.015 | 0.025 | 0.043 | 0.0094 | 0.031 | 0.025 | 0.023 | 0.033 |
| 0.039•• | 0.056 | 0.033 | 0.033 | 0.021 | 0.011 | 0.024 | 0.046 | 0.0098 | 0.035 | 0.023 | 0.026 | 0.034 |
| 0.039•• | 0.057 | 0.035 | 0.031 | 0.022 | 0.013 | 0.023 | 0.041 | 0.0094 | 0.034 | 0.026 | 0.027 | 0.031 |
| 均% | 0.042•• | 0.057 | 0.033 | 0.031 | 0.020 | 0.014 | 0.024 | 0.043 | 0.010 | 0.033 | 0.025 | 0.026 | 0.034 |
| s | 0.002299 | 0.001604 | 0.001890 | 0.001704 | 0.002000 | 0.001915 | 0.001799 | 0.002752 | 0.000567 | 0.001813 | 0.001864 | 0.002690 | 0.002149 |
| CV% | 5.53 | 2.83 | 5.68 | 5.45 | 10.00 | 13.68 | 7.59 | 6.36 | 5.78 | 5.42 | 7.50 | 10.46 | 6.40 |
| 10桂林地矿 | 测定值  % | 0.036 | 0.050 | 0.037 | 0.025 | 0.023 | 0.015 | 0.031 | 0.046 | - | 0.030 | 0.027 | 0.025 | 0.028 |
| 0.037 | 0.051 | 0.036 | 0.025 | 0.023 | 0.014 | 0.032 | 0.044 | - | 0.029 | 0.028 | 0.026 | 0.029 |
| 0.036 | 0.051 | 0.036 | 0.025 | 0.022 | 0.014 | 0.032 | 0.041 | - | 0.028 | 0.028 | 0.023 | 0.028 |
| 0.036 | 0.054 | 0.035 | 0.025 | 0.023 | 0.015 | 0.028 | 0.045 | - | 0.029 | 0.027 | 0.024 | 0.030 |
| 0.037 | 0.050 | 0.037 | 0.026 | 0.023 | 0.014 | 0.029 | 0.042 | - | 0.030 | 0.028 | 0.023 | 0.029 |
| 0.037 | 0.053 | 0.036 | 0.026 | 0.023 | 0.014 | 0.028 | 0.040 | - | 0.030 | 0.026 | 0.026 | 0.030 |
| 0.036 | 0.053 | 0.038 | 0.025 | 0.023 | 0.014 | 0.030 | 0.041 | - | 0.029 | 0.027 | 0.028 | 0.030 |
| 均% | 0.036 | 0.052 | 0.036 | 0.025 | 0.023 | 0.014 | 0.030 | 0.043 | - | 0.029 | 0.027 | 0.025 | 0.029 |
| s | 0.00053 | 0.00160 | 0.00098 | 0.00049 | 0.00038 | 0.00049 | 0.00173 | 0.00229 | - | 0.00076 | 0.00076 | 0.00183 | 0.00090 |
| CV% | 1.47 | 3.10 | 2.68 | 1.93 | 1.65 | 3.42 | 5.77 | 5.36 | - | 2.58 | 2.77 | 7.30 | 3.09 |
| 11紫金铜业 | 测定值  % | 0.036 | 0.051•• | 0.037 | 0.026 | 0.023 | 0.015 | 0.029 | 0.036 | 0.0099 | 0.029 | 0.029 | 0.024 | 0.029 |
| 0.034 | 0.054•• | 0.034 | 0.025 | 0.022 | 0.016 | 0.027 | 0.041 | 0.0098 | 0.029 | 0.028 | 0.023 | 0.028 |
| 0.037 | 0.050•• | 0.031 | 0.028 | 0.021 | 0.014 | 0.029 | 0.040 | 0.010 | 0.030 | 0.029 | 0.021 | 0.027 |
| 0.033 | 0.055•• | 0.034 | 0.030 | 0.023 | 0.013 | 0.030 | 0.043 | 0.011 | 0.028 | 0.027 | 0.023 | 0.026 |
| 0.036 | 0.057•• | 0.036 | 0.025 | 0.024 | 0.015 | 0.028 | 0.042 | 0.011 | 0.031 | 0.030 | 0.021 | 0.029 |
| 0.036 | 0.052•• | 0.037 | 0.027 | 0.022 | 0.016 | 0.029 | 0.041 | 0.010 | 0.029 | 0.028 | 0.022 | 0.030 |
| 0.035 | 0.051•• | 0.034 | 0.027 | 0.022 | 0.015 | 0.029 | 0.044 | 0.0097 | 0.030 | 0.029 | 0.021 | 0.031 |
| 均% | 0.035 | 0.053•• | 0.035 | 0.027 | 0.022 | 0.015 | 0.029 | 0.041 | 0.010 | 0.029 | 0.029 | 0.022 | 0.029 |
| s | 0.001369 | 0.002549 | 0.002156 | 0.001782 | 0.000957 | 0.001080 | 0.000960 | 0.002583 | 0.000546 | 0.000963 | 0.000992 | 0.001208 | 0.001743 |
| CV% | 3.91 | 4.81 | 6.16 | 6.60 | 4.35 | 7.20 | 3.31 | 6.30 | 5.46 | 3.32 | 3.42 | 5.49 | 6.01 |
| 12广东佳纳 | 测定值  % | 0.030 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.033 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| 0.030 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.034 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| 0.031 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.034 | - | 0.029 | 0.034 | 0.024 | 0.027 |
| 0.030 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.034 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| 0.031 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.033 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| 0.031 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.033 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| 0.030 | 0.060 | 0.036 | 0.027 | 0.021 | 0.014 | 0.034 | 0.034 | - | 0.030 | 0.034 | 0.024 | 0.027 |
| 均% | 0.030 | 0.060 | 0.036 | 0.026 | 0.021 | 0.014 | 0.034 | 0.033 | - | 0.029 | 0.035 | 0.024 | 0.027 |
| s | 0.000138 | 0 | 0 | 0.000069 | 0 | 0 | 0 | 0.000330 | - | 0.000269 | 0.000243 | 0 | 0 |
| CV% | 0.45 | 0 | 0 | 0.26 | 0 | 0 | 0 | 0.99 | - | 0.93 | 0.70 | 0 | 0 |
| 13郴州质检 | 测定值  % | 0.058•• | 0.052 | 0.043 | 0.029 | 0.027 | 0.015 | 0.026 | 0.048 | 0.0086 | 0.027 | 0.031 | 0.023 | 0.032 |
| 0.058•• | 0.051 | 0.040 | 0.030 | 0.028 | 0.015 | 0.026 | 0.048 | 0.0090 | 0.026 | 0.033 | 0.026 | 0.032 |
| 0.058•• | 0.051 | 0.040 | 0.030 | 0.028 | 0.015 | 0.026 | 0.048 | 0.0078 | 0.026 | 0.033 | 0.025 | 0.032 |
| 0.058•• | 0.051 | 0.041 | 0.031 | 0.028 | 0.015 | 0.027 | 0.047 | 0.0083 | 0.026 | 0.032 | 0.023 | 0.031 |
| 0.058•• | 0.052 | 0.040 | 0.029 | 0.027 | 0.015 | 0.026 | 0.047 | 0.0088 | 0.027 | 0.032 | 0.024 | 0.031 |
| 0.059•• | 0.052 | 0.040 | 0.029 | 0.027 | 0.015 | 0.027 | 0.047 | 0.0092 | 0.027 | 0.032 | 0.025 | 0.032 |
| 0.057•• | 0.052 | 0.038 | 0.028 | 0.027 | 0.015 | 0.026 | 0.046 | 0.0089 | 0.027 | 0.031 | 0.025 | 0.031 |
| 均% | 0.058•• | 0.052 | 0.040 | 0.029 | 0.027 | 0.015 | 0.026 | 0.047 | 0.0087 | 0.027 | 0.032 | 0.024 | 0.032 |
| s | 0.000422 | 0.000454 | 0.001386 | 0.000938 | 0.000297 | 0 | 0.000441 | 0.000760 | 0.000474 | 0.000435 | 0.000995 | 0.001254 | 0.000462 |
| CV% | 0.73 | 0.88 | 3.43 | 3.18 | 1.08 | 0 | 1.67 | 1.61 | 5.47 | 1.63 | 3.10 | 5.12 | 1.47 |
| 14大冶有色 | 测定值  % | 0.033 | 0.053 | 0.035 | 0.024 | 0.021 | 0.014 | 0.033 | 0.039 | - | 0.029 | 0.027 | 0.026 | 0.027 |
| 0.034 | 0.052 | 0.035 | 0.025 | 0.022 | 0.014 | 0.032 | 0.039 | - | 0.028 | 0.027 | 0.027 | 0.027 |
| 0.033 | 0.052 | 0.037 | 0.025 | 0.022 | 0.014 | 0.034 | 0.042 | - | 0.029 | 0.027 | 0.027 | 0.027 |
| 0.033 | 0.051 | 0.037 | 0.025 | 0.022 | 0.014 | 0.034 | 0.041 | - | 0.029 | 0.029 | 0.026 | 0.029 |
| 0.036 | 0.054 | 0.039 | 0.027 | 0.023 | 0.015 | 0.030 | 0.040 | - | 0.030 | 0.029 | 0.029 | 0.031 |
| 0.036 | 0.054 | 0.038 | 0.026 | 0.023 | 0.015 | 0.030 | 0.040 | - | 0.030 | 0.029 | 0.029 | 0.030 |
| 0.035 | 0.054 | 0.036 | 0.027 | 0.022 | 0.014 | 0.031 | 0.045 | - | 0.028 | 0.029 | 0.029 | 0.028 |
| 0.035 | 0.053 | 0.036 | 0.026 | 0.022 | 0.014 | 0.032 | 0.045 | - | 0.028 | 0.029 | 0.029 | 0.028 |
| 0.036 | 0.053 | 0.038 | 0.026 | 0.023 | 0.015 | 0.032 | 0.040 | - | 0.028 | 0.029 | 0.028 | 0.030 |
| 0.034 | 0.052 | 0.038 | 0.025 | 0.023 | 0.015 | 0.033 | 0.040 | - | 0.028 | 0.028 | 0.028 | 0.030 |
| 0.034 | 0.053 | 0.037 | 0.025 | 0.021 | 0.014 | 0.034 | 0.041 | - | 0.030 | 0.028 | 0.028 | 0.028 |
| 均% | 0.034 | 0.053 | 0.037 | 0.026 | 0.022 | 0.014 | 0.032 | 0.041 | - | 0.029 | 0.028 | 0.028 | 0.029 |
| s | 0.001214 | 0.000982 | 0.001300 | 0.000934 | 0.000751 | 0.000505 | 0.001489 | 0.002119 | - | 0.000874 | 0.000905 | 0.001168 | 0.001433 |
| CV% | 3.57 | 1.85 | 3.51 | 3.59 | 3.41 | 3.61 | 4.65 | 5.17 | - | 3.01 | 3.23 | 4.17 | 4.94 |
| 15广西测试 | 测定值  % | 0.042 | 0.053 | 0.036 | 0.025 | - | 0.014 | 0.030 | - | 0.0095 | 0.029 | 0.027 | 0.023 | 0.027 |
| 0.042 | 0.053 | 0.036 | 0.025 | - | 0.014 | 0.030 | - | 0.0082 | 0.028 | 0.027 | 0.022 | 0.026 |
| 0.043 | 0.053 | 0.035 | 0.025 | - | 0.014 | 0.030 | - | 0.0092 | 0.029 | 0.027 | 0.020 | 0.026 |
| 0.042 | 0.053 | 0.035 | 0.025 | - | 0.014 | 0.028 | - | 0.0094 | 0.028 | 0.027 | 0.026 | 0.026 |
| 0.042 | 0.053 | 0.035 | 0.025 | - | 0.014 | 0.028 | - | 0.0090 | 0.028 | 0.026 | 0.026 | 0.025 |
| 0.042 | 0.052 | 0.036 | 0.025 | - | 0.014 | 0.027 | - | 0.0094 | 0.028 | 0.026 | 0.026 | 0.027 |
| 0.043 | 0.052 | 0.036 | 0.025 | - | 0.014 | 0.028 | - | 0.0085 | 0.027 | 0.025 | 0.024 | 0.027 |
| 均% | 0.042 | 0.053 | 0.036 | 0.025 | - | 0.014 | 0.029 | - | 0.0090 | 0.028 | 0.026 | 0.024 | 0.026 |
| s | 0.000488 | 0.000488 | 0.000535 | 0 | - | 0 | 0.001254 | - | 0.000499 | 0.000690 | 0.000787 | 0.002340 | 0.000756 |
| CV% | 1.16 | 0.92 | 1.49 | 0 | - | 0 | 4.32 | - | 5.54 | 2.46 | 3.03 | 9.75 | 2.91 |
| 16中检广西 | 测定值  % | 0.036 | 0.050 | 0.035 | 0.029 | 0.023 | 0.015 | 0.029 | 0.042 | 0.010 | 0.028 | 0.028 | 0.024 | 0.028 |
| 0.037 | 0.051 | 0.036 | 0.028 | 0.021 | 0.015 | 0.029 | 0.043 | 0.009 | 0.028 | 0.029 | 0.024 | 0.028 |
| 0.036 | 0.053 | 0.036 | 0.030 | 0.024 | 0.014 | 0.029 | 0.041 | 0.011 | 0.028 | 0.029 | 0.023 | 0.029 |
| 0.036 | 0.050 | 0.035 | 0.028 | 0.021 | 0.015 | 0.028 | 0.042 | 0.011 | 0.028 | 0.028 | 0.023 | 0.029 |
| 0.036 | 0.049 | 0.035 | 0.027 | 0.024 | 0.015 | 0.030 | 0.044 | 0.012 | 0.028 | 0.026 | 0.021 | 0.028 |
| 0.037 | 0.048 | 0.035 | 0.028 | 0.023 | 0.015 | 0.028 | 0.041 | 0.011 | 0.026 | 0.026 | 0.021 | 0.027 |
| 0.036 | 0.049 | 0.035 | 0.028 | 0.022 | 0.014 | 0.029 | 0.042 | 0.010 | 0.027 | 0.028 | 0.023 | 0.026 |
| 0.037 | 0.050 | 0.035 | 0.028 | 0.022 | 0.015 | 0.029 | 0.042 | 0.009 | 0.028 | 0.028 | 0.023 | 0.027 |
| 0.037 | 0.051 | 0.035 | 0.028 | 0.023 | 0.015 | 0.029 | 0.043 | 0.009 | 0.027 | 0.028 | 0.022 | 0.028 |
| 0.036 | 0.051 | 0.036 | 0.027 | 0.023 | 0.015 | 0.028 | 0.042 | 0.011 | 0.028 | 0.027 | 0.022 | 0.028 |
| 0.036 | 0.050 | 0.035 | 0.028 | 0.023 | 0.015 | 0.029 | 0.042 | 0.011 | 0.028 | 0.028 | 0.023 | 0.028 |
| 均% | 0.036 | 0.050 | 0.035 | 0.028 | 0.023 | 0.015 | 0.029 | 0.042 | 0.010 | 0.028 | 0.028 | 0.023 | 0.028 |
| s | 0.000501 | 0.001325 | 0.000462 | 0.000829 | 0.001044 | 0.000410 | 0.000606 | 0.000869 | 0.000991 | 0.000683 | 0.001019 | 0.001044 | 0.000879 |
| CV% | 1.39 | 2.65 | 1.32 | 2.96 | 4.54 | 2.73 | 2.09 | 2.07 | 9.91 | 2.44 | 3.64 | 4.54 | 3.14 |
| 17国标青岛 | 测定值  % | 0.033 | 0.054 | 0.037 | 0.027 | 0.023 | 0.014 | 0.031 | 0.042 | 0.0077 | 0.030 | 0.029 | 0.021 | 0.028 |
| 0.034 | 0.055 | 0.034 | 0.027 | 0.021 | 0.014 | 0.027 | 0.043 | 0.0073 | 0.027 | 0.027 | 0.021 | 0.028 |
| 0.034 | 0.054 | 0.038 | 0.025 | 0.022 | 0.015 | 0.031 | 0.044 | 0.0071 | 0.030 | 0.028 | 0.023 | 0.029 |
| 0.034 | 0.055 | 0.037 | 0.027 | 0.021 | 0.015 | 0.031 | 0.042 | 0.0075 | 0.030 | 0.028 | 0.023 | 0.029 |
| 0.034 | 0.054 | 0.038 | 0.027 | 0.021 | 0.015 | 0.032 | 0.042 | 0.0075 | 0.029 | 0.027 | 0.023 | 0.028 |
| 0.035 | 0.054 | 0.037 | 0.027 | 0.022 | 0.015 | 0.032 | 0.043 | 0.0073 | 0.030 | 0.027 | 0.021 | 0.029 |
| 0.034 | 0.053 | 0.038 | 0.027 | 0.020 | 0.015 | 0.031 | 0.042 | 0.0075 | 0.030 | 0.029 | 0.025 | 0.029 |
| 0.035 | 0.052 | 0.038 | 0.027 | 0.023 | 0.015 | 0.033 | 0.042 | 0.0077 | 0.029 | 0.027 | 0.023 | 0.029 |
| 0.035 | 0.054 | 0.039 | 0.027 | 0.022 | 0.014 | 0.033 | 0.042 | 0.007 | 0.028 | 0.027 | 0.023 | 0.028 |
| 0.035 | 0.055 | 0.038 | 0.027 | 0.020 | 0.015 | 0.032 | 0.039 | 0.0075 | 0.027 | 0.028 | 0.020 | 0.029 |
| 0.034 | 0.054 | 0.039 | 0.027 | 0.022 | 0.015 | 0.031 | 0.042 | 0.0073 | 0.028 | 0.027 | 0.023 | 0.025 |
| 均% | 0.034 | 0.054 | 0.038 | 0.027 | 0.022 | 0.015 | 0.031 | 0.042 | 0.0074 | 0.029 | 0.028 | 0.022 | 0.028 |
| s | 0.000647 | 0.000894 | 0.001368 | 0.000603 | 0.001036 | 0.000467 | 0.001618 | 0.001221 | 0.000224 | 0.001221 | 0.000809 | 0.001371 | 0.001191 |
| CV% | 1.90 | 1.66 | 3.60 | 2.23 | 4.71 | 3.11 | 5.22 | 2.91 | 3.03 | 4.21 | 2.89 | 6.23 | 4.25 |
| 18宜昌邦普 | 测定值  % | 0.040 | 0.055 | 0.039 | 0.023 | 0.020 | 0.016 | 0.031•• | 0.055 | 0.0097 | 0.027 | 0.028 | 0.023 | 0.029 |
| 0.035 | 0.052 | 0.035 | 0.025 | 0.024 | 0.015 | 0.030 •• | 0.047 | 0.0090 | 0.030 | 0.030 | 0.023 | 0.032 |
| 0.036 | 0.052 | 0.040 | 0.023 | 0.022 | 0.015 | 0.028•• | 0.054 | 0.010 | 0.029 | 0.026 | 0.028 | 0.030 |
| 0.040 | 0.055 | 0.038 | 0.023 | 0.024 | 0.013 | 0.034•• | 0.050 | 0.010 | 0.027 | 0.028 | 0.024 | 0.030 |
| 0.038 | 0.051 | 0.039 | 0.024 | 0.023 | 0.016 | 0.031•• | 0.045 | 0.010 | 0.030 | 0.025 | 0.024 | 0.028 |
| 0.037 | 0.055 | 0.037 | 0.023 | 0.023 | 0.017 | 0.026•• | 0.046 | 0.010 | 0.026 | 0.026 | 0.021 | 0.031 |
| 0.040 | 0.054 | 0.036 | 0.026 | 0.020 | 0.013 | 0.035•• | 0.050 | 0.0097 | 0.026 | 0.027 | 0.021 | 0.031 |
| 0.039 | 0.052 | 0.035 | 0.023 | 0.020 | 0.017 | 0.032•• | 0.046 | 0.012 | 0.030 | 0.030 | 0.028 | 0.030 |
| 0.036 | 0.052 | 0.038 | 0.027 | 0.023 | 0.017 | 0.029•• | 0.054 | 0.012 | 0.026 | 0.027 | 0.027 | 0.032 |
| 0.039 | 0.051 | 0.039 | 0.025 | 0.025 | 0.016 | 0.033•• | 0.044 | 0.0090 | 0.028 | 0.028 | 0.027 | 0.029 |
| 0.035 | 0.055 | 0.037 | 0.027 | 0.023 | 0.014 | 0.031•• | 0.052 | 0.012 | 0.027 | 0.030 | 0.020 | 0.032 |
| 均% | 0.038 | 0.053 | 0.038 | 0.024 | 0.022 | 0.015 | 0.031 | 0.049 | 0.010 | 0.028 | 0.028 | 0.024 | 0.030 |
| s | 0.002005 | 0.001700 | 0.001695 | 0.001635 | 0.001753 | 0.001502 | 0.002625 | 0.003982 | 0.001056 | 0.001662 | 0.001737 | 0.002926 | 0.001362 |
| CV% | 5.31 | 3.20 | 4.51 | 6.69 | 7.81 | 9.77 | 8.49 | 8.07 | 10.21 | 5.98 | 6.27 | 12.10 | 4.49 |

表5 5#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 5#样 | | Fe | Cu | Mn | Ni | Al | Mg | Ti | Zr | Y | La | Ce |
| 1浙江华友 | 测  定  值  % | 0.0016 | 0.00054 | 0.054 | 0.057 | 0.053 | 0.061 | 0.049 | 0.048 | 0.058 | 0.048 | 0.046 |
| 0.0013 | 0.00057 | 0.054 | 0.058 | 0.053 | 0.061 | 0.049 | 0.049 | 0.058 | 0.048 | 0.046 |
| 0.0013 | 0.00058 | 0.054 | 0.058 | 0.054 | 0.062 | 0.049 | 0.048 | 0.059\* | 0.048 | 0.046 |
| 0.0014 | 0.00069 | 0.054 | 0.057 | 0.053 | 0.061 | 0.048 | 0.048 | 0.058 | 0.048 | 0.046 |
| 0.0013 | 0.00063 | 0.054 | 0.057 | 0.053 | 0.061 | 0.049 | 0.050 | 0.058 | 0.049 | 0.046 |
| 0.0014 | 0.00061 | 0.055 | 0.058 | 0.056 | 0.066 | 0.049 | 0.050 | 0.058 | 0.048 | 0.046 |
| 0.0016 | 0.00053 | 0.055 | 0.058 | 0.056 | 0.066 | 0.050 | 0.050 | 0.058 | 0.048 | 0.046 |
| 0.0016 | 0.00049 | 0.055 | 0.057 | 0.056 | 0.066 | 0.050 | 0.050 | 0.059\* | 0.048 | 0.046 |
| 0.0015 | 0.00043 | 0.055 | 0.057 | 0.055 | 0.066 | 0.049 | 0.050 | 0.058 | 0.048 | 0.046 |
| 0.0015 | 0.00039 | 0.055 | 0.056 | 0.056 | 0.066 | 0.050 | 0.050 | 0.058 | 0.048 | 0.046 |
| 0.0014 | 0.00044 | 0.055 | 0.057 | 0.056 | 0.066 | 0.050 | 0.049 | 0.058 | 0.048 | 0.046 |
| 均% | 0.0014 | 0.00054 | 0.055 | 0.057 | 0.055 | 0.064 | 0.049 | 0.049 | 0.058 | 0.048 | 0.046 |
| s | 0.000121 | 0.000092 | 0.000522 | 0.000647 | 0.001433 | 0.002523 | 0.000647 | 0.000905 | 0.000405 | 0.000302 | 0 |
| CV% | 8.64 | 17.04 | 0.95 | 1.14 | 2.61 | 3.94 | 1.32 | 1.85 | 0.70 | 0.63 | 0 |
| 2衢州华友 | 测  定  值  % | 0.0017 | 0.00052 | 0.059 | 0.059 | 0.065•• | 0.064 | 0.052 | 0.056 | 0.062 | 0.047 | 0.046 |
| 0.0019 | 0.00051 | 0.059 | 0.059 | 0.065•• | 0.064 | 0.052 | 0.057 | 0.062 | 0.048 | 0.045 |
| 0.0019 | 0.00046 | 0.059 | 0.058 | 0.064•• | 0.063 | 0.052 | 0.056 | 0.062 | 0.047 | 0.044 |
| 0.0017 | 0.00054 | 0.059 | 0.058 | 0.065•• | 0.064 | 0.052 | 0.057 | 0.062 | 0.048 | 0.043 |
| 0.0018 | 0.00043 | 0.059 | 0.058 | 0.065•• | 0.063 | 0.052 | 0.057 | 0.062 | 0.047 | 0.046 |
| 0.0016 | 0.00052 | 0.059 | 0.058 | 0.064•• | 0.064 | 0.052 | 0.057 | 0.062 | 0.048 | 0.045 |
| 0.0014 | 0.00062 | 0.059 | 0.058 | 0.064•• | 0.064 | 0.052 | 0.057 | 0.062 | 0.048 | 0.042 |
| 0.0016 | 0.00063 | 0.059 | 0.059 | 0.065•• | 0.064 | 0.052 | 0.058 | 0.063 | 0.048 | 0.045 |
| 0.0018 | 0.00064 | 0.059 | 0.058 | 0.064•• | 0.064 | 0.052 | 0.057 | 0.063 | 0.048 | 0.041 |
| 0.0017 | 0.00056 | 0.059 | 0.059 | 0.065•• | 0.064 | 0.052 | 0.057 | 0.062 | 0.048 | 0.042 |
| 0.0017 | 0.00061 | 0.057 | 0.059 | 0.064•• | 0.064 | 0.052 | 0.058 | 0.065 | 0.048 | 0.046 |
| 均% | 0.0017 | 0.00055 | 0.059 | 0.058 | 0.065•• | 0.064 | 0.052 | 0.057 | 0.063 | 0.048 | 0.044 |
| s | 0.000145 | 0.000070 | 0.000767 | 0.000172 | 0.000397 | 0.000280 | 0.000172 | 0.000596 | 0.000910 | 0.000137 | 0.001814 |
| CV% | 8.53 | 12.73 | 1.30 | 0.29 | 0.62 | 0.44 | 0.33 | 1.05 | 1.46 | 0.29 | 4.11 |
| 3广东邦普 | 测  定  值  % | 0.0016 | 0.00048 | 0.055 | 0.059 | 0.055 | 0.064 | 0.051 | 0.048 | 0.056 | 0.049 | 0.045 |
| 0.0015 | 0.00046 | 0.056 | 0.055 | 0.054 | 0.065 | 0.048 | 0.049 | 0.056 | 0.047 | 0.048 |
| 0.0015 | 0.00045 | 0.058 | 0.059 | 0.054 | 0.065 | 0.050 | 0.052 | 0.056 | 0.047 | 0.046 |
| 0.0016 | 0.00052 | 0.054 | 0.059 | 0.055 | 0.065 | 0.049 | 0.049 | 0.059 | 0.049 | 0.048 |
| 0.0015 | 0.00051 | 0.053 | 0.059 | 0.058 | 0.060 | 0.049 | 0.050 | 0.057 | 0.048 | 0.050 |
| 0.0014 | 0.00060 | 0.056 | 0.057 | 0.058 | 0.065 | 0.050 | 0.051 | 0.057 | 0.049 | 0.045 |
| 0.0017 | 0.00049 | 0.054 | 0.060 | 0.055 | 0.063 | 0.051 | 0.049 | 0.055 | 0.045 | 0.049 |
| 0.0015 | 0.00043 | 0.057 | 0.059 | 0.058 | 0.063 | 0.048 | 0.051 | 0.056 | 0.049 | 0.050 |
| 0.0016 | 0.00051 | 0.056 | 0.058 | 0.054 | 0.066 | 0.051 | 0.050 | 0.058 | 0.046 | 0.046 |
| 0.0015 | 0.00052 | 0.057 | 0.060 | 0.054 | 0.061 | 0.051 | 0.051 | 0.059 | 0.047 | 0.047 |
| 0.0015 | 0.00046 | 0.054 | 0.057 | 0.058 | 0.062 | 0.050 | 0.052 | 0.058 | 0.047 | 0.047 |
| 均% | 0.0015 | 0.00049 | 0.055 | 0.058 | 0.056 | 0.064 | 0.050 | 0.050 | 0.057 | 0.048 | 0.047 |
| s | 0.000081 | 0.000047 | 0.001572 | 0.001502 | 0.001849 | 0.001916 | 0.001168 | 0.001328 | 0.001342 | 0.001368 | 0.001804 |
| CV% | 5.40 | 9.59 | 2.84 | 2.57 | 3.32 | 3.02 | 2.34 | 2.65 | 2.35 | 2.88 | 3.81 |
| 4中金岭南 | 测  定  值  % | 0.0016 | 0.00041 | 0.054 | 0.056 | 0.059 | 0.066 | 0.049 | 0.053 | 0.059 | 0.050 | 0.047 |
| 0.0015 | 0.00052 | 0.055 | 0.058 | 0.060 | 0.067 | 0.048 | 0.054 | 0.058 | 0.051 | 0.048 |
| 0.0014 | 0.00046 | 0.056 | 0.057 | 0.057 | 0.063 | 0.049 | 0.055 | 0.058 | 0.051 | 0.048 |
| 0.0017 | 0.00040 | 0.054 | 0.055 | 0.058 | 0.065 | 0.051 | 0.055 | 0.059 | 0.050 | 0.047 |
| 0.0015 | 0.00043 | 0.053 | 0.057 | 0.057 | 0.066 | 0.050 | 0.053 | 0.057 | 0.050 | 0.047 |
| 0.0016 | 0.00061 | 0.056 | 0.056 | 0.056 | 0.065 | 0.049 | 0.054 | 0.058 | 0.050 | 0.049 |
| 0.0015 | 0.00058 | 0.056 | 0.058 | 0.059 | 0.064 | 0.048 | 0.055 | 0.057 | 0.049 | 0.049 |
| 0.0014 | 0.00040 | 0.055 | 0.057 | 0.057 | 0.063 | 0.049 | 0.054 | 0.059 | 0.049 | 0.047 |
| 0.0016 | 0.00050 | 0.054 | 0.056 | 0.058 | 0.065 | 0.048 | 0.054 | 0.058 | 0.051 | 0.047 |
| 0.0014 | 0.00044 | 0.055 | 0.055 | 0.058 | 0.066 | 0.050 | 0.053 | 0.057 | 0.051 | 0.048 |
| 0.0015 | 0.00040 | 0.054 | 0.058 | 0.057 | 0.067 | 0.050 | 0.054 | 0.058 | 0.049 | 0.049 |
| 均% | 0.0015 | 0.00047 | 0.055 | 0.057 | 0.058 | 0.065 | 0.049 | 0.054 | 0.058 | 0.050 | 0.048 |
| s | 0.000098 | 0.000075 | 0.001009 | 0.001120 | 0.001168 | 0.001401 | 0.000982 | 0.000775 | 0.000775 | 0.000831 | 0.000874 |
| CV% | 6.53 | 15.96 | 1.84 | 1.98 | 2.02 | 2.15 | 2.00 | 1.43 | 1.34 | 1.66 | 1.83 |
| 5荆门格林美 | 测  定  值  % | — | — | 0.062 | 0.064 | 0.056 | 0.065 | 0.051 | 0.046 | 0.056 | 0.046 | 0.044 |
| — | — | 0.062 | 0.063 | 0.056 | 0.065 | 0.051 | 0.045 | 0.055 | 0.046 | 0.042 |
| — | — | 0.062 | 0.063 | 0.056 | 0.065 | 0.051 | 0.046 | 0.056 | 0.047 | 0.044 |
| — | — | 0.061 | 0.058 | 0.055 | 0.064 | 0.050 | 0.045 | 0.055 | 0.046 | 0.043 |
| — | — | 0.061 | 0.058 | 0.055 | 0.065 | 0.051 | 0.046 | 0.055 | 0.046 | 0.043 |
| — | — | 0.061 | 0.058 | 0.055 | 0.064 | 0.051 | 0.045 | 0.055 | 0.046 | 0.042 |
| — | — | 0.061 | 0.058 | 0.055 | 0.064 | 0.050 | 0.045 | 0.055 | 0.045 | 0.043 |
| — | — | 0.061 | 0.058 | 0.055 | 0.064 | 0.050 | 0.045 | 0.055 | 0.046 | 0.043 |
| — | — | 0.061 | 0.058 | 0.055 | 0.064 | 0.045 | 0.045 | 0.055 | 0.046 | 0.043 |
| — | — | 0.062 | 0.061 | 0.055 | 0.064 | 0.051 | 0.045 | 0.055 | 0.046 | 0.043 |
| — | — | 0.062 | 0.061 | 0.055 | 0.064 | 0.050 | 0.044 | 0.055 | 0.045 | 0.042 |
| 均% | — | — | 0.061 | 0.060 | 0.055 | 0.064 | 0.050 | 0.045 | 0.055 | 0.046 | 0.043 |
| s | — | — | 0.000428 | 0.002271 | 0.000550 | 0.000341 | 0.000386 | 0.000601 | 0.000360 | 0.000381 | 0.000662 |
| CV% | — | — | 0.70 | 3.80 | 1.00 | 0.53 | 0.77 | 1.33 | 0.65 | 0.83 | 1.55 |
| 6甘肃金川 | 测  定  值  % | — | — | 0.058 | 0.061 | 0.057 | 0.063 | 0.052 | 0.051 | 0.060 | 0.048 | 0.045 |
| — | — | 0.058 | 0.06 | 0.056 | 0.065 | 0.053 | 0.051 | 0.062 | 0.048 | 0.049 |
| — | — | 0.059 | 0.058 | 0.055 | 0.062 | 0.052 | 0.053 | 0.063 | 0.049 | 0.049 |
| — | — | 0.061 | 0.058 | 0.057 | 0.061 | 0.054 | 0.052 | 0.060 | 0.052 | 0.049 |
| — | — | 0.060 | 0.059 | 0.058 | 0.060 | 0.054 | 0.051 | 0.059 | 0.052 | 0.050 |
| — | — | 0.059 | 0.058 | 0.059 | 0.063 | 0.050 | 0.052 | 0.058 | 0.052 | 0.049 |
| — | — | 0.060 | 0.060 | 0.056 | 0.064 | 0.050 | 0.053 | 0.059 | 0.053 | 0.048 |
| — | — | 0.058 | 0.061 | 0.058 | 0.069 | 0.052 | 0.095 | 0.061 | 0.054 | 0.049 |
| — | — | 0.061 | 0.062 | 0.055 | 0.063 | 0.049 | 0.050 | 0.061 | 0.053 | 0.046 |
| — | — | 0.060 | 0.058 | 0.056 | 0.065 | 0.050 | 0.054 | 0.062 | 0.059 | 0.047 |
| — | — | 0.060 | 0.059 | 0.057 | 0.064 | 0.051 | 0.053 | 0.063 | 0.052 | 0.049 |
| 均% | — | — | 0.059 | 0.059 | 0.057 | 0.063 | 0.052 | 0.052 | 0.061 | 0.051 | 0.048 |
| s | — | — | 0.001076 | 0.001373 | 0.001213 | 0.001710 | 0.001616 | 0.001266 | 0.001601 | 0.001992 | 0.001466 |
| CV% | — | — | 1.81 | 2.31 | 2.14 | 2.73 | 3.14 | 2.45 | 2.64 | 3.90 | 3.03 |
| 7湖南中伟 | 测  定  值  % | 0.0017 | 0.00051 | 0.055 | 0.056 | 0.058 | 0.059 | 0.050 | 0.052 | 0.058 | 0.049 | 0.068 |
| 0.0018 | 0.00052 | 0.056 | 0.057 | 0.058 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.068 |
| 0.0016 | 0.00049 | 0.055 | 0.057 | 0.059 | 0.060 | 0.050 | 0.052 | 0.060 | 0.050 | 0.069 |
| 0.0019 | 0.00048 | 0.055 | 0.056 | 0.058 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.069 |
| 0.0016 | 0.00053 | 0.056 | 0.056 | 0.058 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.068 |
| 0.0018 | 0.00054 | 0.056 | 0.056 | 0.058 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.068 |
| 0.0017 | 0.00058 | 0.056 | 0.056 | 0.059 | 0.060 | 0.050 | 0.052 | 0.060 | 0.051 | 0.069 |
| 0.0016 | 0.00051 | 0.055 | 0.057 | 0.058 | 0.060 | 0.049 | 0.052 | 0.059 | 0.050 | 0.068 |
| 0.0017 | 0.00050 | 0.056 | 0.056 | 0.059 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.068 |
| 0.0016 | 0.00050 | 0.056 | 0.056 | 0.050 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.069 |
| 0.0016 | 0.00054 | 0.056 | 0.057 | 0.050 | 0.060 | 0.049 | 0.051 | 0.060 | 0.051 | 0.069 |
| 均% | 0.0017 | 0.00052 | 0.056 | 0.056 | 0.058 | 0.060 | 0.050 | 0.052 | 0.059 | 0.050 | 0.068 |
| s | 0.000104 | 0.000028 | 0.000320 | 0.000198 | 0.000337 | 0.000361 | 0.000138 | 0.000211 | 0.000414 | 0.000383 | 0.000447 |
| CV% | 6.12 | 5.38 | 0.58 | 0.36 | 0.59 | 0.61 | 0.28 | 0.41 | 0.71 | 0.77 | 0.01 |
| 8天津巴莫 | 测  定  值  % | — | — | 0.057 | 0.062 | 0.053 | 0.064 | 0.060•• | 0.060 | 0.067 | 0.050 | 0.054 |
| — | — | 0.058 | 0.062 | 0.053 | 0.064 | 0.060•• | 0.060 | 0.067 | 0.050 | 0.054 |
| — | — | 0.057 | 0.063 | 0.054 | 0.064 | 0.061•• | 0.060 | 0.068 | 0.051 | 0.053 |
| — | — | 0.057 | 0.062 | 0.053 | 0.064 | 0.060•• | 0.059 | 0.068 | 0.051 | 0.053 |
| — | — | 0.057 | 0.062 | 0.053 | 0.065 | 0.061•• | 0.060 | 0.068 | 0.050 | 0.054 |
| — | — | 0.057 | 0.061 | 0.053 | 0.064 | 0.061•• | 0.060 | 0.068 | 0.050 | 0.054 |
| — | — | 0.057 | 0.062 | 0.053 | 0.064 | 0.061•• | 0.060 | 0.068 | 0.051 | 0.054 |
| 均% | — | — | 0.057 | 0.062 | 0.053 | 0.064 | 0.061•• | 0.060 | 0.068 | 0.050 | 0.054 |
| s | — | — | 0.000346 | 0.000677 | 0.000206 | 0.000134 | 0.000321 | 0.000281 | 0.000454 | 0.000090 | 0.000121 |
| CV% | — | — | 0.61 | 1.09 | 0.39 | 0.21 | 0.53 | 0.47 | 0.67 | 0.18 | 0.23 |
| 9国标北京 | 测  定  值  % | — | — | 0.058 | 0.064 | 0.053 | 0.067 | 0.041•• | 0.054 | 0.063 | 0.043•• | 0.050 |
| — | — | 0.058 | 0.061 | 0.056 | 0.068 | 0.045•• | 0.055 | 0.066 | 0.043•• | 0.051 |
| — | — | 0.061 | 0.057 | 0.053 | 0.063 | 0.045•• | 0.052 | 0.063 | 0.045•• | 0.048 |
| — | — | 0.062 | 0.059 | 0.057 | 0.066 | 0.044•• | 0.058 | 0.062 | 0.049•• | 0.046 |
| — | — | 0.057 | 0.063 | 0.053 | 0.063 | 0.043•• | 0.051 | 0.059 | 0.041•• | 0.046 |
| — | — | 0.056 | 0.062 | 0.052 | 0.062 | 0.046•• | 0.054 | 0.062 | 0.043•• | 0.049 |
| — | — | 0.059 | 0.061 | 0.055 | 0.066 | 0.048•• | 0.055 | 0.062 | 0.045•• | 0.051 |
| 均% | — | — | 0.059 | 0.061 | 0.054 | 0.065 | 0.045•• | 0.054 | 0.062 | 0.044•• | 0.049 |
| s | — | — | 0.002138 | 0.002380 | 0.001864 | 0.002309 | 0.002225 | 0.002268 | 0.002070 | 0.002545 | 0.002138 |
| CV% | — | — | 3.64 | 3.90 | 3.44 | 3.55 | 4.99 | 4.19 | 3.32 | 5.77 | 4.39 |
| 10桂林地矿 | 测  定  值  % | 0.0014 | 0.00058 | 0.054 | 0.056 | 0.054 | 0.058 | 0.048 | 0.049 | 0.058 | 0.047 | 0.046 |
| 0.0017 | 0.00055 | 0.054 | 0.057 | 0.056 | 0.059 | 0.049 | 0.048 | 0.058 | 0.048 | 0.046 |
| 0.0013 | 0.00057 | 0.056 | 0.057 | 0.052 | 0.060 | 0.048 | 0.049 | 0.057 | 0.048 | 0.048 |
| 0.0014 | 0.00058 | 0.055 | 0.058 | 0.052 | 0.060 | 0.048 | 0.050 | 0.059 | 0.049 | 0.046 |
| 0.0014 | 0.00060 | 0.055 | 0.058 | 0.055 | 0.062 | 0.049 | 0.048 | 0.057 | 0.048 | 0.045 |
| 0.0016 | 0.00057 | 0.054 | 0.057 | 0.054 | 0.061 | 0.048 | 0.049 | 0.057 | 0.048 | 0.045 |
| 0.0014 | 0.00055 | 0.055 | 0.056 | 0.055 | 0.062 | 0.050 | 0.050 | 0.058 | 0.048 | 0.046 |
| 均% | 0.0015 | 0.00057 | 0.055 | 0.057 | 0.054 | 0.060 | 0.049 | 0.049 | 0.058 | 0.048 | 0.046 |
| s | 0.000140 | 0.000018 | 0.00076 | 0.00082 | 0.00153 | 0.00150 | 0.00079 | 0.00082 | 0.00076 | 0.00058 | 0.00100 |
| CV% | 9.33 | 3.16 | 1.38 | 1.43 | 2.83 | 2.48 | 1.62 | 1.67 | 1.31 | 1.20 | 2.17 |
| 11紫金铜业 | 测  定  值  % | — | — | 0.054 | 0.056 | 0.056 | 0.063 | 0.052 | 0.047 | 0.055 | 0.046 | 0.045 |
| — | — | 0.052 | 0.057 | 0.055 | 0.062 | 0.051 | 0.050 | 0.056 | 0.047 | 0.044 |
| — | — | 0.051 | 0.056 | 0.057 | 0.063 | 0.049 | 0.049 | 0.057 | 0.047 | 0.046 |
| — | — | 0.054 | 0.055 | 0.056 | 0.062 | 0.049 | 0.051 | 0.057 | 0.049 | 0.045 |
| — | — | 0.053 | 0.058 | 0.054 | 0.064 | 0.050 | 0.050 | 0.058 | 0.048 | 0.046 |
| — | — | 0.055 | 0.057 | 0.053 | 0.065 | 0.050 | 0.049 | 0.059 | 0.047 | 0.044 |
| — | — | 0.053 | 0.055 | 0.055 | 0.062 | 0.051 | 0.048 | 0.057 | 0.047 | 0.045 |
| 均% | — | — | 0.053 | 0.056 | 0.055 | 0.063 | 0.050 | 0.049 | 0.057 | 0.047 | 0.045 |
| s | — | — | 0.001341 | 0.001089 | 0.001342 | 0.001135 | 0.001127 | 0.001315 | 0.001288 | 0.000945 | 0.000815 |
| CV% | — | — | 2.53 | 1.98 | 2.44 | 1.83 | 2.21 | 2.74 | 2.26 | 2.01 | 1.81 |
| 12广东佳纳 | 测  定  值  % | — | — | 0.055 | 0.058 | 0.058 | 0.060 | 0.055 | 0.053 | 0.059 | 0.051 | 0.050 |
| — | — | 0.054 | 0.058 | 0.058 | 0.060 | 0.056 | 0.053 | 0.058 | 0.051 | 0.051 |
| — | — | 0.054 | 0.059 | 0.057 | 0.060 | 0.055 | 0.053 | 0.058 | 0.051 | 0.050 |
| — | — | 0.055 | 0.059 | 0.057 | 0.060 | 0.056 | 0.053 | 0.058 | 0.051 | 0.050 |
| — | — | 0.054 | 0.059 | 0.058 | 0.060 | 0.056 | 0.054 | 0.058 | 0.051 | 0.050 |
| — | — | 0.054 | 0.058 | 0.058 | 0.060 | 0.056 | 0.053 | 0.059 | 0.051 | 0.051 |
| — | — | 0.054 | 0.058 | 0.058 | 0.060 | 0.056 | 0.053 | 0.058 | 0.051 | 0.051 |
| 均% | — | — | 0.054 | 0.058 | 0.057 | 0.060 | 0.056 | 0.053 | 0.058 | 0.051 | 0.050 |
| s | — | — | 0.000257 | 0.000243 | 0.000289 | 0 | 0.000390 | 0.000416 | 0.000426 | 0 | 0.000439 |
| CV% | — | — | 0.47 | 0.42 | 0.50 | 0 | 0.70 | 0.78 | 0.73 | 0 | 0.87 |
| 13郴州质检 | 测  定  值  % | — | — | 0.052 | 0.072•• | 0.055 | 0.066 | 0.051 | 0.049 | 0.062 | 0.051 | 0.043 |
| — | — | 0.051 | 0.072•• | 0.051 | 0.064 | 0.050 | 0.052 | 0.062 | 0.050 | 0.040 |
| — | — | 0.053 | 0.071•• | 0.053 | 0.067 | 0.051 | 0.048 | 0.063 | 0.051 | 0.043 |
| — | — | 0.050 | 0.070•• | 0.052 | 0.062 | 0.050 | 0.050 | 0.062 | 0.050 | 0.041 |
| — | — | 0.051 | 0.068•• | 0.051 | 0.064 | 0.050 | 0.050 | 0.060 | 0.050 | 0.041 |
| — | — | 0.051 | 0.069•• | 0.052 | 0.064 | 0.050 | 0.051 | 0.061 | 0.050 | 0.043 |
| — | — | 0.052 | 0.069•• | 0.055 | 0.065 | 0.051 | 0.051 | 0.061 | 0.051 | 0.041 |
| 均% | — | — | 0.052 | 0.070 | 0.053 | 0.065 | 0.051 | 0.050 | 0.061 | 0.051 | 0.042 |
| s | — | — | 0.000878 | 0.001354 | 0.001695 | 0.001652 | 0.000332 | 0.001388 | 0.000853 | 0.000405 | 0.001193 |
| CV% | — | — | 1.70 | 1.94 | 3.22 | 2.56 | 0.66 | 2.78 | 1.39 | 0.80 | 2.86 |
| 14大冶有色 | 测  定  值  % | — | — | 0.053 | 0.054 | 0.057 | 0.062 | 0.050 | 0.051 | 0.061 | 0.048 | 0.048 |
| — | — | 0.054 | 0.054 | 0.056 | 0.060 | 0.051 | 0.052 | 0.062 | 0.048 | 0.048 |
| — | — | 0.054 | 0.055 | 0.056 | 0.063 | 0.051 | 0.048 | 0.062 | 0.046 | 0.048 |
| — | — | 0.055 | 0.055 | 0.057 | 0.060 | 0.051 | 0.047 | 0.061 | 0.048 | 0.047 |
| — | — | 0.055 | 0.055 | 0.058 | 0.061 | 0.050 | 0.048 | 0.063 | 0.049 | 0.047 |
| — | — | 0.053 | 0.054 | 0.055 | 0.063 | 0.050 | 0.048 | 0.063 | 0.048 | 0.047 |
| — | — | 0.054 | 0.054 | 0.056 | 0.063 | 0.050 | 0.049 | 0.061 | 0.048 | 0.046 |
| — | — | 0.054 | 0.056 | 0.056 | 0.061 | 0.050 | 0.050 | 0.061 | 0.048 | 0.046 |
| — | — | 0.054 | 0.055 | 0.057 | 0.062 | 0.050 | 0.049 | 0.061 | 0.048 | 0.048 |
| — | — | 0.055 | 0.055 | 0.057 | 0.062 | 0.051 | 0.050 | 0.062 | 0.048 | 0.047 |
| — | — | 0.053 | 0.055 | 0.056 | 0.063 | 0.052 | 0.049 | 0.062 | 0.048 | 0.047 |
| 均% | — | — | 0.054 | 0.055 | 0.056 | 0.062 | 0.051 | 0.049 | 0.062 | 0.048 | 0.047 |
| s | — | — | 0.000775 | 0.000647 | 0.000820 | 0.001168 | 0.000688 | 0.001471 | 0.000786 | 0.000701 | 0.000751 |
| CV% | — | — | 1.44 | 1.18 | 1.46 | 1.88 | 1.35 | 3.00 | 1.27 | 1.46 | 1.60 |
| 15广西测试 | 测定值% | 0.0013 | 0.00045 | 0.055 | 0.056 | 0.055 | 0.060 | 0.054 | 0.049 | 0.048 | 0.058•• | 0.069 |
| 0.0016 | 0.00055 | 0.058 | 0.058 | 0.056 | 0.063 | 0.052 | 0.047 | 0.051 | 0.061•• | 0.064 |
| 0.0016 | 0.00062 | 0.054 | 0.054 | 0.052 | 0.063 | 0.052 | 0.047 | 0.048 | 0.057•• | 0.068 |
| 0.0014 | 0.00043 | 0.057 | 0.052 | 0.055 | 0.059 | 0.054 | 0.052 | 0.051 | 0.060•• | 0.068 |
| 0.0015 | 0.00040 | 0.054 | 0.055 | 0.052 | 0.060 | 0.052 | 0.051 | 0.048 | 0.057•• | 0.068 |
| 0.0013 | 0.00060 | 0.054 | 0.054 | 0.052 | 0.059 | 0.052 | 0.051 | 0.048 | 0.056•• | 0.067 |
| 0.0015 | 0.00041 | 0.054 | 0.054 | 0.054 | 0.061 | 0.054 | 0.050 | 0.049 | 0.057•• | 0.066 |
| 均% | 0.0015 | 0.00049 | 0.055 | 0.056 | 0.054 | 0.061 | 0.053 | 0.050 | 0.049 | 0.058•• | 0.067 |
| s | 0.000127 | 0.000093 | 0.001708 | 0.001947 | 0.001760 | 0.001729 | 0.001083 | 0.002174 | 0.001524 | 0.001762 | 0.001699 |
| CV% | 8.47 | 18.98 | 3.11 | 3.48 | 3.26 | 2.83 | 2.04 | 4.35 | 3.11 | 3.04 | 2.54 |
| 16中检广西 | 测定值% | — | — | 0.055 | 0.057 | 0.054 | 0.062 | 0.050 | 0.051 | 0.055 | 0.046 | 0.049 |
| — | — | 0.055 | 0.057 | 0.053 | 0.063 | 0.053 | 0.050 | 0.056 | 0.047 | 0.050 |
| — | — | 0.055 | 0.058 | 0.054 | 0.062 | 0.051 | 0.049 | 0.056 | 0.048 | 0.050 |
| — | — | 0.054 | 0.056 | 0.055 | 0.064 | 0.050 | 0.049 | 0.055 | 0.048 | 0.049 |
| — | — | 0.053 | 0.056 | 0.053 | 0.063 | 0.051 | 0.049 | 0.056 | 0.047 | 0.052 |
| — | — | 0.053 | 0.055 | 0.056 | 0.064 | 0.052 | 0.051 | 0.056 | 0.047 | 0.050 |
| — | — | 0.054 | 0.056 | 0.055 | 0.062 | 0.051 | 0.050 | 0.055 | 0.047 | 0.049 |
| — | — | 0.053 | 0.055 | 0.055 | 0.062 | 0.052 | 0.050 | 0.056 | 0.047 | 0.049 |
| — | — | 0.054 | 0.056 | 0.054 | 0.063 | 0.051 | 0.049 | 0.057 | 0.046 | 0.050 |
| — | — | 0.054 | 0.056 | 0.054 | 0.062 | 0.051 | 0.050 | 0.055 | 0.047 | 0.050 |
| — | — | 0.055 | 0.056 | 0.053 | 0.062 | 0.051 | 0.050 | 0.056 | 0.047 | 0.050 |
| 均% | — | — | 0.054 | 0.056 | 0.054 | 0.063 | 0.051 | 0.050 | 0.056 | 0.047 | 0.050 |
| s | — | — | 0.000832 | 0.000874 | 0.000977 | 0.000813 | 0.000872 | 0.000755 | 0.000650 | 0.000635 | 0.000875 |
| CV% | — | — | 1.54 | 1.56 | 1.81 | 1.29 | 1.71 | 1.51 | 1.16 | 1.35 | 1.75 |
| 17国标青岛 | 测  定  值  % | — | — | 0.052 | 0.054 | 0.058 | 0.066 | 0.051 | 0.049 | 0.055 | 0.045 | 0.046 |
| — | — | 0.053 | 0.055 | 0.059 | 0.064 | 0.052 | 0.050 | 0.056 | 0.046 | 0.045 |
| — | — | 0.053 | 0.055 | 0.054 | 0.065 | 0.051 | 0.050 | 0.055 | 0.047 | 0.045 |
| — | — | 0.052 | 0.054 | 0.054 | 0.065 | 0.051 | 0.050 | 0.056 | 0.046 | 0.044 |
| — | — | 0.053 | 0.056 | 0.055 | 0.065 | 0.051 | 0.050 | 0.057 | 0.046 | 0.045 |
| — | — | 0.053 | 0.055 | 0.055 | 0.066 | 0.052 | 0.050 | 0.057 | 0.047 | 0.045 |
| — | — | 0.053 | 0.055 | 0.054 | 0.064 | 0.051 | 0.051 | 0.056 | 0.047 | 0.044 |
| — | — | 0.053 | 0.055 | 0.054 | 0.064 | 0.051 | 0.050 | 0.056 | 0.047 | 0.044 |
| — | — | 0.052 | 0.056 | 0.055 | 0.066 | 0.052 | 0.051 | 0.056 | 0.047 | 0.045 |
| — | — | 0.053 | 0.055 | 0.054 | 0.065 | 0.051 | 0.051 | 0.055 | 0.046 | 0.044 |
| — | — | 0.053 | 0.056 | 0.055 | 0.066 | 0.051 | 0.050 | 0.056 | 0.047 | 0.045 |
| 均% | — | — | 0.053 | 0.055 | 0.055 | 0.065 | 0.051 | 0.050 | 0.056 | 0.046 | 0.045 |
| s | — | — | 0.000467 | 0.000701 | 0.001722 | 0.000831 | 0.000467 | 0.000603 | 0.000701 | 0.000688 | 0.000647 |
| CV% | — | — | 0.88 | 1.27 | 3.13 | 1.28 | 0.92 | 1.21 | 1.25 | 1.50 | 1.44 |
| 18宜昌邦普 | 测  定  值  % | 0.0013 | 0.00050 | 0.054 | 0.057 | 0.055 | 0.066 | 0.052 | 0.049 | 0.055 | 0.049 | 0.049 |
| 0.0014 | 0.00040 | 0.057 | 0.058 | 0.055 | 0.062 | 0.050 | 0.048 | 0.058 | 0.048 | 0.046 |
| 0.0014 | 0.00060 | 0.055 | 0.056 | 0.056 | 0.060 | 0.051 | 0.049 | 0.060 | 0.047 | 0.048 |
| 0.0016 | 0.00050 | 0.054 | 0.058 | 0.055 | 0.061 | 0.051 | 0.049 | 0.058 | 0.045 | 0.049 |
| 0.0015 | 0.00052 | 0.058 | 0.055 | 0.056 | 0.063 | 0.051 | 0.051 | 0.059 | 0.050 | 0.045 |
| 0.0014 | 0.00046 | 0.054 | 0.055 | 0.057 | 0.062 | 0.049 | 0.051 | 0.056 | 0.048 | 0.047 |
| 0.0015 | 0.00054 | 0.058 | 0.055 | 0.054 | 0.062 | 0.049 | 0.050 | 0.058 | 0.049 | 0.049 |
| 0.0016 | 0.00052 | 0.055 | 0.059 | 0.055 | 0.065 | 0.051 | 0.049 | 0.056 | 0.046 | 0.050 |
| 0.0016 | 0.00060 | 0.056 | 0.056 | 0.053 | 0.062 | 0.050 | 0.052 | 0.059 | 0.049 | 0.045 |
| 0.0014 | 0.00058 | 0.056 | 0.055 | 0.056 | 0.062 | 0.049 | 0.052 | 0.056 | 0.050 | 0.045 |
| 0.0014 | 0.00042 | 0.058 | 0.057 | 0.057 | 0.066 | 0.052 | 0.049 | 0.060 | 0.048 | 0.048 |
| 均% | 0.0015 | 0.00051 | 0.056 | 0.056 | 0.055 | 0.063 | 0.050 | 0.050 | 0.058 | 0.048 | 0.047 |
| s | 0.000103 | 0.000067 | 0.001640 | 0.001440 | 0.001206 | 0.001991 | 0.001128 | 0.001375 | 0.001737 | 0.001578 | 0.001859 |
| CV% | 6.87 | 13.14 | 2.93 | 2.55 | 2.18 | 3.17 | 2.24 | 2.76 | 3.01 | 3.28 | 3.92 |

表6 7#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 7#样 | | Mn | Ni | Al | Mg | Ti | Zr | Y | La | Ce |
| 1浙江华友 | 测定值% | 0.53 | 0.55 | 0.53 | 0.57 | 0.57 | 0.56 | 0.58\* | 0.46 | 0.51 |
| 0.53 | 0.55 | 0.52 | 0.57 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.52 | 0.55 | 0.52 | 0.56 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.52 | 0.55 | 0.52 | 0.56 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.53 | 0.55 | 0.53 | 0.56 | 0.56 | 0.57 | 0.58\* | 0.46 | 0.50 |
| 0.53 | 0.55 | 0.53 | 0.61 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.53 | 0.55 | 0.53 | 0.61 | 0.57 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.52 | 0.55 | 0.52 | 0.61 | 0.56 | 0.55 | 0.57 | 0.46 | 0.50 |
| 0.52 | 0.55 | 0.52 | 0.61 | 0.56 | 0.55 | 0.57 | 0.46 | 0.50 |
| 0.53 | 0.55 | 0.53 | 0.61 | 0.57 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.53 | 0.55 | 0.53 | 0.61 | 0.57 | 0.56 | 0.57 | 0.46 | 0.50 |
| 均% | 0.53 | 0.55 | 0.53 | 0.59 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| s | 0.005045 | 0 | 0.005222 | 0.024271 | 0.005045 | 0.005394 | 0.004045 | 0 | 0.003015 |
| CV% | 0.95 | 0 | 0.99 | 4.11 | 0.90 | 0.96 | 0.71 | 0 | 0.61 |
| 2衢州华友 | 测定值% | 0.56 | 0.56 | 0.53 | 0.58 | 0.58 | 0.57 | 0.61 | 0.47 | 0.53 |
| 0.56 | 0.56 | 0.53 | 0.58 | 0.58 | 0.57 | 0.61 | 0.47 | 0.53 |
| 0.56 | 0.55 | 0.53 | 0.57 | 0.58 | 0.57 | 0.61 | 0.47 | 0.52 |
| 0.53 | 0.56 | 0.53 | 0.58 | 0.58 | 0.58 | 0.61 | 0.47 | 0.53 |
| 0.56 | 0.56 | 0.53 | 0.58 | 0.58 | 0.57 | 0.61 | 0.47 | 0.52 |
| 0.56 | 0.52 | 0.53 | 0.58 | 0.56 | 0.57 | 0.61 | 0.47 | 0.52 |
| 0.55 | 0.55 | 0.52 | 0.57 | 0.57 | 0.57 | 0.60 | 0.46 | 0.52 |
| 0.56 | 0.56 | 0.54 | 0.58 | 0.58 | 0.58 | 0.61 | 0.47 | 0.53 |
| 0.55 | 0.55 | 0.54 | 0.58 | 0.58 | 0.58 | 0.61 | 0.47 | 0.53 |
| 0.56 | 0.56 | 0.55 | 0.57 | 0.58 | 0.58 | 0.62 | 0.47 | 0.53 |
| 0.55 | 0.55 | 0.54 | 0.58 | 0.58 | 0.57 | 0.61 | 0.47 | 0.53 |
| 均% | 0.55 | 0.55 | 0.53 | 0.58 | 0.58 | 0.57 | 0.61 | 0.47 | 0.53 |
| s | 0.008450 | 0.010980 | 0.007610 | 0.003156 | 0.007090 | 0.003819 | 0.004059 | 0.002613 | 0.004102 |
| CV% | 1.52 | 1.99 | 1.46 | 0.55 | 1.23 | 0.67 | 0.66 | 0.56 | 0.78 |
| 3广东邦普 | 测定值% | 0.54 | 0.52 | 0.52 | 0.61 | 0.57 | 0.58 | 0.56 | 0.50 | 0.50 |
| 0.53 | 0.56 | 0.52 | 0.59 | 0.55 | 0.57 | 0.57 | 0.45 | 0.51 |
| 0.51 | 0.55 | 0.50 | 0.61 | 0.56 | 0.58 | 0.56 | 0.45 | 0.51 |
| 0.54 | 0.56 | 0.52 | 0.61 | 0.57 | 0.57 | 0.58 | 0.48 | 0.48 |
| 0.51 | 0.56 | 0.50 | 0.56 | 0.55 | 0.57 | 0.60 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.50 | 0.59 | 0.55 | 0.54 | 0.56 | 0.48 | 0.49 |
| 0.50 | 0.56 | 0.53 | 0.60 | 0.58 | 0.56 | 0.59 | 0.46 | 0.52 |
| 0.55 | 0.52 | 0.50 | 0.58 | 0.57 | 0.58 | 0.58 | 0.46 | 0.48 |
| 0.52 | 0.53 | 0.55 | 0.59 | 0.58 | 0.56 | 0.57 | 0.48 | 0.49 |
| 0.52 | 0.57 | 0.50 | 0.61 | 0.55 | 0.57 | 0.55 | 0.47 | 0.49 |
| 0.52 | 0.53 | 0.50 | 0.60 | 0.57 | 0.54 | 0.56 | 0.46 | 0.51 |
| 均% | 0.52 | 0.55 | 0.51 | 0.60 | 0.56 | 0.57 | 0.57 | 0.47 | 0.50 |
| s | 0.01502 | 0.01809 | 0.01679 | 0.01572 | 0.01206 | 0.01440 | 0.01514 | 0.01514 | 0.01375 |
| CV% | 2.87 | 3.32 | 3.27 | 2.64 | 2.14 | 2.55 | 2.65 | 3.23 | 2.76 |
| 4中金岭南 | 测定值% | 0.54 | 0.56 | 0.54 | 0.58 | 0.56 | 0.55 | 0.57 | 0.46 | 0.50 |
| 0.55 | 0.57 | 0.54 | 0.59 | 0.57 | 0.54 | 0.58 | 0.48 | 0.51 |
| 0.55 | 0.57 | 0.53 | 0.59 | 0.56 | 0.55 | 0.59 | 0.47 | 0.50 |
| 0.55 | 0.57 | 0.53 | 0.57 | 0.58 | 0.55 | 0.57 | 0.46 | 0.50 |
| 0.54 | 0.56 | 0.54 | 0.57 | 0.57 | 0.54 | 0.59 | 0.48 | 0.51 |
| 0.54 | 0.56 | 0.53 | 0.58 | 0.57 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.55 | 0.57 | 0.53 | 0.59 | 0.56 | 0.56 | 0.57 | 0.47 | 0.50 |
| 0.56 | 0.57 | 0.54 | 0.59 | 0.58 | 0.56 | 0.57 | 0.46 | 0.52 |
| 0.56 | 0.56 | 0.54 | 0.58 | 0.56 | 0.54 | 0.58 | 0.48 | 0.50 |
| 0.55 | 0.55 | 0.53 | 0.58 | 0.57 | 0.54 | 0.59 | 0.47 | 0.51 |
| 0.55 | 0.57 | 0.53 | 0.59 | 0.57 | 0.55 | 0.58 | 0.46 | 0.50 |
| 均% | 0.55 | 0.56 | 0.53 | 0.58 | 0.57 | 0.55 | 0.58 | 0.47 | 0.51 |
| s | 0.007006 | 0.006876 | 0.005222 | 0.007862 | 0.007508 | 0.007508 | 0.008312 | 0.008312 | 0.006876 |
| CV% | 1.28 | 1.22 | 0.98 | 1.35 | 1.32 | 1.37 | 1.44 | 1.77 | 1.36 |
| 5荆门格林美 | 测定值% | 0.53 | 0.55 | 0.54 | 0.59 | 0.55 | 0.57 | 0.57 | 0.46 | 0.49 |
| 0.52 | 0.55 | 0.55 | 0.58 | 0.56 | 0.55 | 0.57 | 0.46 | 0.48 |
| 0.52 | 0.56 | 0.53 | 0.58 | 0.57 | 0.56 | 0.55 | 0.46 | 0.48 |
| 0.53 | 0.56 | 0.53 | 0.59 | 0.57 | 0.57 | 0.56 | 0.46 | 0.48 |
| 0.54 | 0.57 | 0.53 | 0.59 | 0.58 | 0.57 | 0.57 | 0.46 | 0.49 |
| 0.54 | 0.57 | 0.53 | 0.59 | 0.58 | 0.58 | 0.57 | 0.46 | 0.49 |
| 0.53 | 0.56 | 0.52 | 0.60 | 0.57 | 0.57 | 0.55 | 0.47 | 0.49 |
| 0.53 | 0.56 | 0.52 | 0.58 | 0.57 | 0.57 | 0.55 | 0.46 | 0.49 |
| 0.53 | 0.55 | 0.54 | 0.59 | 0.56 | 0.56 | 0.57 | 0.47 | 0.48 |
| 0.52 | 0.55 | 0.53 | 0.58 | 0.57 | 0.56 | 0.56 | 0.46 | 0.48 |
| 0.52 | 0.55 | 0.52 | 0.58 | 0.57 | 0.56 | 0.55 | 0.46 | 0.48 |
| 均% | 0.53 | 0.56 | 0.53 | 0.59 | 0.57 | 0.57 | 0.56 | 0.46 | 0.48 |
| s | 0.006254 | 0.005950 | 0.006580 | 0.006843 | 0.005205 | 0.006629 | 0.007917 | 0.005888 | 0.005770 |
| CV% | 1.18 | 1.06 | 1.24 | 1.17 | 0.91 | 1.17 | 1.41 | 1.27 | 1.19 |
| 6甘肃金川 | 测定值% | 0.56 | 0.58 | 0.55 | 0.60 | 0.56 | 0.59 | 0.61 | 0.49 | 0.53•• |
| 0.57 | 0.58 | 0.55 | 0.60 | 0.58 | 0.58 | 0.62 | 0.45 | 0.53•• |
| 0.50 | 0.56 | 0.54 | 0.58 | 0.61 | 0.60 | 0.60 | 0.48 | 0.52•• |
| 0.51 | 0.57 | 0.54 | 0.59 | 0.61 | 0.61 | 0.58 | 0.49 | 0.53•• |
| 0.57 | 0.59 | 0.54 | 0.59 | 0.59 | 0.57 | 0.58 | 0.47 | 0.52•• |
| 0.56 | 0.57 | 0.53 | 0.59 | 0.58 | 0.58 | 0.60 | 0.50 | 0.48•• |
| 0.57 | 0.56 | 0.53 | 0.60 | 0.59 | 0.60 | 0.60 | 0.51 | 0.49•• |
| 0.52 | 0.54 | 0.55 | 0.60 | 0.60 | 0.60 | 0.58 | 0.49 | 0.48•• |
| 0.53 | 0.55 | 0.54 | 0.59 | 0.61 | 0.61 | 0.57 | 0.48 | 0.47•• |
| 0.51 | 0.57 | 0.54 | 0.59 | 0.59 | 0.58 | 0.58 | 0.47 | 0.48•• |
| 0.50 | 0.56 | 0.53 | 0.58 | 0.58 | 0.59 | 0.59 | 0.49 | 0.50•• |
| 均% | 0.54 | 0.57 | 0.54 | 0.59 | 0.60 | 0.59 | 0.59 | 0.48 | 0.50•• |
| s | 0.028372 | 0.013667 | 0.007385 | 0.007158 | 0.015048 | 0.012662 | 0.014659 | 0.015535 | 0.022600 |
| CV% | 5.29 | 2.43 | 1.38 | 1.22 | 2.56 | 2.14 | 2.48 | 3.23 | 4.50 |
| 7湖南中伟 | 测定值% | 0.52 | 0.52 | 0.54 | 0.54 | 0.54 | 0.52 | 0.56 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.54 | 0.53 | 0.55 | 0.53 | 0.57 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.53 | 0.54 | 0.55 | 0.53 | 0.57 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.53 | 0.54 | 0.54 | 0.53 | 0.56 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.53 | 0.54 | 0.55 | 0.53 | 0.57 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.54 | 0.54 | 0.55 | 0.53 | 0.57 | 0.46 | 0.54 |
| 0.52 | 0.52 | 0.53 | 0.54 | 0.54 | 0.52 | 0.57 | 0.46 | 0.54 |
| 0.52 | 0.52 | 0.54 | 0.54 | 0.55 | 0.53 | 0.57 | 0.46 | 0.54 |
| 0.52 | 0.52 | 0.54 | 0.55 | 0.54 | 0.52 | 0.57 | 0.46 | 0.54 |
| 0.52 | 0.52 | 0.54 | 0.54 | 0.54 | 0.52 | 0.58 | 0.46 | 0.53 |
| 0.52 | 0.52 | 0.54 | 0.55 | 0.55 | 0.53 | 0.57 | 0.46 | 0.54 |
| 均% | 0.52 | 0.52 | 0.54 | 0.54 | 0.54 | 0.53 | 0.57 | 0.46 | 0.54 |
| s | 0 | 0 | 0.002786 | 0.005082 | 0.002497 | 0.002757 | 0.004308 | 0 | 0.002877 |
| CV% | 0 | 0 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0 | 0.01 |
| 8天津巴莫 | 测定值% | 0.54 | 0.53 | 0.54 | 0.64 | 0.63 | 0.59 | 0.64 | 0.47 | 0.50 |
| 0.54 | 0.53 | 0.54 | 0.64 | 0.64 | 0.59 | 0.63 | 0.48 | 0.50 |
| 0.54 | 0.53 | 0.54 | 0.64 | 0.65 | 0.59 | 0.63 | 0.48 | 0.50 |
| 0.54 | 0.53 | 0.54 | 0.64 | 0.66 | 0.60 | 0.63 | 0.50 | 0.50 |
| 0.54 | 0.54 | 0.54 | 0.64 | 0.67 | 0.60 | 0.63 | 0.47 | 0.50 |
| 0.54 | 0.53 | 0.54 | 0.64 | 0.67 | 0.60 | 0.64 | 0.47 | 0.50 |
| 0.54 | 0.53 | 0.54 | 0.64 | 0.67 | 0.60 | 0.63 | 0.47 | 0.50 |
| 均% | 0.54 | 0.53 | 0.54 | 0.64 | 0.66 | 0.60 | 0.63 | 0.48 | 0.50 |
| s | 0 | 0.003041 | 0 | 0 | 0.014612 | 0.004331 | 0.005526 | 0.010472 | 0 |
| CV% | 0 | 0.57 | 0 | 0 | 2.23 | 0.73 | 0.87 | 2.20 | 0 |
| 9国标北京 | 测定值% | 0.55 | 0.59 | 0.53 | 0.57 | 0.54 | 0.53 | 0.64 | 0.45 | 0.50 |
| 0.55 | 0.61 | 0.55 | 0.56 | 0.53 | 0.55 | 0.61 | 0.46 | 0.51 |
| 0.55 | 0.59 | 0.54 | 0.56 | 0.54 | 0.55 | 0.63 | 0.45 | 0.51 |
| 0.54 | 0.59 | 0.53 | 0.57 | 0.54 | 0.54 | 0.64 | 0.44 | 0.51 |
| 0.54 | 0.58 | 0.53 | 0.59 | 0.53 | 0.55 | 0.62 | 0.44 | 0.51 |
| 0.55 | 0.59 | 0.54 | 0.56 | 0.54 | 0.56 | 0.60 | 0.44 | 0.51 |
| 0.54 | 0.60 | 0.53 | 0.56 | 0.54 | 0.55 | 0.62 | 0.43 | 0.50 |
| 均% | 0.55 | 0.59 | 0.54 | 0.57 | 0.54 | 0.55 | 0.62 | 0.44 | 0.51 |
| s | 0.005345 | 0.009512 | 0.007868 | 0.011127 | 0.004880 | 0.009512 | 0.014960 | 0.009759 | 0.004880 |
| CV% | 0.98 | 1.60 | 1.47 | 1.96 | 0.91 | 1.74 | 2.40 | 2.20 | 0.96 |
| 10桂林地矿 | 测定值% | 0.50 | 0.56 | 0.52 | 0.58 | 0.56 | 0.57 | 0.55 | 0.45 | 0.51 |
| 0.50 | 0.56 | 0.52 | 0.57 | 0.55 | 0.57 | 0.58 | 0.45 | 0.51 |
| 0.52 | 0.56 | 0.53 | 0.59 | 0.58 | 0.56 | 0.58 | 0.46 | 0.51 |
| 0.53 | 0.55 | 0.51 | 0.60 | 0.57 | 0.55 | 0.56 | 0.47 | 0.51 |
| 0.53 | 0.54 | 0.52 | 0.60 | 0.57 | 0.56 | 0.58 | 0.47 | 0.52 |
| 0.52 | 0.54 | 0.51 | 0.60 | 0.57 | 0.55 | 0.57 | 0.46 | 0.51 |
| 0.53 | 0.54 | 0.53 | 0.58 | 0.55 | 0.55 | 0.57 | 0.46 | 0.50 |
| 均% | 0.52 | 0.55 | 0.52 | 0.59 | 0.56 | 0.56 | 0.57 | 0.46 | 0.51 |
| s | 0.0135 | 0.0100 | 0.00744 | 0.0121 | 0.0112 | 0.00831 | 0.0115 | 0.00792 | 0.00525 |
| CV% | 2.59 | 1.82 | 1.43 | 2.06 | 2.00 | 1.49 | 2.01 | 1.72 | 1.03 |
| 11紫金铜业 | 测定值% | 0.53 | 0.54 | 0.56 | 0.59 | 0.56 | 0.56 | 0.57 | 0.46 | 0.50 |
| 0.52 | 0.52 | 0.55 | 0.61 | 0.57 | 0.54 | 0.58 | 0.48 | 0.51 |
| 0.51 | 0.56 | 0.57 | 0.61 | 0.57 | 0.52 | 0.56 | 0.48 | 0.47 |
| 0.53 | 0.53 | 0.56 | 0.60 | 0.54 | 0.55 | 0.58 | 0.48 | 0.49 |
| 0.53 | 0.55 | 0.55 | 0.60 | 0.57 | 0.53 | 0.58 | 0.45 | 0.51 |
| 0.55 | 0.52 | 0.55 | 0.61 | 0.58 | 0.52 | 0.57 | 0.48 | 0.52 |
| 0.52 | 0.55 | 0.56 | 0.60 | 0.55 | 0.54 | 0.58 | 0.48 | 0.50 |
| 均% | 0.53 | 0.54 | 0.56 | 0.60 | 0.56 | 0.54 | 0.57 | 0.47 | 0.50 |
| s | 0.012614 | 0.015768 | 0.007612 | 0.007500 | 0.013720 | 0.015066 | 0.007809 | 0.012455 | 0.016350 |
| CV% | 2.38 | 2.92 | 1.36 | 1.25 | 2.45 | 2.79 | 1.37 | 2.65 | 3.27 |
| 12广东佳纳 | 测定值% | 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.57 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| 均% | 0.52 | 0.54 | 0.52 | 0.54 | 0.58 | 0.55 | 0.58 | 0.47 | 0.51 |
| s | 0 | 0 | 0 | 0 | 0.000434 | 0 | 0 | 0 | 0 |
| CV% | 0 | 0 | 0 | 0 | 0.08 | 0 | 0 | 0 | 0 |
| 13郴州质检 | 测定值% | 0.48 | 0.66•• | 0.45•• | 0.55 | 0.60 | 0.56 | 0.60 | 0.46 | 0.55 |
| 0.47 | 0.65•• | 0.45•• | 0.55 | 0.58 | 0.55 | 0.60 | 0.45 | 0.55 |
| 0.46 | 0.64•• | 0.44•• | 0.54 | 0.59 | 0.56 | 0.59 | 0.45 | 0.54 |
| 0.47 | 0.64•• | 0.44•• | 0.54 | 0.60 | 0.57 | 0.60 | 0.45 | 0.55 |
| 0.49 | 0.61•• | 0.47•• | 0.55 | 0.58 | 0.56 | 0.59 | 0.45 | 0.54 |
| 0.47 | 0.61•• | 0.46•• | 0.55 | 0.59 | 0.55 | 0.59 | 0.45 | 0.54 |
| 0.48 | 0.62•• | 0.47•• | 0.55 | 0.59 | 0.56 | 0.59 | 0.45 | 0.54 |
| 均% | 0.47 | 0.63•• | 0.46•• | 0.55 | 0.59 | 0.56 | 0.59 | 0.45 | 0.54 |
| s | 0.007557 | 0.018899 | 0.011905 | 0.006605 | 0.00504525 | 0.006940 | 0.005364 | 0.003228 | 0.005148 |
| CV% | 1.60 | 2.98 | 2.62 | 1.21 | 0.90 | 1.24 | 0.90 | 0.72 | 0.95 |
| 14大冶有色 | 测定值% | 0.55 | 0.58 | 0.52 | 0.61 | 0.58 | 0.52 | 0.61 | 0.44 | 0.54 |
| 0.55 | 0.58 | 0.52 | 0.62 | 0.58 | 0.53 | 0.62 | 0.44 | 0.53 |
| 0.56 | 0.57 | 0.52 | 0.63 | 0.58 | 0.52 | 0.60 | 0.43 | 0.54 |
| 0.55 | 0.56 | 0.52 | 0.63 | 0.57 | 0.52 | 0.60 | 0.43 | 0.54 |
| 0.54 | 0.56 | 0.51 | 0.63 | 0.56 | 0.51 | 0.61 | 0.42 | 0.52 |
| 0.54 | 0.56 | 0.51 | 0.64 | 0.56 | 0.51 | 0.62 | 0.42 | 0.54 |
| 0.55 | 0.56 | 0.52 | 0.66 | 0.56 | 0.51 | 0.61 | 0.43 | 0.53 |
| 0.55 | 0.57 | 0.52 | 0.64 | 0.57 | 0.51 | 0.62 | 0.43 | 0.53 |
| 0.54 | 0.58 | 0.52 | 0.61 | 0.58 | 0.52 | 0.60 | 0.42 | 0.52 |
| 0.56 | 0.58 | 0.51 | 0.61 | 0.57 | 0.51 | 0.61 | 0.42 | 0.52 |
| 0.55 | 0.57 | 0.51 | 0.61 | 0.57 | 0.52 | 0.61 | 0.42 | 0.52 |
| 均% | 0.55 | 0.57 | 0.52 | 0.63 | 0.57 | 0.52 | 0.61 | 0.43 | 0.53 |
| s | 0.007006 | 0.008944 | 0.005045 | 0.016293 | 0.008312 | 0.006742 | 0.007746 | 0.007862 | 0.008944 |
| CV% | 1.27 | 1.57 | 0.97 | 2.59 | 1.46 | 1.30 | 1.27 | 1.83 | 1.69 |
| 15广西测试 | 测定值% | 0.53 | 0.53 | 0.52 | 0.56 | 0.49 | 0.55 | 0.54 | 0.56•• | 0.53 |
| 0.50 | 0.51 | 0.50 | 0.55 | 0.47 | 0.54 | 0.52 | 0.54•• | 0.51 |
| 0.53 | 0.54 | 0.53 | 0.54 | 0.49 | 0.58 | 0.55 | 0.57•• | 0.54 |
| 0.51 | 0.51 | 0.51 | 0.56 | 0.47 | 0.54 | 0.50 | 0.53•• | 0.52 |
| 0.54 | 0.53 | 0.53 | 0.53 | 0.49 | 0.57 | 0.53 | 0.56•• | 0.54 |
| 0.54 | 0.54 | 0.53 | 0.54 | 0.50 | 0.58 | 0.54 | 0.57•• | 0.55 |
| 0.53 | 0.53 | 0.53 | 0.59 | 0.49 | 0.56 | 0.53 | 0.56•• | 0.53 |
| 均% | 0.53 | 0.53 | 0.52 | 0.55 | 0.49 | 0.49 | 0.53 | 0.56•• | 0.53 |
| s | 0.015119 | 0.012536 | 0.012150 | 0.019760 | 0.011339 | 0.189774 | 0.016330 | 0.015119 | 0.013452 |
| CV% | 2.85 | 2.37 | 2.34 | 3.59 | 2.31 | 38.73 | 3.08 | 2.70 | 2.54 |
| 16中检广西 | 测定值% | 0.53 | 0.56 | 0.54 | 0.59 | 0.57 | 0.55 | 0.53 | 0.45 | 0.52 |
| 0.53 | 0.54 | 0.54 | 0.59 | 0.57 | 0.55 | 0.54 | 0.45 | 0.52 |
| 0.51 | 0.54 | 0.52 | 0.58 | 0.57 | 0.55 | 0.53 | 0.44 | 0.51 |
| 0.52 | 0.54 | 0.53 | 0.58 | 0.58 | 0.56 | 0.54 | 0.44 | 0.51 |
| 0.53 | 0.53 | 0.55 | 0.58 | 0.59 | 0.54 | 0.54 | 0.45 | 0.52 |
| 0.51 | 0.54 | 0.54 | 0.58 | 0.59 | 0.55 | 0.53 | 0.45 | 0.52 |
| 0.51 | 0.53 | 0.53 | 0.57 | 0.56 | 0.56 | 0.54 | 0.46 | 0.50 |
| 0.53 | 0.54 | 0.54 | 0.57 | 0.57 | 0.55 | 0.55 | 0.45 | 0.50 |
| 0.52 | 0.53 | 0.55 | 0.58 | 0.59 | 0.55 | 0.54 | 0.44 | 0.51 |
| 0.54 | 0.55 | 0.54 | 0.59 | 0.56 | 0.56 | 0.53 | 0.44 | 0.50 |
| 0.52 | 0.55 | 0.53 | 0.59 | 0.56 | 0.55 | 0.55 | 0.46 | 0.51 |
| 均% | 0.52 | 0.54 | 0.54 | 0.58 | 0.57 | 0.55 | 0.54 | 0.45 | 0.51 |
| s | 0.010036 | 0.009396 | 0.009072 | 0.007482 | 0.011970 | 0.005995 | 0.007506 | 0.007560 | 0.008313 |
| CV% | 1.93 | 1.74 | 1.68 | 1.29 | 2.10 | 1.09 | 1.39 | 1.68 | 1.63 |
| 17国标青岛 | 测  定  值  % | 0.55 | 0.55 | 0.55 | 0.59 | 0.56 | 0.56 | 0.58 | 0.46 | 0.49 |
| 0.56 | 0.56 | 0.55 | 0.59 | 0.57 | 0.56 | 0.57 | 0.46 | 0.49 |
| 0.54 | 0.56 | 0.54 | 0.60 | 0.55 | 0.56 | 0.58 | 0.46 | 0.49 |
| 0.55 | 0.54 | 0.55 | 0.59 | 0.56 | 0.55 | 0.58 | 0.44 | 0.47 |
| 0.55 | 0.56 | 0.56 | 0.59 | 0.57 | 0.56 | 0.57 | 0.46 | 0.48 |
| 0.56 | 0.55 | 0.55 | 0.58 | 0.55 | 0.56 | 0.58 | 0.47 | 0.48 |
| 0.55 | 0.55 | 0.53 | 0.59 | 0.55 | 0.54 | 0.58 | 0.45 | 0.49 |
| 0.53 | 0.56 | 0.54 | 0.61 | 0.55 | 0.56 | 0.59 | 0.46 | 0.49 |
| 0.55 | 0.56 | 0.54 | 0.58 | 0.56 | 0.55 | 0.58 | 0.46 | 0.47 |
| 0.55 | 0.56 | 0.53 | 0.59 | 0.56 | 0.55 | 0.56 | 0.46 | 0.49 |
| 0.54 | 0.56 | 0.54 | 0.59 | 0.57 | 0.56 | 0.58 | 0.45 | 0.48 |
| 均% | 0.55 | 0.56 | 0.54 | 0.59 | 0.56 | 0.56 | 0.58 | 0.46 | 0.48 |
| s | 0.008739 | 0.006876 | 0.009244 | 0.008312 | 0.008312 | 0.006878 | 0.007862 | 0.007862 | 0.008090 |
| CV% | 1.59 | 1.23 | 1.71 | 1.41 | 1.48 | 1.23 | 1.36 | 1.71 | 1.69 |
| 18宜昌邦普 | 测  定  值  % | 0.55 | 0.53 | 0.53 | 0.60 | 0.55 | 0.54 | 0.55 | 0.46 | 0.49 |
| 0.50 | 0.55 | 0.54 | 0.57 | 0.55 | 0.58 | 0.58 | 0.47 | 0.50 |
| 0.52 | 0.54 | 0.54 | 0.57 | 0.54 | 0.55 | 0.55 | 0.50 | 0.52 |
| 0.52 | 0.53 | 0.50 | 0.60 | 0.57 | 0.57 | 0.58 | 0.50 | 0.51 |
| 0.52 | 0.52 | 0.51 | 0.56 | 0.54 | 0.55 | 0.56 | 0.47 | 0.51 |
| 0.53 | 0.55 | 0.51 | 0.57 | 0.54 | 0.58 | 0.55 | 0.46 | 0.49 |
| 0.53 | 0.53 | 0.50 | 0.61 | 0.58 | 0.54 | 0.55 | 0.47 | 0.50 |
| 0.55 | 0.56 | 0.54 | 0.56 | 0.57 | 0.56 | 0.58 | 0.46 | 0.48 |
| 0.54 | 0.55 | 0.53 | 0.56 | 0.54 | 0.58 | 0.59 | 0.45 | 0.52 |
| 0.50 | 0.55 | 0.51 | 0.58 | 0.55 | 0.56 | 0.56 | 0.49 | 0.51 |
| 0.54 | 0.52 | 0.53 | 0.60 | 0.56 | 0.54 | 0.55 | 0.48 | 0.51 |
| 均% | 0.53 | 0.54 | 0.52 | 0.58 | 0.55 | 0.56 | 0.56 | 0.47 | 0.50 |
| s | 0.01737 | 0.01375 | 0.01601 | 0.01897 | 0.01433 | 0.01640 | 0.01567 | 0.01690 | 0.01286 |
| CV% | 3.29 | 2.55 | 3.07 | 3.27 | 2.59 | 2.93 | 2.78 | 3.57 | 2.55 |

表7 9#样品精密度统计

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 9#样 | | Mn | Ni | Al | Mg | Ti | Zr | Y | La | Ce |
| 1浙江华友 | 测  定  值  % | 2.31 | 2.44 | 2.54 | 2.32 | 2.54 | 2.56 | 2.56 | 2.35 | 2.32 |
| 2.31 | 2.44 | 2.53 | 2.33 | 2.52 | 2.55 | 2.56 | 2.36 | 2.33 |
| 2.33 | 2.45 | 2.56 | 2.32 | 2.54 | 2.61 | 2.58 | 2.38 | 2.34 |
| 2.34 | 2.46 | 2.57 | 2.35 | 2.56 | 2.57 | 2.59 | 2.40 | 2.36 |
| 2.36\* | 2.45 | 2.57 | 2.35 | 2.56 | 2.58 | 2.60 | 2.40 | 2.36 |
| 2.31 | 2.43 | 2.52 | 2.48 | 2.51 | 2.49 | 2.53 | 2.34 | 2.30 |
| 2.32 | 2.43 | 2.53 | 2.49 | 2.51 | 2.49 | 2.54 | 2.34 | 2.30 |
| 2.31 | 2.43 | 2.52 | 2.49 | 2.51 | 2.48 | 2.53 | 2.34 | 2.29 |
| 2.31 | 2.42 | 2.51 | 2.48 | 2.50 | 2.47 | 2.53 | 2.33 | 2.29 |
| 2.32 | 2.42 | 2.54 | 2.49 | 2.51 | 2.50 | 2.54 | 2.34 | 2.32 |
| 2.33 | 2.42 | 2.53 | 2.50 | 2.52 | 2.50 | 2.54 | 2.33 | 2.31 |
| 均% | 2.32 | 2.44 | 2.54 | 2.42 | 2.53 | 2.53 | 2.55 | 2.36 | 2.32 |
| s | 0.016181 | 0.013685 | 0.020405 | 0.081341 | 0.021149 | 0.047768 | 0.025442 | 0.026216 | 0.025298 |
| CV% | 0.70 | 0.56 | 0.80 | 3.36 | 0.84 | 1.89 | 1.00 | 1.11 | 1.09 |
| 2衢州华友 | 测  定  值  % | 2.40 | 2.40 | 2.55 | 2.30 | 2.56 | 2.58 | 2.67 | 2.40 | 2.33 |
| 2.38 | 2.42 | 2.57 | 2.29 | 2.57 | 2.58 | 2.68 | 2.39 | 2.32 |
| 2.40 | 2.41 | 2.53 | 2.27 | 2.54 | 2.57 | 2.67 | 2.39 | 2.32 |
| 2.39 | 2.40 | 2.55 | 2.29 | 2.55 | 2.57 | 2.66 | 2.39 | 2.32 |
| 2.40 | 2.42 | 2.54 | 2.27 | 2.57 | 2.58 | 2.66 | 2.39 | 2.32 |
| 2.37 | 2.42 | 2.55 | 2.30 | 2.56 | 2.56 | 2.66 | 2.39 | 2.31 |
| 2.37 | 2.42 | 2.59 | 2.30 | 2.56 | 2.57 | 2.67 | 2.39 | 2.32 |
| 2.39 | 2.40 | 2.54 | 2.29 | 2.53 | 2.56 | 2.66 | 2.38 | 2.30 |
| 2.41 | 2.37 | 2.51 | 2.29 | 2.56 | 2.57 | 2.66 | 2.39 | 2.32 |
| 2.41 | 2.42 | 2.54 | 2.30 | 2.55 | 2.58 | 2.66 | 2.40 | 2.32 |
| 2.39 | 2.43 | 2.52 | 2.31 | 2.57 | 2.59 | 2.68 | 2.41 | 2.34 |
| 均% | 2.39 | 2.41 | 2.54 | 2.29 | 2.56 | 2.57 | 2.67 | 2.39 | 2.32 |
| s | 0.01335 | 0.01672 | 0.020028 | 0.01193 | 0.01212 | 0.009285 | 0.008483 | 0.009196 | 0.009059 |
| CV% | 0.56 | 0.69 | 0.79 | 0.52 | 0.47 | 0.36 | 0.32 | 0.38 | 0.39 |
| 3广东邦普 | 测  定  值  % | 2.27 | 2.44 | 2.64 | 2.41 | 2.54 | 2.56 | 2.52 | 2.34 | 2.34 |
| 2.33 | 2.54 | 2.54 | 2.41 | 2.48 | 2.60 | 2.47 | 2.31 | 2.25 |
| 2.38 | 2.40 | 2.55 | 2.38 | 2.47 | 2.58 | 2.56 | 2.44 | 2.32 |
| 2.40 | 2.40 | 2.53 | 2.42 | 2.58 | 2.62 | 2.59 | 2.37 | 2.30 |
| 2.32 | 2.60 | 2.65 | 2.47 | 2.50 | 2.65 | 2.62 | 2.29 | 2.40 |
| 2.28 | 2.44 | 2.50 | 2.42 | 2.59 | 2.65 | 2.60 | 2.35 | 2.31 |
| 2.28 | 2.58 | 2.60 | 2.44 | 2.51 | 2.47 | 2.62 | 2.32 | 2.34 |
| 2.32 | 2.48 | 2.44 | 2.30 | 2.51 | 2.60 | 2.62 | 2.44 | 2.37 |
| 2.33 | 2.41 | 2.64 | 2.47 | 2.45 | 2.54 | 2.60 | 2.36 | 2.30 |
| 2.39 | 2.40 | 2.47 | 2.49 | 2.60 | 2.54 | 2.48 | 2.29 | 2.28 |
| 2.32 | 2.43 | 2.45 | 2.37 | 2.60 | 2.47 | 2.50 | 2.40 | 2.31 |
| 均% | 2.33 | 2.47 | 2.55 | 2.42 | 2.53 | 2.57 | 2.56 | 2.36 | 2.32 |
| s | 0.04460 | 0.07448 | 0.07749 | 0.05372 | 0.05495 | 0.06252 | 0.05879 | 0.05355 | 0.04147 |
| CV% | 1.91 | 3.02 | 3.04 | 2.22 | 2.17 | 2.43 | 2.29 | 2.27 | 1.79 |
| 4中金岭南 | 测  定值  % | 2.43 | 2.55• | 2.49 | 2.45 | 2.50 | 2.35 | 2.53 | 2.36 | 2.28 |
| 2.42 | 2.54• | 2.48 | 2.44 | 2.50 | 2.33 | 2.56 | 2.36 | 2.31 |
| 2.46 | 2.56• | 2.51 | 2.45 | 2.51 | 2.38 | 2.52 | 2.37 | 2.26 |
| 2.45 | 2.57• | 2.51 | 2.49 | 2.47 | 2.33 | 2.54 | 2.32 | 2.28 |
| 2.43 | 2.53• | 2.52 | 2.45 | 2.51 | 2.37 | 2.57 | 2.35 | 2.32 |
| 2.42 | 2.54• | 2.50 | 2.44 | 2.52 | 2.38 | 2.57 | 2.36 | 2.30 |
| 2.43 | 2.56• | 2.49 | 2.48 | 2.50 | 2.39 | 2.56 | 2.37 | 2.31 |
| 2.44 | 2.55• | 2.50 | 2.47 | 2.51 | 2.35 | 2.55 | 2.35 | 2.31 |
| 2.45 | 2.53• | 2.51 | 2.44 | 2.49 | 2.35 | 2.55 | 2.33 | 2.29 |
| 2.42 | 2.56• | 2.49 | 2.46 | 2.52 | 2.36 | 2.54 | 2.36 | 2.30 |
| 2.42 | 2.55• | 2.50 | 2.46 | 2.50 | 2.35 | 2.53 | 2.35 | 2.30 |
| 均% | 2.43 | 2.55 | 2.50 | 2.46 | 2.50 | 2.36 | 2.55 | 2.35 | 2.30 |
| s | 0.014334 | 0.013003 | 0.011832 | 0.016787 | 0.014206 | 0.019909 | 0.016787 | 0.015551 | 0.017477 |
| CV% | 0.59 | 0.51 | 0.47 | 0.68 | 0.57 | 0.84 | 0.66 | 0.66 | 0.76 |
| 5荆门格林美 | 测定值% | 2.33 | 2.45 | 2.56 | 2.46 | 2.51 | 2.51 | 2.56 | 2.39 | 2.35 |
| 2.31 | 2.43 | 2.57 | 2.42 | 2.51 | 2.53 | 2.55 | 2.40 | 2.35 |
| 2.35 | 2.48 | 2.59 | 2.44 | 2.53 | 2.55 | 2.57 | 2.39 | 2.35 |
| 2.36 | 2.49 | 2.60 | 2.43 | 2.52 | 2.54 | 2.54 | 2.34 | 2.30 |
| 2.35 | 2.47 | 2.57 | 2.40 | 2.48 | 2.50 | 2.54 | 2.34 | 2.31 |
| 2.34 | 2.47 | 2.56 | 2.41 | 2.50 | 2.52 | 2.53 | 2.35 | 2.31 |
| 2.31 | 2.44 | 2.51 | 2.36 | 2.48 | 2.51 | 2.57 | 2.34 | 2.31 |
| 2.32 | 2.44 | 2.51 | 2.35 | 2.46 | 2.49 | 2.51 | 2.36 | 2.31 |
| 2.30 | 2.43 | 2.48 | 2.31 | 2.49 | 2.46 | 2.56 | 2.37 | 2.31 |
| 2.31 | 2.44 | 2.48 | 2.31 | 2.45 | 2.45 | 2.52 | 2.39 | 2.33 |
| 2.30 | 2.42 | 2.45 | 2.27 | 2.51 | 2.54 | 2.52 | 2.36 | 2.33 |
| 均% | 2.33 | 2.45 | 2.53 | 2.36 | 2.49 | 2.51 | 2.54 | 2.36 | 2.32 |
| s | 0.023651 | 0.024910 | 0.054381 | 0.060630 | 0.026682 | 0.035452 | 0.024032 | 0.020786 | 0.015117 |
| CV% | 1.02 | 1.02 | 2.15 | 2.56 | 1.07 | 1.41 | 0.95 | 0.88 | 0.65 |
| 6甘肃金川 | 测定值% | 2.43•• | 2.38 | 2.55 | 2.42 | 2.69•• | 2.67 | 2.71•• | 2.48•• | 2.52•• |
| 2.41•• | 2.49 | 2.59 | 2.34 | 2.73•• | 2.71 | 2.74•• | 2.51•• | 2.26•• |
| 2.23•• | 2.52 | 2.49 | 2.46 | 2.60•• | 2.54 | 2.56•• | 2.32•• | 2.28•• |
| 2.28•• | 2.50 | 2.62 | 2.50 | 2.55•• | 2.46 | 2.47•• | 2.25•• | 2.41•• |
| 2.35•• | 2.46 | 2.52 | 2.43 | 2.58•• | 2.50 | 2.57•• | 2.45•• | 2.46•• |
| 2.48•• | 2.58 | 2.56 | 2.34 | 2.58•• | 2.55 | 2.55•• | 2.47•• | 2.48•• |
| 2.39•• | 2.39 | 2.55 | 2.42 | 2.67•• | 2.54 | 2.56•• | 2.58•• | 2.41•• |
| 2.48•• | 2.48 | 2.57 | 2.41 | 2.55•• | 2.58 | 2.48•• | 2.35•• | 2.45•• |
| 2.38•• | 2.58 | 2.59 | 2.34 | 2.50•• | 2.48 | 2.58•• | 2.39•• | 2.43•• |
| 2.45•• | 2.61 | 2.67 | 2.40 | 2.48•• | 2.47 | 2.54•• | 2.41•• | 2.36•• |
| 2.51•• | 2.55 | 2.40 | 2.45 | 2.47•• | 2.51 | 2.50•• | 2.39•• | 2.35•• |
| 均% | 2.40•• | 2.50 | 2.56 | 2.41 | 2.58•• | 2.55 | 2.57•• | 2.42•• | 2.40•• |
| s | 0.08232 | 0.0715 | 0.067328 | 0.050128 | 0.081528 | 0.076755 | 0.081469 | 0.088572 | 0.07752 |
| CV% | 3.43 | 2.86 | 2.63 | 2.08 | 3.16 | 3.01 | 3.17 | 3.66 | 3.23 |
| 7湖南中伟 | 测定值% | 2.58•• | 2.65•• | 2.74 | 2.72•• | 2.62 | 2.42 | 2.81•• | 2.55 | 2.46 |
| 2.58•• | 2.66•• | 2.76 | 2.72•• | 2.61 | 2.51 | 2.83•• | 2.55 | 2.46 |
| 2.58•• | 2.67•• | 2.76 | 2.73•• | 2.61 | 2.52 | 2.83•• | 2.55 | 2.48 |
| 2.57•• | 2.66•• | 2.74 | 2.71•• | 2.67 | 2.53 | 2.81•• | 2.54 | 2.46 |
| 2.56•• | 2.66•• | 2.73 | 2.70•• | 2.61 | 2.53 | 2.80•• | 2.53 | 2.44 |
| 2.56•• | 2.65•• | 2.74 | 2.70•• | 2.60 | 2.51 | 2.80•• | 2.52 | 2.44 |
| 2.55•• | 2.63•• | 2.72 | 2.69•• | 2.59 | 2.51 | 2.79•• | 2.52 | 2.42 |
| 2.57•• | 2.65•• | 2.74 | 2.71•• | 2.60 | 2.52 | 2.81•• | 2.53 | 2.44 |
| 2.57•• | 2.66•• | 2.75 | 2.71•• | 2.61 | 2.53 | 2.81•• | 2.54 | 2.45 |
| 2.54•• | 2.65•• | 2.72 | 2.69•• | 2.62 | 2.55 | 2.78•• | 2.50 | 2.42 |
| 2.54•• | 2.63•• | 2.72 | 2.68•• | 2.61 | 2.54 | 2.76•• | 2.49 | 2.41 |
| 均% | 2.56•• | 2.65 | 2.74 | 2.71•• | 2.61 | 2.52 | 2.80•• | 2.53 | 2.44 |
| s | 0.016079 | 0.012789 | 0.014812 | 0.014804 | 0.008351 | 0.034832 | 0.018983 | 0.019245 | 0.021104 |
| CV% | 0.01 | 0.00 | 0.01 | 0.01 | 0.00 | 0.01 | 0.01 | 0.01 | 0.01 |
| 8天津巴莫 | 测定值% | — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| — | — | — | — | — | — | — | — | — |
| 均% | — | — | — | — | — | — | — | — | — |
| s | — | — | — | — | — | — | — | — | — |
| CV% | — | — | — | — | — | — | — | — | — |
| 9国标北京 | 测定值% | 2.31 | 2.41 | 2.51 | 2.33 | 2.51 | 2.61 | 2.51 | 2.30 | 2.36 |
| 2.33 | 2.42 | 2.52 | 2.35 | 2.54 | 2.57 | 2.52 | 2.30 | 2.36 |
| 2.31 | 2.44 | 2.54 | 2.33 | 2.55 | 2.58 | 2.55 | 2.34 | 2.31 |
| 2.32 | 2.42 | 2.55 | 2.35 | 2.52 | 2.62 | 2.54 | 2.33 | 2.38 |
| 2.31 | 2.42 | 2.55 | 2.33 | 2.55 | 2.60 | 2.52 | 2.36 | 2.35 |
| 2.34 | 2.45 | 2.51 | 2.31 | 2.54 | 2.60 | 2.53 | 2.35 | 2.34 |
| 2.31 | 2.42 | 2.56 | 2.33 | 2.52 | 2.57 | 2.56 | 2.33 | 2.35 |
| 均% | 2.32 | 2.42 | 2.53 | 2.33 | 2.53 | 2.59 | 2.53 | 2.33 | 2.35 |
| s | 0.011926 | 0.014606 | 0.019196 | 0.013925 | 0.015359 | 0.020190 | 0.018632 | 0.022889 | 0.021930 |
| CV% | 0.51 | 0.60 | 0.76 | 0.60 | 0.61 | 0.78 | 0.74 | 0.98 | 0.93 |
| 10桂林地矿 | 测定值% | 2.32 | 2.43 | 2.55 | 2.41 | 2.49 | 2.59 | 2.60 | 2.36 | 2.28 |
| 2.31 | 2.42 | 2.59 | 2.42 | 2.53 | 2.53 | 2.61 | 2.32 | 2.33 |
| 2.30 | 2.43 | 2.51 | 2.32 | 2.52 | 2.49 | 2.51 | 2.36 | 2.35 |
| 2.32 | 2.46 | 2.55 | 2.38 | 2.53 | 2.61 | 2.54 | 2.39 | 2.30 |
| 2.32 | 2.46 | 2.52 | 2.36 | 2.55 | 2.47 | 2.53 | 2.27 | 2.27 |
| 2.28 | 2.45 | 2.53 | 2.38 | 2.53 | 2.52 | 2.60 | 2.34 | 2.26 |
| 2.31 | 2.43 | 2.56 | 2.34 | 2.55 | 2.58 | 2.57 | 2.35 | 2.36 |
| 均% | 2.31 | 2.44 | 2.54 | 2.37 | 2.53 | 2.54 | 2.57 | 2.34 | 2.31 |
| s | 0.0155 | 0.0164 | 0.0270 | 0.0365 | 0.0198 | 0.0529 | 0.0405 | 0.0394 | 0.0395 |
| CV% | 0.67 | 0.67 | 1.06 | 1.54 | 0.78 | 2.08 | 1.58 | 1.68 | 1.71 |
| 11紫金铜业 | 测定值% | 2.33 | 2.45 | 2.54 | 2.44 | 2.53 | 2.51 | 2.56 | 2.32 | 2.34 |
| 2.38 | 2.40 | 2.55 | 2.48 | 2.51 | 2.52 | 2.54 | 2.36 | 2.35 |
| 2.36 | 2.48 | 2.62 | 2.50 | 2.50 | 2.48 | 2.55 | 2.38 | 2.32 |
| 2.35 | 2.45 | 2.60 | 2.49 | 2.54 | 2.52 | 2.54 | 2.33 | 2.33 |
| 2.34 | 2.43 | 2.59 | 2.48 | 2.55 | 2.50 | 2.53 | 2.35 | 2.32 |
| 2.36 | 2.47 | 2.58 | 2.49 | 2.52 | 2.52 | 2.53 | 2.34 | 2.34 |
| 2.34 | 2.47 | 2.56 | 2.45 | 2.51 | 2.49 | 2.54 | 2.36 | 2.34 |
| 均% | 2.35 | 2.45 | 2.58 | 2.48 | 2.52 | 2.51 | 2.54 | 2.35 | 2.33 |
| s | 0.016685 | 0.027685 | 0.028638 | 0.022320 | 0.017892 | 0.016315 | 0.010668 | 0.020445 | 0.011417 |
| CV% | 0.71 | 1.13 | 1.11 | 0.90 | 0.71 | 0.65 | 0.42 | 0.87 | 0.49 |
| 12广东佳纳 | 测定值% | 2.36 | 2.38 | 2.51 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.37 | 2.38 | 2.52 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.36 | 2.38 | 2.51 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.36 | 2.38 | 2.52 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.36 | 2.38 | 2.51 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.36 | 2.38 | 2.52 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 2.37 | 2.38 | 2.51 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| 均% | 2.36 | 2.38 | 2.51 | 2.40 | 2.59 | 2.55 | 2.62 | 2.40 | 2.40 |
| s | 0.001896 | 0 | 0.001975 | 0 | 0 | 0 | 0 | 0 | 0 |
| CV% | 0.08 | 0 | 0.08 | 0 | 0 | 0 | 0 | 0 | 0 |
| 13郴州质检 | 测定值% | 2.27 | 2.41 | 2.49 | 2.36 | 2.61 | 2.56 | 2.58 | 2.21 | 2.36 |
| 2.26 | 2.42 | 2.50 | 2.34 | 2.59 | 2.57 | 2.57 | 2.19 | 2.32 |
| 2.24 | 2.39 | 2.50 | 2.42 | 2.67 | 2.58 | 2.59 | 2.22 | 2.39 |
| 2.27 | 2.42 | 2.51 | 2.31 | 2.58 | 2.46 | 2.58 | 2.25 | 2.32 |
| 2.28 | 2.40 | 2.49 | 2.30 | 2.59 | 2.54 | 2.57 | 2.23 | 2.31 |
| 2.26 | 2.41 | 2.47 | 2.35 | 2.58 | 2.56 | 2.58 | 2.21 | 2.32 |
| 2.29 | 2.39 | 2.52 | 2.33 | 2.58 | 2.57 | 2.57 | 2.25 | 2.34 |
| 均% | 2.27 | 2.41 | 2.50 | 2.34 | 2.60 | 2.55 | 2.58 | 2.22 | 2.34 |
| s | 0.014730 | 0.012457 | 0.017059 | 0.037034 | 0.030502 | 0.042020 | 0.006295 | 0.023489 | 0.029607 |
| CV% | 0.65 | 0.52 | 0.68 | 1.58 | 1.17 | 1.65 | 0.24 | 1.06 | 1.27 |
| 14大冶有色 | 测定值% | 2.37 | 2.48 | 2.60 | 2.53 | 2.53 | 2.57 | 2.54 | 2.31 | 2.27 |
| 2.32 | 2.49 | 2.62 | 2.53 | 2.54 | 2.52 | 2.58 | 2.33 | 2.28 |
| 2.37 | 2.50 | 2.61 | 2.56 | 2.54 | 2.51 | 2.57 | 2.32 | 2.28 |
| 2.35 | 2.51 | 2.59 | 2.57 | 2.57 | 2.57 | 2.58 | 2.33 | 2.29 |
| 2.34 | 2.49 | 2.59 | 2.50 | 2.56 | 2.52 | 2.62 | 2.32 | 2.28 |
| 2.36 | 2.48 | 2.60 | 2.52 | 2.55 | 2.49 | 2.58 | 2.31 | 2.28 |
| 2.32 | 2.49 | 2.61 | 2.55 | 2.55 | 2.51 | 2.60 | 2.33 | 2.28 |
| 2.33 | 2.48 | 2.61 | 2.55 | 2.56 | 2.52 | 2.59 | 2.33 | 2.28 |
| 2.33 | 2.49 | 2.60 | 2.54 | 2.53 | 2.48 | 2.58 | 2.32 | 2.29 |
| 2.35 | 2.50 | 2.59 | 2.48 | 2.56 | 2.50 | 2.53 | 2.32 | 2.29 |
| 2.35 | 2.50 | 2.62 | 2.50 | 2.57 | 2.51 | 2.58 | 2.30 | 2.28 |
| 均% | 2.34 | 2.49 | 2.60 | 2.53 | 2.55 | 2.52 | 2.58 | 2.32 | 2.28 |
| s | 0.018091 | 0.009816 | 0.011201 | 0.027928 | 0.014460 | 0.028572 | 0.024936 | 0.010000 | 0.006030 |
| CV% | 0.77 | 0.39 | 0.43 | 1.10 | 0.57 | 1.13 | 0.97 | 0.43 | 0.26 |
| 15广西测试 | 测定值% | 2.40 | 2.39 | 2.36 | 2.49 | 2.51 | 2.53 | 2.43 | 2.50 | 2.38 |
| 2.43 | 2.41 | 2.45 | 2.47 | 2.51 | 2.72 | 2.52 | 2.60 | 2.39 |
| 2.41 | 2.37 | 2.33 | 2.50 | 2.48 | 2.60 | 2.39 | 2.46 | 2.34 |
| 2.35 | 2.35 | 2.34 | 2.36 | 2.43 | 2.50 | 2.37 | 2.43 | 2.28 |
| 2.39 | 2.36 | 2.27 | 2.50 | 2.47 | 2.58 | 2.40 | 2.45 | 2.31 |
| 2.43 | 2.40 | 2.31 | 2.49 | 2.51 | 2.62 | 2.45 | 2.49 | 2.35 |
| 2.35 | 2.43 | 2.44 | 2.52 | 2.48 | 2.51 | 2.48 | 2.51 | 2.31 |
| 均% | 2.39 | 2.39 | 2.36 | 2.48 | 2.48 | 2.58 | 2.43 | 2.49 | 2.34 |
| s | 0.033594 | 0.028702 | 0.066261 | 0.053184 | 0.029358 | 0.076811 | 0.053184 | 0.055806 | 0.039881 |
| CV% | 1.41 | 1.20 | 2.81 | 2.14 | 1.18 | 2.98 | 2.19 | 2.24 | 1.70 |
| 16中检广西 | 测定值% | 2.32 | 2.43 | 2.50 | 2.38 | 2.48 | 2.51 | 2.50 | 2.32 | 2.35 |
| 2.28 | 2.44 | 2.49 | 2.41 | 2.47 | 2.52 | 2.51 | 2.33 | 2.29 |
| 2.32 | 2.40 | 2.47 | 2.44 | 2.51 | 2.45 | 2.52 | 2.30 | 2.35 |
| 2.32 | 2.38 | 2.49 | 2.45 | 2.54 | 2.47 | 2.50 | 2.30 | 2.34 |
| 2.34 | 2.43 | 2.52 | 2.50 | 2.55 | 2.51 | 2.50 | 2.34 | 2.28 |
| 2.31 | 2.40 | 2.52 | 2.47 | 2.54 | 2.51 | 2.51 | 2.33 | 2.29 |
| 2.26 | 2.45 | 2.51 | 2.37 | 2.48 | 2.52 | 2.50 | 2.34 | 2.32 |
| 2.26 | 2.39 | 2.52 | 2.39 | 2.46 | 2.50 | 2.53 | 2.32 | 2.28 |
| 2.28 | 2.43 | 2.48 | 2.41 | 2.51 | 2.48 | 2.52 | 2.30 | 2.29 |
| 2.32 | 2.42 | 2.51 | 2.43 | 2.52 | 2.49 | 2.50 | 2.32 | 2.30 |
| 2.30 | 2.44 | 2.52 | 2.42 | 2.49 | 2.48 | 2.51 | 2.31 | 2.28 |
| 均% | 2.30 | 2.42 | 2.50 | 2.42 | 2.50 | 2.49 | 2.51 | 2.32 | 2.31 |
| s | 0.02691 | 0.02299 | 0.018 | 0.038962 | 0.03075 | 0.02241 | 0.010542 | 0.01508 | 0.028413 |
| CV% | 1.17 | 0.95 | 0.72 | 1.61 | 1.23 | 0.90 | 0.42 | 0.65 | 1.23 |
| 17国标青岛 | 测  定  值  % | 2.35 | 2.42 | 2.54 | 2.38 | 2.48 | 2.53 | 2.59 | 2.34 | 2.28 |
| 2.34 | 2.40 | 2.56 | 2.39 | 2.49 | 2.48 | 2.61 | 2.36 | 2.30 |
| 2.30 | 2.40 | 2.56 | 2.39 | 2.49 | 2.51 | 2.53 | 2.36 | 2.29 |
| 2.28 | 2.46 | 2.56 | 2.41 | 2.53 | 2.52 | 2.54 | 2.35 | 2.28 |
| 2.28 | 2.39 | 2.54 | 2.40 | 2.52 | 2.53 | 2.52 | 2.33 | 2.30 |
| 2.29 | 2.39 | 2.56 | 2.39 | 2.53 | 2.53 | 2.53 | 2.35 | 2.30 |
| 2.30 | 2.38 | 2.51 | 2.34 | 2.56 | 2.50 | 2.54 | 2.36 | 2.30 |
| 2.32 | 2.44 | 2.55 | 2.32 | 2.53 | 2.50 | 2.54 | 2.36 | 2.29 |
| 2.30 | 2.46 | 2.50 | 2.33 | 2.53 | 2.53 | 2.53 | 2.35 | 2.31 |
| 2.32 | 2.47 | 2.51 | 2.34 | 2.54 | 2.52 | 2.59 | 2.36 | 2.31 |
| 2.31 | 2.42 | 2.52 | 2.35 | 2.55 | 2.51 | 2.54 | 2.35 | 2.30 |
| 均% | 2.31 | 2.42 | 2.54 | 2.37 | 2.52 | 2.51 | 2.55 | 2.35 | 2.30 |
| s | 0.022724 | 0.032079 | 0.023277 | 0.031652 | 0.025726 | 0.016348 | 0.030481 | 0.009816 | 0.010269 |
| CV% | 0.98 | 1.33 | 0.92 | 1.34 | 1.02 | 0.65 | 1.20 | 0.42 | 0.45 |
| 18宜昌邦普 | 测  定  值  % | 2.38•• | 2.59 | 2.52 | 2.50 | 2.53 | 2.50 | 2.53 | 2.44 | 2.36 |
| 2.39•• | 2.60 | 2.55 | 2.44 | 2.45 | 2.48 | 2.47 | 2.31 | 2.28 |
| 2.36•• | 2.58 | 2.53 | 2.41 | 2.46 | 2.56 | 2.53 | 2.41 | 2.29 |
| 2.36•• | 2.51 | 2.62 | 2.30 | 2.50 | 2.57 | 2.51 | 2.30 | 2.34 |
| 2.26•• | 2.55 | 2.51 | 2.32 | 2.55 | 2.62 | 2.52 | 2.35 | 2.27 |
| 2.26•• | 2.49 | 2.59 | 2.39 | 2.57 | 2.56 | 2.56 | 2.40 | 2.26 |
| 2.27•• | 2.48 | 2.42 | 2.42 | 2.49 | 2.61 | 2.54 | 2.38 | 2.31 |
| 2.37•• | 2.41 | 2.50 | 2.37 | 2.58 | 2.53 | 2.51 | 2.45 | 2.28 |
| 2.25•• | 2.42 | 2.45 | 2.35 | 2.45 | 2.54 | 2.57 | 2.39 | 2.39 |
| 2.34•• | 2.45 | 2.46 | 2.45 | 2.54 | 2.61 | 2.62 | 2.31 | 2.30 |
| 2.26•• | 2.55 | 2.59 | 2.41 | 2.59 | 2.60 | 2.49 | 2.42 | 2.36 |
| 均% | 2.32•• | 2.51 | 2.52 | 2.40 | 2.52 | 2.56 | 2.53 | 2.38 | 2.31 |
| s | 0.05724 | 0.06750 | 0.06306 | 0.05870 | 0.05205 | 0.04644 | 0.04094 | 0.05344 | 0.04315 |
| CV% | 2.47 | 2.69 | 2.50 | 2.45 | 2.07 | 1.81 | 1.62 | 2.25 | 1.87 |