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中华人民共和国有色金属行业标准

YS/T XXXXX—XXXX

粗氢氧化镍钴化学分析方法

第4部分：铜、铝、锂、锌、镉、铅、砷含量的测定

电感耦合等离子体原子发射光谱法

Methods for chemical analysis of crude nickel cobalt hydroxide— Part 4：Determination of copper, aluminum, lithium, zinc, cadmium, lead and arsenic contents— Inductively coupled plasma atomic emission spectrometry

(点击此处添加与国际标准一致性程度的标识)

（本草案完成时间：2022年 3月 9日）

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1. 前言

本文件按照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》的规定起草。

本文件是YS/T XXXX《粗氢氧化镍钴化学分析方法》的第4部分。YS/T XXXX已经发布了以下部分：

——第1部分：镍含量的测定 丁二酮肟重量法；

——第2部分：铬、磷、锰含量的测定 电感耦合等离子体原子发射光谱法；

——第3部分：氟离子含量的测定 离子选择性电极法；

——第4部分：铜、铝、锂、锌、镉、铅、砷含量的测定 电感耦合等离子体原子发射光谱法；

——第5部分：水分含量的测定 烘箱干燥法。

——第6部分：盐酸不溶物含量的测定 重量法；

——第7部分：锰含量的测定 电位滴定法。

请注意本文件的某些内容可能涉及专利。本文件的发布机构不承担识别专利的责任。

本文件由全国有色金属标准化技术委员会（SAC/TC 243）提出并归口。

本标准起草单位：广东邦普循环科技有限公司、深圳海关工业品检测技术中心、华友新能源科技（衢州）有限公司、广东省工业分析检测中心、长沙矿冶研究院有限责任公司、格林美股份有限公司、金川集团股份有限公司、国合通用（青岛）测试评价有限公司、中国检验认证集团广西有限公司、紫金铜业有限公司、北矿检测技术有限公司、佛山海关综合技术中心、浙江华友钴业股份有限公司、衢州华友钴新材料有限公司、广东佳纳新能源科技有限公司、湖南邦普循环科技有限公司。

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1. 引言

粗氢氧化镍钴是一种含镍钴元素的二元湿法冶炼中间品，是由锂离子电池废料经预处理、酸溶、除杂、碱沉等湿法富集工艺得到的具有较高利用价值、对环境无污染的产品，可作为生产镍钴锰三元素复合氢氧化物、镍钴锰酸锂、镍或钴的化工盐及其他相关材料的原料。粗氢氧化镍钴产品的化学成分直接影响到产品质量的好坏，建立一套针对粗氢氧化镍钴化学成分的分析方法标准是十分必要的。

YS/T XXXX《粗氢氧化镍钴化学分析方法》由7个部分构成。

——第1部分：镍含量的测定 丁二酮肟重量法；

——第2部分：铬、磷、锰含量的测定 电感耦合等离子体原子发射光谱法；

——第3部分：氟离子含量的测定 离子选择性电极法；

——第4部分：铜、铝、锂、锌、镉、铅、砷含量的测定 电感耦合等离子体原子发射光谱法；

——第5部分：水分含量的测定 烘箱干燥法；

——第6部分：盐酸不溶物含量的测定 重量法；

——第7部分：锰含量的测定 电位滴定法。

铜、铝、锂是区分粗氢氧化镍钴产品与锂离子电池废料的特征指标之一，镉、铅、砷是需要限定的有毒有害元素，锌对下游产品影响较大。本文件的目的在于规范粗氢氧化镍钴中铜、铝、锂、锌、镉、铅、砷杂质元素含量的测试方法及其精密度。由于各金属杂质元素含量均较低，普通的化学分析方法难以满足其测定范围要求。电感耦合等离子体原子发射光谱法具有操作简便、检出限低、精密度高、能同时测定多个元素等优点。电感耦合等离子体原子发射光谱法测定金属杂质元素含量与其它化学成分的检测方法不同，且铜、铝、锂、锌、镉、铅、砷的干扰较铬、磷更小，为减少检测时间，提高标准的实用性，推荐采用工作曲线法。综合考虑，铜、铝、锂、锌、镉、铅、砷含量的测定单独编制为一个部分。本文件的制定为科学、准确的测定粗氢氧化镍钴的铜、铝、锂、锌、镉、铅、砷含量提供了依据，对于减少供需双方之间因检测误差造成的商业纠纷以及促进产品的贸易发展具有重要作用。

粗氢氧化镍钴化学分析方法

第4部分：铜、铝、锂、锌、镉、铅、砷含量的测定

电感耦合等离子体原子发射光谱法

* 1. 范围

本文件规定了粗氢氧化镍钴中铜、铝、锂、锌、镉、铅、砷含量的测定方法。

本文件适用于粗氢氧化镍钴中铜、铝、锂、锌、镉、铅、砷含量的测定。测定范围见表1。

1. 测定范围（质量分数）

|  |  |
| --- | --- |
| 元 素 | 测定范围（质量分数）/% |
| 铜 | 0.010～3.00 |
| 铝 | 0.010～3.00 |
| 锂 | 0.010～3.00 |
| 锌 | 0.010～1.00 |
| 镉 | 0.001 0～0.10 |
| 铅 | 0.001 0～0.10 |
| 砷 | 0.005 0～0.10 |

* 1. 规范性引用文件

下列文件中的内容通过文中的规范性引用而构成本文件必不可少的条款。其中，注日期的引用文件，仅该日期对应的版本适用于本文件；不注日期的引用文件，其最新版本（包括所有的修改单）适用于本文件。

GB/T 6682 分析实验室用水规格和试验方法

GB/T 8170 数值修约规则与极限数值的表示和判定

YS/T 1460—2021 粗氢氧化镍钴

* 1. 术语和定义

本文件没有需要界定的术语和定义。

* 1. 原理

试料用盐酸溶解，于电感耦合等离子体原子发射光谱仪上测定铜、铝、锂、锌、镉、铅、砷的激发强度，在工作曲线上查得各元素浓度并计算质量分数。

* 1. 试剂

除非另有说明，本文件所用试剂均为优级纯的试剂。

水，符合GB/T 6682规定的二级及以上纯度的水。

盐酸（1+1）。

铜标准贮存溶液：称取0.100 0 g金属铜（*w*Cu≥99.99 %）置于250 mL烧杯中，加入10 mL水，加入10 mL硝酸（1+1），低温加热至溶解完全，微沸驱除氮的氧化物，冷却至室温。移入1 00 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg铜。

铝标准贮存溶液：称取0.100 0 g金属铝（*w*Al≥99.99 %）置于250 mL烧杯中，加入10 mL盐酸（1+1），低温加热至溶解完全，冷却至室温。移入100 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg铝。

锂标准贮存溶液：称取0.532 3 g碳酸锂[*w*(Li2CO3)≥99.99%]置于250 mL烧杯中，盖上表面皿，缓慢加入10 mL硝酸（1+1），加热至完全溶解，煮沸数分钟驱赶二氧化碳，冷却至室温，移入1 00 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg锂。

锌标准贮存溶液：称取0.100 0 g金属锌（*w*Zn≥99.99 %）于250 mL烧杯中，加入10 mL盐酸（1+1），低温加热至溶解完全，冷却至室温。移入100 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg锌。

镉标准贮存溶液：称取0.100 0 g金属镉（*w*Cd≥99.99 %）置于250 mL烧杯中，溶于水。移入1 00 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg镉。

铅标准贮存溶液：称取0.159 9g硝酸铅（*w*Pb≥99.99 %）置于250 mL烧杯中，加入10 mL盐酸（1+1），低温加热至溶解完全，微沸数分钟，冷却至室温。移入1 00 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg铅。

砷标准贮存溶液：称取0.132 0 g于硫酸干燥器中干燥至恒重的三氧化二砷（*w*As≥99.99%）置于250 mL烧杯中，加入5 mL氢氧化钠溶液（100 g/L），加热至完全溶解，冷却至室温，移入1 00 mL容量瓶中，用水稀释至刻度，混匀。此溶液1 mL含1 mg砷。

铜、铝、锂、锌混合标准溶液A：各移取10.00 mL铜标准贮存溶液（5.3）、铝标准贮存溶液（5.4）、锂标准贮存溶液（5.5）、锌标准贮存溶液（5.6）置于100 mL容量瓶中，加入10 mL盐酸（5.2），用水稀释至刻度，混匀。此溶液1 mL含铜、铝、锂、锌各100 μg。

铜、铝、锂、锌混合标准溶液B：移取10.00 mL铜、铝、锂、锌混合标准溶液A（5.10）置于100 mL容量瓶中，加入10 mL盐酸（5.2），以水稀释至刻度，混匀。此溶液1 mL含铜、铝、锂、锌各10 μg。

镉、铅、砷混合标准溶液A：各移取10.00 mL镉标准贮存溶液（5.7）、铅标准贮存溶液（5.8）、砷标准贮存溶液（5.9）置于100 mL容量瓶中，加入10 mL盐酸（5.2），用水稀释至刻度，混匀。此溶液1 mL含镉、铅、砷各100 μg。

镉、铅、砷混合标准溶液B：移取20.00 mL镉、铅、砷混合标准溶液A（5.12）置于100 mL容量瓶中，加入10 mL盐酸（5.2），用水稀释至刻度，混匀。此溶液1 mL含镉、铅、砷各20 μg。

* 1. 仪器设备

电感耦合等离子体原子发射光谱仪。

——200 nm时光学分辨率不大于0.007 nm；400 nm时光学分辨率不大于0.020 nm。

推荐的分析谱线见表2。

1. 推荐的分析谱线

|  |  |
| --- | --- |
| 元 素 | 分析谱线/nm |
| 铜 | 217.894 |
| 铝 | 396.152 |
| 锂 | 610.362 |
| 锌 | 206.200 |
| 隔 | 214.438 |
| 铅 | 220.353 |
| 砷 | 189.042 |

* 1. 样品

按YS/T 1460—2021的7.4要求取样与制样。

样品分析前应在105 ℃ ± 2 ℃烘箱中烘干2 h，并置于干燥器中冷却至室温备用。

* 1. 试验步骤
		1. 试料

称取0.20 g（*m*）样品（7），精确至0.000 1 g。

* + 1. 平行试验

平行做两份试验，取其平均值。

* + 1. 空白试验

随同试料做空白试验。

* + 1. 测定

将试料（8.1）置于100 mL烧杯中，用少量水润湿，加入10 mL盐酸（5.2）溶解，低温加热至约微沸5 min ～ 10 min，冷却至室温，移入100 mL（*V*1）容量瓶中，以水稀释至刻度，混匀。干过滤。

当铜、铝、锂、锌含量大于0.50%时，移取10.00 mL（*V*2）试液（8.4.1），置于100 mL（*V*3）容量瓶中，加入10 mL盐酸（5.2），以水稀释至刻度，混匀。

于电感耦合等离子体原子发射光谱仪（6）上，按表2推荐的分析谱线测定空白试液（8.3）和试液（8.4.1或8.4.2）中铜、铝、锂、锌、镉、铅、砷的激发强度。自工作曲线上查得空白试液中待测元素的质量浓度（*ρ*0）和试液中待测元素的质量浓度（*ρ*）。

* + 1. 工作曲线的绘制

按表3移取铜、铝、锂、锌、镉、铅、砷标准溶液置于一组100 mL的容量瓶中，各加入10 mL盐酸（5.1），以水稀释至刻度，混匀，移入干燥塑料瓶中。于电感耦合等离子体原子发射光谱仪上按表2推荐的分析谱线测定系列标准溶液中铜、铝、锂、锌、镉、铅、砷的激发强度，以待测元素的质量浓度为横坐标，对应的激发强度（减去“零”溶液的激发强度）为纵坐标，绘制铜、铝、锂、锌、镉、铅、砷的工作曲线。

1. 标准溶液移取体积

单位为毫升（mL）

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 标准溶液 | 梯度1 | 梯度2 | 梯度3 | 梯度4 | 梯度5 | 梯度6 | 梯度7 |
| 铜、铝、锂、锌混合标准溶液A（5.10） | — | — | — | — | 2.50 | 5.00 | 10.00 |
| 铜、铝、锂、锌混合标准溶液B（5.11） | 0 | 1.00 | 5.00 | 10.00 | — | — | — |
| 镉、铅、砷混合标准溶液B（5.13） | 0 | 0.50 | 1.00 | 2.50 | 5.00 | 10.00 | 20.00 |

* 1. 试验数据处理

各元素含量以该元素的质量分数*wx*计，按公式（1）计算：

…………………………………（1）

式中：

*x* ——铜、铝、锂、锌、镉、铅、砷等被测元素；

*ρ*——自工作曲线上查得试液中被测元素的质量浓度，单位为微克每毫升（μg/mL）；

*ρ*0 ——自工作曲线上查得空白试液中被测元素的浓度，单位为微克每毫升（μg/mL）；

*V*1——试液定容的体积，单位为毫升（mL）；

*V*3——测定试液的体积，单位为毫升（mL）；

*m*——试料的质量，单位为克（g）；

*V*2——分取试液的体积，单位为毫升（mL）。

当测定计算结果≥0.10%时表示到小数点后两位，当0.010%≤计算结果＜0.10%时表示到小数点后三位，当计算结果＜0.010%时表示到小数点后四位，按GB/T 8170的规定进行修约。

* 1. 精密度
		1. 重复性

在重复性条件下获得的两次独立测试结果的测定值，精密度实验原始数据参见附录A。在表3给出的平均值范围内，两个测试结果的绝对差值不超过重复性限（*r*），超过重复性限（*r*）的情况不超过5%，重复性限（*r*）按表4数据采用线性内插法或外延法求得：

1. 重复性限

| 元素 | *w*/% | 重复性限*r*/% |
| --- | --- | --- |
| 铜 | 0.014  | 0.002  |
| 0.078  | 0.006  |
| 0.31  | 0.03  |
| 0.99  | 0.05  |
| 2.78  | 0.11  |
| 铝 | 0.017  | 0.002 |
| 0.089  | 0.005 |
| 0.35  | 0.03 |
| 1.06  | 0.08 |
| 2.85  | 0.11 |
| 锂 | 0.018 | 0.002 |
| 0.083 | 0.006 |
| 0.32 | 0.02 |
| 1.01 | 0.06 |
| 2.76 | 0.17 |
| 锌 | 0.015  | 0.002  |
| 0.069  | 0.005  |
| 0.21  | 0.01  |
| 0.57  | 0.03  |
| 0.95  | 0.05  |
| 镉 | 0.0026  | 0.0004  |
| 0.010  | 0.002  |
| 0.031  | 0.003  |
| 0.059  | 0.004  |
| 0.091  | 0.006  |
| 铅 | 0.0030  | 0.0007  |
| 0.012  | 0.002  |
| 0.033  | 0.004  |
| 0.059  | 0.006  |
| 0.092  | 0.008  |
| 砷 | 0.0050  | 0.0008  |
| 0.010  | 0.002  |
| 0.025  | 0.003  |
| 0.098  | 0.004  |

* + 1. 再现性

在再现性条件下获得的两次独立测试结果的测定值，精密度实验原始数据参见附录A。在表4给出的平均值范围内，两个测试结果的绝对差值不超过再现性限（*R*），超过再现性限（*R*）的情况不超过5%，再现性限（*R*）按表5数据采用线性内插法或外延法求得：

1. 再现性限

|  |  |  |
| --- | --- | --- |
| 元素 | *w*/% | 再现性限*R*/% |
| 铜 | 0.014  | 0.004  |
| 0.078  | 0.012  |
| 0.31  | 0.05  |
| 0.99  | 0.09  |
| 2.78  | 0.21  |
| 铝 | 0.017  | 0.006 |
| 0.089  | 0.014 |
| 0.35  | 0.03 |
| 1.06  | 0.12 |
| 2.85  | 0.25 |
| 锂 | 0.018 | 0.004 |
| 0.083 | 0.012 |
| 0.32 | 0.04 |
| 1.01 | 0.11 |
| 2.76 | 0.22 |
| 锌 | 0.015  | 0.004  |
| 0.069  | 0.010  |
| 0.21  | 0.02  |
| 0.57  | 0.04  |
| 0.95  | 0.10  |
| 镉 | 0.0026  | 0.0007  |
| 0.010  | 0.003  |
| 0.031  | 0.005  |
| 0.059  | 0.006  |
| 0.091  | 0.012  |
| 铅 | 0.0030  | 0.0013  |
| 0.012  | 0.003  |
| 0.033  | 0.008  |
| 0.059  | 0.010  |
| 0.092  | 0.012  |
| 砷 | 0.0050  | 0.0011  |
| 0.010  | 0.003  |
| 0.025  | 0.005  |
| 0.098  | 0.007  |

* 1. 试验报告

本章规定试验报告所包括的内容。至少应给出以下几个方面的内容：

——试验对象；

——本文件编号；

——分析结果及其表示；

——与基本分析步骤的差异；

——观察到的异常现象；

——试验日期。

1.
2. （资料性）
精密度试验原始数据

精密度数据是在2021年由16家实验室对5个不同水平的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7～11次。测定的原始数据见表A.1。

* 1. 铜精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *w*/%（*n*=11） |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0152  | 0.0122  | 0.0128  | 0.0137  | 0.0143  | 0.0124  | 0.0123  | 0.0126  | 0.0125  | 0.0125  | 0.0127  |
| 2 | 0.0732  | 0.0743  | 0.0750  | 0.0765  | 0.0783  | 0.0797  | 0.0768  | 0.0779  | 0.0784  | 0.0759  | 0.0756  |
| 3 | 0.3172  | 0.3150  | 0.3132  | 0.3122  | 0.3133  | 0.3132  | 0.3151  | 0.3139  | 0.3113  | 0.3060  | 0.3079  |
| 4 | 0.9902  | 0.9927  | 0.9650  | 0.9524  | 0.9601  | 0.9464  | 0.9573  | 0.9501  | 0.9500  | 0.9581  | 0.9584  |
| 5 | 2.7909  | 2.7550  | 2.7242  | 2.7302  | 2.7383  | 2.6915  | 2.7036  | 2.6953  | 2.7017  | 2.6995  | 2.6856  |
| 2 | 1 | 0.0132  | 0.0127  | 0.0126  | 0.0135  | 0.0123  | 0.0142  | 0.0133  | 0.0136  | 0.0129  | 0.0127  | 0.0132  |
| 2 | 0.0734  | 0.0724  | 0.0745  | 0.0736  | 0.0767  | 0.0801  | 0.0786  | 0.0769  | 0.0789  | 0.0779  | 0.0775  |
| 3 | 0.3172  | 0.3150  | 0.3132  | 0.3122  | 0.3133  | 0.3132  | 0.3151  | 0.3139  | 0.3113  | 0.3060  | 0.3079  |
| 4 | 0.9892  | 0.9729  | 0.9682  | 0.9425  | 0.9702  | 0.9479  | 0.9637  | 0.9528  | 0.9562  | 0.9618  | 0.9658  |
| 5 | 2.8912  | 2.7760  | 2.7242  | 2.7302  | 2.7183  | 2.6999  | 2.6987  | 2.7163  | 2.7107  | 2.7997  | 2.7864  |
| 3 | 1 | 0.0123  | 0.0133  | 0.0130  | 0.0127  | 0.0129  | 0.0126  | 0.0127  | 0.0124  | 0.0133  | 0.0130  | 0.0125  |
| 2 | 0.0776  | 0.0787  | 0.0784  | 0.0794  | 0.0778  | 0.0759  | 0.0763  | 0.0779  | 0.0784  | 0.0796  | 0.0775  |
| 3 | 0.3119  | 0.3112  | 0.3107  | 0.3092  | 0.3107  | 0.3114  | 0.3137  | 0.3159  | 0.3165  | 0.3149  | 0.3134  |
| 4 | 1.0170  | 1.0130  | 1.0090  | 1.0160  | 1.0250  | 1.0220  | 1.0320  | 1.0160  | 1.0150  | 1.0130  | 1.0200  |
| 5 | 2.8310  | 2.8380  | 2.8300  | 2.8980  | 2.8760  | 2.8840  | 2.8790  | 2.8390  | 2.8820  | 2.8300  | 2.8350  |
| 4 | 1 | 0.0170  | 0.0172  | 0.0171  | 0.0173  | 0.0165  | 0.0167  | 0.0164  | 0.0165  | 0.0165  | — | — |
| 2 | 0.0813  | 0.0823  | 0.0823  | 0.0808  | 0.0840  | 0.0825  | 0.0840  | 0.0825  | 0.0830  | — | — |
| 3 | 0.3149  | 0.3059  | 0.3094  | 0.3079  | 0.3091  | 0.3056  | 0.3036  | 0.3086  | 0.3031  | — | — |
| 4 | 0.9900  | 0.9990  | 1.0075  | 1.0010  | 1.0030  | 0.9980  | 1.0135  | 1.0025  | 1.0085  | — | — |
| 5 | 2.7190  | 2.7379  | 2.7330  | 2.7872  | 2.8188  | 2.8308  | 2.8113  | 2.7407  | 2.7810  | — | — |
| 5 | 1 | 0.0136  | 0.0132  | 0.0135  | 0.0135  | 0.0133  | 0.0124  | 0.0127  | 0.0126  | 0.0128  | 0.0135  | 0.0137  |
| 2 | 0.0780  | 0.0778  | 0.0782  | 0.0783  | 0.0775  | 0.0769  | 0.0779  | 0.0789  | 0.0759  | 0.0769  | 0.0764  |
| 3 | 0.3298  | 0.3362  | 0.3305  | 0.3209  | 0.3299  | 0.3209  | 0.3251  | 0.3301  | 0.3327  | 0.3259  | 0.3295  |
| 4 | 1.0182  | 1.0377  | 1.0173  | 1.0198  | 1.0320  | 1.0211  | 1.0161  | 1.0208  | 1.0211  | 1.0197  | 1.0279  |
| 5 | 2.6933  | 2.8959  | 2.7571  | 2.7002  | 2.7480  | 2.7159  | 2.7123  | 2.7232  | 2.7707  | 2.8008  | 2.7856  |
| 6 | 1 | 0.0145  | 0.0141  | 0.0138  | 0.0136  | 0.0146  | 0.0148  | 0.0143  | 0.0146  | 0.0139  | 0.0142  | 0.0131  |
| 2 | 0.0781  | 0.0774  | 0.0794  | 0.0784  | 0.0795  | 0.0785  | 0.0794  | 0.0777  | 0.0795  | 0.0788  | 0.0775  |
| 3 | 0.3187  | 0.3173  | 0.3161  | 0.3201  | 0.3275  | 0.3196  | 0.3219  | 0.3157  | 0.3175  | 0.3226  | 0.3178  |
| 4 | 0.9807  | 0.9763  | 0.9784  | 0.9672  | 0.9895  | 0.9796  | 0.9855  | 0.9710  | 0.9895  | 0.9817  | 0.9736  |
| 5 | 2.7958  | 2.8304  | 2.7938  | 2.7950  | 2.7918  | 2.7818  | 2.8197  | 2.7895  | 2.7928  | 2.7880  | 2.7713  |
| 7 | 1 | 0.0134  | 0.0127  | 0.0120  | 0.0120  | 0.0122  | 0.0143  | 0.0144  | 0.0134  | 0.0131  | 0.0130  | 0.0127  |
| 2 | 0.0754  | 0.0752  | 0.0751  | 0.0770  | 0.0770  | 0.0745  | 0.0743  | 0.0750  | 0.0747  | 0.0755  | 0.0749  |
| 3 | 0.2950  | 0.2920  | 0.2980  | 0.2980  | 0.2950  | 0.2950  | 0.2980  | 0.2980  | 0.2980  | 0.2940  | 0.2940  |
| 4 | 1.0240  | 1.0280  | 1.0140  | 1.0270  | 1.0360  | 1.0150  | 1.0070  | 1.0180  | 1.0140  | 1.0010  | 1.0230  |
| 5 | 2.8990  | 2.8860  | 2.9100  | 2.9260  | 2.9040  | 2.9150  | 2.8320  | 2.8540  | 2.8660  | 2.8700  | 2.8920  |
| 8 | 1 | 0.0127  | 0.0129  | 0.0143  | 0.0140  | 0.0133  | 0.0133  | 0.0135  | — | — | — | — |
| 2 | 0.0768  | 0.0754  | 0.0737  | 0.0751  | 0.0777  | 0.0747  | 0.0754  | — | — | — | — |
| 3 | 0.3230  | 0.3246  | 0.3330  | 0.3395  | 0.3205  | 0.3265  | 0.3186  | — | — | — | — |
| 4 | 1.0744  | 1.0580  | 1.0408  | 1.0408  | 1.1170  | 1.0079  | 1.0823  | — | — | — | — |
| 5 | 2.9712  | 2.8940  | 2.8446  | 2.9355  | 2.8353  | 2.8545  | 2.8786  | — | — | — | — |
| 9 | 1 | 0.0129  | 0.0127  | 0.0127  | 0.0126  | 0.0127  | 0.0126  | 0.0126  | 0.0126  | 0.0125  | 0.0126  | 0.0125  |
| 2 | 0.0728  | 0.0739  | 0.0746  | 0.0733  | 0.0738  | 0.0732  | 0.0742  | 0.0750  | 0.0735  | 0.0732  | 0.0733  |
| 3 | 0.3116  | 0.3138  | 0.3163  | 0.3167  | 0.3153  | 0.3178  | 0.3174  | 0.3114  | 0.3142  | 0.3146  | 0.3199  |
| 4 | 0.9622  | 0.9552  | 0.9592  | 0.9654  | 0.9611  | 0.9752  | 0.9689  | 0.9585  | 0.9669  | 0.9689  | 0.9635  |
| 5 | 2.6840  | 2.7140  | 2.6810  | 2.7390  | 2.7470  | 2.7820  | 2.7800  | 2.8130  | 2.7340  | 2.7290  | 2.7840  |
| 10 | 1 | 0.0136  | 0.0150  | 0.0142  | 0.0138  | 0.0141  | 0.0136  | 0.0135  | 0.0134  | 0.0130  | 0.0136  | 0.0134  |
| 2 | 0.0759  | 0.0819  | 0.0766  | 0.0744  | 0.0753  | 0.0755  | 0.0837  | 0.0760  | 0.0753  | 0.0755  | 0.0762  |
| 3 | 0.3112  | 0.3095  | 0.3145  | 0.3120  | 0.3131  | 0.3140  | 0.3119  | 0.3109  | 0.3098  | 0.3117  | 0.3122  |
| 4 | 0.9611  | 0.9688  | 0.9647  | 0.9739  | 0.9664  | 0.9737  | 0.9663  | 0.9776  | 0.9837  | 0.9768  | 0.9796  |
| 5 | 2.7661  | 2.7642  | 2.7539  | 2.6932  | 2.6751  | 2.6654  | 2.6812  | 2.6901  | 2.6924  | 2.6761  | 2.6842  |
| 11 | 1 | 0.0170  | 0.0165  | 0.0145  | 0.0160  | 0.0150  | 0.0130  | 0.0150  | 0.0162  | 0.0144  | 0.0152  | 0.0155  |
| 2 | 0.0798  | 0.0762  | 0.0786  | 0.0775  | 0.0801  | 0.0806  | 0.0792  | 0.0794  | 0.0812  | 0.0808  | 0.0810  |
| 3 | 0.2960  | 0.2860  | 0.3030  | 0.3060  | 0.2780  | 0.2760  | 0.2840  | 0.2770  | 0.3010  | 0.2980  | 0.2940  |
| 4 | 1.0050  | 1.0120  | 1.0090  | 0.9950  | 1.0020  | 0.9720  | 0.9560  | 0.9880  | 1.0120  | 0.9820  | 1.0060  |
| 5 | 2.7220  | 2.6700  | 2.7340  | 2.7110  | 2.7440  | 2.7820  | 2.7490  | 2.7140  | 2.7250  | 2.6840  | 2.6920  |
| 12 | 1 | 0.0150  | 0.0160  | 0.0180  | 0.0170  | 0.0170  | 0.0170  | 0.0160  | 0.0160  | 0.0160  | 0.0160  | 0.0160  |
| 2 | 0.0890  | 0.0900  | 0.0990  | 0.0840  | 0.0910  | 0.0850  | 0.0930  | 0.0850  | 0.0900  | 0.0860  | 0.0890  |
| 3 | 0.2900  | 0.2800  | 0.2600  | 0.2600  | 0.2900  | 0.2900  | 0.3100  | 0.3200  | 0.3200  | 0.3300  | 0.3300  |
| 4 | 0.9100  | 0.9600  | 0.9500  | 0.9400  | 0.9500  | 0.9500  | 0.9400  | 0.9400  | 0.9400  | 0.9400  | 0.9300  |
| 5 | 2.6200  | 2.7000  | 2.7700  | 2.7000  | 2.7900  | 2.6700  | 2.7300  | 2.7600  | 2.8100  | 2.7300  | 2.7600  |
| 13 | 1 | 0.0137  | 0.0136  | 0.0132  | 0.0129  | 0.0135  | 0.0137  | 0.0133  | 0.0135  | 0.0134  | 0.0131  | 0.0128  |
| 2 | 0.0778  | 0.0773  | 0.0768  | 0.0747  | 0.0772  | 0.0767  | 0.0764  | 0.0773  | 0.0778  | 0.0769  | 0.0771  |
| 3 | 0.2980  | 0.2984  | 0.2980  | 0.3055  | 0.2974  | 0.2997  | 0.3084  | 0.3063  | 0.3061  | 0.3034  | 0.3153  |
| 4 | 1.0070  | 1.0260  | 1.0130  | 1.0410  | 1.0200  | 1.0320  | 1.0230  | 1.0230  | 1.0290  | 1.0390  | 1.0290  |
| 5 | 2.8700  | 2.9200  | 2.8800  | 2.8800  | 2.8800  | 2.8600  | 2.8600  | 2.8600  | 2.7900  | 2.8700  | 2.8700  |
| 14 | 1 | 0.0140  | 0.0136  | 0.0141  | 0.0137  | 0.0144  | 0.0139  | 0.0136  | 0.0135  | 0.0140  | — | — |
| 2 | 0.0767  | 0.0776  | 0.0772  | 0.0787  | 0.0761  | 0.0784  | 0.0777  | 0.0765  | 0.0760  | — | — |
| 3 | 0.3173  | 0.3056  | 0.3037  | 0.3057  | 0.3108  | 0.3142  | 0.3007  | 0.3041  | 0.3085  | — | — |
| 4 | 0.9646  | 0.9751  | 0.9711  | 0.9786  | 0.9901  | 0.9975  | 1.0015  | 1.0025  | 0.9826  | — | — |
| 5 | 2.7069  | 2.6592  | 2.6775  | 2.7169  | 2.7036  | 2.6718  | 2.7042  | 2.6730  | 2.6786  | — | — |
| 15 | 1 | 0.0140  | 0.0150  | 0.0140  | 0.0130  | 0.0130  | 0.0140  | 0.0130  | 0.0150  | 0.0140  | 0.0140  | 0.0130  |
| 2 | 0.0780  | 0.0760  | 0.0770  | 0.0770  | 0.0830  | 0.0730  | 0.0740  | 0.0750  | 0.0830  | 0.0780  | 0.0760  |
| 3 | 0.3090  | 0.3080  | 0.3100  | 0.3090  | 0.3100  | 0.3090  | 0.3110  | 0.3080  | 0.3100  | 0.3090  | 0.3070  |
| 4 | 0.9950  | 0.9940  | 0.9930  | 0.9940  | 0.9930  | 0.9910  | 0.9930  | 0.9920  | 0.9940  | 0.9930  | 0.9920  |
| 5 | 2.7810  | 2.7810  | 2.7800  | 2.7790  | 2.7810  | 2.7830  | 2.7800  | 2.7790  | 2.7810  | 2.7810  | 2.7800  |
| 16 | 1 | 0.0136  | 0.0132  | 0.0125  | 0.0132  | 0.0136  | 0.0137  | 0.0123  | 0.0133  | 0.0135  | 0.0119  | 0.0136  |
| 2 | 0.0759  | 0.0749  | 0.0750  | 0.0761  | 0.0753  | 0.0771  | 0.0741  | 0.0743  | 0.0762  | 0.0747  | 0.0768  |
| 3 | 0.3121  | 0.3179  | 0.3097  | 0.3078  | 0.3049  | 0.3096  | 0.3154  | 0.3123  | 0.3075  | 0.3069  | 0.3103  |
| 4 | 1.0140  | 1.0162  | 1.0138  | 1.0167  | 1.0122  | 1.0109  | 1.0300  | 1.0272  | 1.0175  | 1.0103  | 1.0054  |
| 5 | 2.7777  | 2.7688  | 2.7871  | 2.8089  | 2.8149  | 2.8138  | 2.8139  | 2.8480  | 2.8434  | 2.7735  | 2.7569  |

* 1. 铝精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0172  | 0.0160  | 0.0160  | 0.0160  | 0.0159  | 0.0162  | 0.0156  | 0.0157  | 0.0160  | 0.0142  | 0.0164  |
| 2 | 0.0874  | 0.0875  | 0.0864  | 0.0833  | 0.0884  | 0.0834  | 0.0858  | 0.0852  | 0.0854  | 0.0893  | 0.0872  |
| 3 | 0.3549  | 0.3501  | 0.3531  | 0.3511  | 0.3433  | 0.3471  | 0.3539  | 0.3530  | 0.3541  | 0.3520  | 0.3532  |
| 4 | 1.0895  | 1.0845  | 1.0797  | 1.0830  | 1.0797  | 1.0793  | 1.0793  | 1.0709  | 1.0836  | 1.0773  | 1.0752  |
| 5 | 2.7964  | 2.8130  | 2.8371  | 2.8011  | 2.8258  | 2.7852  | 2.8273  | 2.8209  | 2.9234  | 2.8942  | 2.8874  |
| 2 | 1 | 0.0168  | 0.0162  | 0.0159  | 0.0164  | 0.0160  | 0.0165  | 0.0158  | 0.0158  | 0.0161  | 0.0172  | 0.0166  |
| 2 | 0.0869  | 0.0857  | 0.0848  | 0.0853  | 0.0852  | 0.0846  | 0.0862  | 0.0882  | 0.0874  | 0.0839  | 0.0849  |
| 3 | 0.3508  | 0.3428  | 0.3552  | 0.3527  | 0.3486  | 0.3498  | 0.3516  | 0.3530  | 0.3594  | 0.3512  | 0.3489  |
| 4 | 1.0895  | 1.0845  | 1.0797  | 1.0830  | 1.0797  | 1.0793  | 1.0793  | 1.0709  | 1.0836  | 1.0773  | 1.0752  |
| 5 | 2.8079  | 2.8103  | 2.8130  | 2.8011  | 2.8246  | 2.8125  | 2.8361  | 2.8219  | 2.8956  | 2.8274  | 2.7986  |
| 3 | 1 | 0.0185  | 0.0179  | 0.0172  | 0.0176  | 0.0177  | 0.0174  | 0.0176  | 0.0178  | 0.0178  | 0.0169  | 0.0176  |
| 2 | 0.0834  | 0.0858  | 0.0843  | 0.0834  | 0.0837  | 0.0865  | 0.0866  | 0.0857  | 0.0843  | 0.0837  | 0.0848  |
| 3 | 0.3457  | 0.3476  | 0.3560  | 0.3499  | 0.3524  | 0.3466  | 0.3467  | 0.3622  | 0.3516  | 0.3566  | 0.3544  |
| 4 | 1.0540  | 1.0550  | 1.0470  | 1.0500  | 1.0510  | 1.0550  | 1.0620  | 1.0480  | 1.0430  | 1.0450  | 1.0490  |
| 5 | 2.8800  | 2.8810  | 2.9060  | 2.9240  | 2.9060  | 2.9500  | 2.9310  | 2.9380  | 2.9240  | 2.9160  | 2.8670  |
| 4 | 1 | 0.0171  | 0.0173  | 0.0176  | 0.0166  | 0.0163  | 0.0164  | 0.0167  | 0.0170  | 0.0169  | — | — |
| 2 | 0.0891  | 0.0896  | 0.0896  | 0.0896  | 0.0879  | 0.0879  | 0.0879  | 0.0879  | 0.0889  | — | — |
| 3 | 0.3406  | 0.3426  | 0.3411  | 0.3451  | 0.3444  | 0.3449  | 0.3454  | 0.3449  | 0.3489  | — | — |
| 4 | 1.0374  | 1.0250  | 1.0269  | 1.0195  | 1.0284  | 1.0234  | 1.0279  | 1.0209  | 1.0209  | — | — |
| 5 | 2.7369  | 2.7304  | 2.7250  | 2.7414  | 2.7364  | 2.7349  | 2.7534  | 2.7294  | 2.7434  | — | — |
| 5 | 1 | 0.0195  | 0.0188  | 0.0187  | 0.0179  | 0.0187  | 0.0194  | 0.0176  | 0.0178  | 0.0175  | 0.0191  | 0.0176  |
| 2 | 0.0923  | 0.0903  | 0.0917  | 0.0914  | 0.0921  | 0.0918  | 0.0902  | 0.0912  | 0.0906  | 0.0919  | 0.0902  |
| 3 | 0.3535  | 0.3559  | 0.3501  | 0.3511  | 0.3503  | 0.3571  | 0.3542  | 0.3543  | 0.3560  | 0.3539  | 0.3522  |
| 4 | 1.0458  | 1.0461  | 1.0379  | 1.0398  | 1.0404  | 1.0393  | 1.0495  | 1.0390  | 1.0437  | 1.0477  | 1.0355  |
| 5 | 2.7935  | 2.8024  | 2.8532  | 2.8101  | 2.8112  | 2.8802  | 2.7203  | 2.8231  | 2.9030  | 2.7982  | 2.7874  |
| 6 | 1 | 0.0163  | 0.0168  | 0.0161  | 0.0172  | 0.0159  | 0.0171  | 0.0165  | 0.0163  | 0.0159  | 0.0163  | 0.0159  |
| 2 | 0.0792  | 0.0815  | 0.0784  | 0.0799  | 0.0819  | 0.0782  | 0.0796  | 0.0795  | 0.0809  | 0.0786  | 0.0795  |
| 3 | 0.3552  | 0.3651  | 0.3662  | 0.3518  | 0.3614  | 0.3514  | 0.3582  | 0.3626  | 0.3624  | 0.3641  | 0.3750  |
| 4 | 1.0244  | 1.1218  | 1.0593  | 1.1142  | 1.1195  | 1.0870  | 1.0706  | 1.1197  | 1.1195  | 1.0914  | 1.0898  |
| 5 | 2.8456  | 2.8268  | 2.8907  | 2.7117  | 2.8117  | 2.8977  | 2.7929  | 2.9717  | 2.9768  | 2.8578  | 2.8602  |
| 7 | 1\* | 0.0159  | 0.0154  | 0.0158  | 0.0161  | 0.0161  | 0.0163  | 0.0162  | 0.0150  | 0.0149  | 0.0151  | 0.0148  |
| 2 | 0.0897  | 0.0867  | 0.0852  | 0.0919  | 0.0867  | 0.0840  | 0.0869  | 0.0880  | 0.0853  | 0.0818  | 0.0839  |
| 3 | 0.3440  | 0.3450  | 0.3530  | 0.3430  | 0.3530  | 0.3590  | 0.3580  | 0.3610  | 0.3620  | 0.3620  | 0.3610  |
| 4 | 1.1080  | 1.1090  | 1.1180  | 1.1110  | 1.1170  | 1.1210  | 1.1320  | 1.1390  | 1.1180  | 1.1280  | 1.1350  |
| 5 | 2.8860  | 2.9260  | 2.9240  | 2.9460  | 2.9180  | 2.9470  | 2.9920  | 2.9930  | 2.9920  | 2.9520  | 2.9720  |
| 8 | 1 | 0.0183  | 0.0170  | 0.0164  | 0.0164  | 0.0183  | 0.0170  | 0.0178  | — | — | — | — |
| 2 | 0.0834  | 0.0830  | 0.0812  | 0.0851  | 0.0908  | 0.0882  | 0.0875  | — | — | — | — |
| 3 | 0.3332  | 0.3580  | 0.3689  | 0.3527  | 0.3684  | 0.3425  | 0.3618  | — | — | — | — |
| 4 | 1.0552  | 1.0715  | 1.1053  | 1.0861  | 1.1016  | 1.0823  | 1.0789  | — | — | — | — |
| 5 | 3.0026  | 3.0474  | 3.0956  | 3.0384  | 3.1163  | 3.0428  | 3.0617  | — | — | — | — |
| 9 | 1 | 0.0168  | 0.0155  | 0.0156  | 0.0158  | 0.0155  | 0.0154  | 0.0158  | 0.0156  | 0.0153  | 0.0156  | 0.0155  |
| 2 | 0.0861  | 0.0859  | 0.0862  | 0.0859  | 0.0866  | 0.0851  | 0.0860  | 0.0864  | 0.0863  | 0.0866  | 0.0864  |
| 3 | 0.3423  | 0.3501  | 0.3479  | 0.3526  | 0.3535  | 0.3527  | 0.3397  | 0.3547  | 0.3567  | 0.3487  | 0.3496  |
| 4 | 1.0910  | 1.1230  | 1.1180  | 1.1320  | 1.1160  | 1.1160  | 1.1170  | 1.1050  | 1.0950  | 1.0880  | 1.1200  |
| 5 | 2.8010  | 2.9130  | 2.8870  | 2.7400  | 2.8620  | 2.8780  | 2.9090  | 2.9020  | 2.8430  | 2.8520  | 2.7990  |
| 10 | 1 | 0.0175  | 0.0173  | 0.0173  | 0.0173  | 0.0173  | 0.0170  | 0.0172  | 0.0175  | 0.0170  | 0.0174  | 0.0176  |
| 2 | 0.0904  | 0.0919  | 0.0909  | 0.0918  | 0.0930  | 0.0920  | 0.0915  | 0.0915  | 0.0927  | 0.0928  | 0.0891  |
| 3 | 0.3325  | 0.3484  | 0.3280  | 0.3314  | 0.3589  | 0.3474  | 0.3478  | 0.3537  | 0.3531  | 0.3527  | 0.3542  |
| 4 | 1.0691  | 1.0792  | 1.0723  | 1.0674  | 1.0641  | 1.0732  | 1.0633  | 1.0624  | 1.0651  | 1.0712  | 1.0643  |
| 5 | 2.8882  | 2.9313  | 2.8851  | 2.9502  | 2.9371  | 2.9512  | 2.9323  | 2.8713  | 2.8972  | 2.9041  | 2.8640  |
| 11 | 1\* | 0.0167  | 0.0178  | 0.0164  | 0.0163  | 0.0172  | 0.0181  | 0.0185  | 0.0186  | 0.0174  | 0.0162  | 0.0166  |
| 2\* | 0.0893  | 0.0912  | 0.0932  | 0.0906  | 0.0913  | 0.0904  | 0.0911  | 0.0892  | 0.0894  | 0.0882  | 0.0883  |
| 3 | 0.3350  | 0.3330  | 0.3620  | 0.3660  | 0.3280  | 0.3440  | 0.3640  | 0.3550  | 0.3580  | 0.3420  | 0.3380  |
| 4 | 1.0250  | 1.0230  | 1.0460  | 1.0520  | 1.0320  | 1.0330  | 1.0280  | 1.0260  | 1.0440  | 1.0420  | 1.0490  |
| 5 | 2.7450  | 2.7250  | 2.7350  | 2.7550  | 2.7830  | 2.8110  | 2.7620  | 2.7510  | 2.7040  | 2.7120  | 2.7650  |
| 12 | 1 | 0.0250  | 0.0220  | 0.0240  | 0.0240  | 0.0230  | 0.0210  | 0.0250  | 0.0230  | 0.0240  | 0.0240  | 0.0250  |
| 2 | 0.0910  | 0.0950  | 0.0940  | 0.0930  | 0.0960  | 0.0980  | 0.0950  | 0.0950  | 0.0950  | 0.0930  | 0.0960  |
| 3 | 0.3400  | 0.3400  | 0.3700  | 0.3600  | 0.3800  | 0.3600  | 0.3800  | 0.3800  | 0.4000  | 0.3900  | 0.3900  |
| 4 | 0.9500  | 0.8800  | 0.9100  | 1.0200  | 1.0000  | 1.0200  | 1.1400  | 1.1600  | 1.1700  | 1.1800  | 1.1800  |
| 5 | 2.8000  | 3.0900  | 2.8700  | 2.9600  | 3.1700  | 3.1500  | 3.1300  | 2.9500  | 3.1200  | 3.1100  | 3.1100  |
| 13 | 1 | 0.0144  | 0.0145  | 0.0148  | 0.0145  | 0.0148  | 0.0153  | 0.0178  | 0.0149  | 0.0148  | 0.0148  | 0.0146  |
| 2 | 0.0954  | 0.0987  | 0.0999  | 0.1017  | 0.1011  | 0.0998  | 0.0998  | 0.0994  | 0.1012  | 0.1019  | 0.0977  |
| 3 | 0.3510  | 0.3560  | 0.3520  | 0.3490  | 0.3500  | 0.3410  | 0.3460  | 0.3470  | 0.3320  | 0.3380  | 0.3420  |
| 4 | 1.0010  | 1.0070  | 0.9930  | 1.0160  | 0.9890  | 0.9970  | 1.0200  | 1.0110  | 0.9900  | 0.9920  | 1.0140  |
| 5 | 2.7400  | 2.6800  | 2.6600  | 2.7100  | 2.7400  | 2.7100  | 2.7100  | 2.7600  | 2.7300  | 2.7200  | 2.7400  |
| 14 | 1 | 0.0163  | 0.0169  | 0.0156  | 0.0160  | 0.0157  | 0.0165  | 0.0160  | 0.0159  | 0.0158  | — | — |
| 2 | 0.0919  | 0.0957  | 0.0916  | 0.0929  | 0.0939  | 0.0919  | 0.0938  | 0.0919  | 0.0928  | — | — |
| 3 | 0.3589  | 0.3592  | 0.3648  | 0.3632  | 0.3566  | 0.3615  | 0.3679  | 0.3628  | 0.3602  | — | — |
| 4 | 0.9791  | 0.9527  | 0.9515  | 0.9580  | 0.9520  | 0.9543  | 0.9846  | 0.9566  | 0.9671  | — | — |
| 5 | 2.6939  | 2.6803  | 2.7602  | 2.7284  | 2.5810  | 2.6349  | 2.6214  | 2.6598  | 2.6171  | — | — |
| 15 | 1 | 0.0180  | 0.0170  | 0.0180  | 0.0170  | 0.0170  | 0.0160  | 0.0180  | 0.0190  | 0.0160  | 0.0170  | 0.0190  |
| 2 | 0.0890  | 0.0870  | 0.0860  | 0.0880  | 0.0860  | 0.0870  | 0.0880  | 0.0860  | 0.0890  | 0.0870  | 0.0860  |
| 3 | 0.3530  | 0.3510  | 0.3570  | 0.3540  | 0.3520  | 0.3560  | 0.3530  | 0.3560  | 0.3520  | 0.3520  | 0.3540  |
| 4 | 1.0700  | 1.0670  | 1.0660  | 1.0620  | 1.0650  | 1.0650  | 1.0630  | 1.0680  | 1.0650  | 1.0690  | 1.0680  |
| 5 | 2.8600  | 2.8550  | 2.8610  | 2.8480  | 2.8570  | 2.8540  | 2.8520  | 2.8610  | 2.8560  | 2.8570  | 2.8590  |
| 16 | 1 | 0.0172  | 0.0173  | 0.0173  | 0.0174  | 0.0174  | 0.0175  | 0.0172  | 0.0175  | 0.0172  | 0.0163  | 0.0154  |
| 2 | 0.0847  | 0.0852  | 0.0881  | 0.0882  | 0.0877  | 0.0876  | 0.0876  | 0.0871  | 0.0875  | 0.0869  | 0.0877  |
| 3 | 0.3447  | 0.3460  | 0.3479  | 0.3469  | 0.3468  | 0.3477  | 0.3487  | 0.3485  | 0.3468  | 0.3464  | 0.3457  |
| 4 | 1.0546  | 1.0524  | 1.0501  | 1.0728  | 1.0752  | 1.0797  | 1.0897  | 1.0945  | 1.0466  | 1.0613  | 1.0637  |
| 5 | 2.8491  | 2.8723  | 2.8858  | 2.8821  | 2.8883  | 2.8922  | 2.9386  | 2.9508  | 2.8478  | 2.8399  | 2.8536  |

* 1. 锂精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0177  | 0.0184  | 0.0182  | 0.0177  | 0.0180  | 0.0174  | 0.0182  | 0.0185  | 0.0182  | 0.0155  | 0.0155  |
| 2 | 0.0779  | 0.0857  | 0.0863  | 0.0862  | 0.0857  | 0.0782  | 0.0793  | 0.0793  | 0.0820  | 0.0862  | 0.0857  |
| 3 | 0.3204  | 0.3094  | 0.3119  | 0.3149  | 0.3012  | 0.3098  | 0.3108  | 0.3077  | 0.3102  | 0.3203  | 0.3189  |
| 4 | 0.9832  | 1.0164  | 0.9835  | 1.0233  | 0.9677  | 0.9907  | 0.9528  | 0.9707  | 1.0390  | 1.0126  | 0.9884  |
| 5 | 2.5819  | 2.7553  | 2.8954  | 2.8229  | 2.7026  | 2.6236  | 2.5652  | 2.7127  | 2.7686  | 2.7201  | 2.8239  |
| 2 | 1 | 0.0172  | 0.0168  | 0.0189  | 0.0170  | 0.0181  | 0.0175  | 0.0186  | 0.0181  | 0.0180  | 0.0175  | 0.0167  |
| 2 | 0.0779  | 0.0857  | 0.0863  | 0.0862  | 0.0857  | 0.0782  | 0.0793  | 0.0793  | 0.0820  | 0.0862  | 0.0857  |
| 3 | 0.3212  | 0.3194  | 0.3101  | 0.3126  | 0.3012  | 0.3098  | 0.3128  | 0.3177  | 0.3089  | 0.3243  | 0.3192  |
| 4 | 0.9932  | 1.0106  | 0.9869  | 1.0022  | 0.9689  | 0.9987  | 0.9662  | 0.9787  | 1.0292  | 1.0261  | 0.9998  |
| 5 | 2.6918  | 2.7355  | 2.8246  | 2.8032  | 2.7152  | 2.6863  | 2.6954  | 2.7089  | 2.8122  | 2.7095  | 2.7768  |
| 3 | 1 | 0.0196  | 0.0206  | 0.0200  | 0.0200  | 0.0198  | 0.0205  | 0.0199  | 0.0198  | 0.0200  | 0.0199  | 0.0198  |
| 2 | 0.0894  | 0.0890  | 0.0871  | 0.0880  | 0.0886  | 0.0886  | 0.0889  | 0.0880  | 0.0878  | 0.0875  | 0.0883  |
| 3 | 0.3296  | 0.3302  | 0.3309  | 0.3388  | 0.3361  | 0.3350  | 0.3361  | 0.3372  | 0.3313  | 0.3302  | 0.3372  |
| 4 | 1.0260  | 1.0070  | 1.0050  | 1.0180  | 1.0130  | 1.0270  | 1.0140  | 1.0130  | 0.9961  | 0.9881  | 0.9712  |
| 5 | 2.8970  | 2.7770  | 2.8540  | 2.8290  | 2.8500  | 2.8060  | 2.8030  | 2.9320  | 2.8840  | 2.5700  | 2.8890  |
| 4 | 1 | 0.0191  | 0.0195  | 0.0191  | 0.0195  | 0.0183  | 0.0182  | 0.0183  | 0.0182  | 0.0183  | — | — |
| 2\* | 0.0893  | 0.0883  | 0.0873  | 0.0878  | 0.0887  | 0.0877  | 0.0872  | 0.0867  | 0.0872  | — | — |
| 3 | 0.3312  | 0.3347  | 0.3352  | 0.3297  | 0.3315  | 0.3335  | 0.3290  | 0.3305  | 0.3320  | — | — |
| 4 | 1.0219  | 1.0368  | 1.0264  | 1.0249  | 1.0534  | 1.0514  | 1.0604  | 1.0584  | 1.0494  | — | — |
| 5 | 3.0251  | 3.0690  | 3.0596  | 3.0281  | 2.7536  | 2.7089  | 2.7615  | 2.7546  | 2.7362  | — | — |
| 5 | 1 | 0.0179  | 0.0171  | 0.0179  | 0.0178  | 0.0182  | 0.0176  | 0.0180  | 0.0185  | 0.0172  | 0.0175  | 0.0175  |
| 2 | 0.0823  | 0.0834  | 0.0878  | 0.0859  | 0.0849  | 0.0832  | 0.0850  | 0.0843  | 0.0829  | 0.0844  | 0.0875  |
| 3 | 0.3084  | 0.3194  | 0.3100  | 0.3053  | 0.3144  | 0.3108  | 0.3098  | 0.3125  | 0.3098  | 0.3059  | 0.3077  |
| 4 | 1.0107  | 1.0111  | 1.0023  | 1.0098  | 1.0186  | 0.9986  | 0.9789  | 0.9890  | 1.0378  | 1.0141  | 0.9898  |
| 5 | 2.7575  | 2.6945  | 2.7351  | 2.7356  | 2.7026  | 2.7236  | 2.6652  | 2.7524  | 2.7754  | 2.7690  | 2.7239  |
| 6 | 1 | 0.0177  | 0.0175  | 0.0169  | 0.0182  | 0.0172  | 0.0183  | 0.0172  | 0.0171  | 0.0175  | 0.0183  | 0.0189  |
| 2 | 0.0798  | 0.0805  | 0.0800  | 0.0797  | 0.0794  | 0.0820  | 0.0798  | 0.0794  | 0.0794  | 0.0800  | 0.0783  |
| 3 | 0.3076  | 0.3107  | 0.3068  | 0.3073  | 0.3063  | 0.3062  | 0.3120  | 0.3071  | 0.3063  | 0.3071  | 0.3046  |
| 4 | 0.9855  | 0.9805  | 0.9831  | 0.9848  | 0.9967  | 0.9845  | 0.9839  | 0.9955  | 0.9967  | 0.9820  | 0.9788  |
| 5 | 2.8147  | 2.8774  | 2.8387  | 2.8121  | 2.8023  | 2.8320  | 2.8932  | 2.9074  | 2.8123  | 2.8080  | 2.8510  |
| 7 | 1 | 0.0166  | 0.0161  | 0.0161  | 0.0162  | 0.0162  | 0.0166  | 0.0165  | 0.0164  | 0.0163  | 0.0163  | 0.0165  |
| 2 | 0.0768  | 0.0744  | 0.0752  | 0.0753  | 0.0753  | 0.0765  | 0.0797  | 0.0770  | 0.0772  | 0.0768  | 0.0758  |
| 3 | 0.3000  | 0.3040  | 0.2960  | 0.3010  | 0.2980  | 0.3090  | 0.3020  | 0.3040  | 0.3030  | 0.2990  | 0.3080  |
| 4 | 0.9430  | 1.0640  | 0.9610  | 0.9210  | 0.9760  | 0.9610  | 0.9680  | 0.9700  | 0.9640  | 0.9550  | 0.9650  |
| 5 | 2.7460  | 2.7280  | 2.7830  | 2.7570  | 2.7470  | 2.7340  | 2.8270  | 2.8370  | 2.7890  | 2.7920  | 2.7530  |
| 8 | 1 | 0.0183  | 0.0173  | 0.0181  | 0.0184  | 0.0174  | 0.0180  | 0.0175  | — | — | — | — |
| 2 | 0.0853  | 0.0865  | 0.0846  | 0.0851  | 0.0865  | 0.0864  | 0.0876  | — | — | — | — |
| 3 | 0.3333  | 0.3230  | 0.3220  | 0.3338  | 0.3248  | 0.3215  | 0.3279  | — | — | — | — |
| 4 | 1.0348  | 1.0163  | 1.0372  | 0.9977  | 1.0553  | 0.9987  | 1.0342  | — | — | — | — |
| 5 | 2.8460  | 2.7351  | 2.7870  | 2.8547  | 2.8543  | 2.7831  | 2.7675  | — | — | — | — |
| 9 | 1 | 0.0180  | 0.0171  | 0.0174  | 0.0177  | 0.0174  | 0.0178  | 0.0171  | 0.0182  | 0.0172  | 0.0176  | 0.0166  |
| 2 | 0.0853  | 0.0828  | 0.0821  | 0.0842  | 0.0825  | 0.0834  | 0.0830  | 0.0830  | 0.0840  | 0.0841  | 0.0820  |
| 3 | 0.3073  | 0.3075  | 0.3070  | 0.3068  | 0.3080  | 0.3085  | 0.3072  | 0.3108  | 0.3105  | 0.3065  | 0.3133  |
| 4 | 1.0130  | 0.9967  | 1.0080  | 1.0270  | 1.0140  | 1.0260  | 0.9991  | 0.9993  | 1.0020  | 1.0300  | 1.0350  |
| 5 | 2.7440  | 2.7620  | 2.8010  | 2.7730  | 2.7350  | 2.7020  | 2.7090  | 2.7170  | 2.6710  | 2.6990  | 2.7520  |
| 10 | 1 | 0.0175  | 0.0162  | 0.0169  | 0.0180  | 0.0172  | 0.0159  | 0.0166  | 0.0168  | 0.0176  | 0.0158  | 0.0180  |
| 2 | 0.0855  | 0.0797  | 0.0867  | 0.0828  | 0.0826  | 0.0849  | 0.0860  | 0.0801  | 0.0798  | 0.0808  | 0.0855  |
| 3 | 0.3198  | 0.3068  | 0.3088  | 0.3155  | 0.3189  | 0.3088  | 0.3046  | 0.3188  | 0.3194  | 0.3102  | 0.3136  |
| 4 | 0.9886  | 1.0166  | 1.0299  | 0.9998  | 0.9896  | 0.9906  | 1.0089  | 1.0122  | 0.9836  | 0.9900  | 0.9938  |
| 5 | 2.5816  | 2.7558  | 2.6080  | 2.8066  | 2.7749  | 2.6898  | 2.6062  | 2.7368  | 2.7980  | 2.8802  | 2.6060  |
| 11 | 1 | 0.0177  | 0.0184  | 0.0182  | 0.0177  | 0.0180  | 0.0174  | 0.0182  | 0.0185  | 0.0182  | 0.0155  | 0.0155  |
| 2\* | 0.0785  | 0.0810  | 0.0810  | 0.0813  | 0.0794  | 0.0798  | 0.0774  | 0.0782  | 0.0774  | 0.0776  | 0.0782  |
| 3\* | 0.3170  | 0.3110  | 0.3140  | 0.3100  | 0.3100  | 0.3100  | 0.3340  | 0.3240  | 0.3260  | 0.3360  | 0.3420  |
| 4\* | 1.0140  | 1.0450  | 1.0230  | 1.0030  | 1.0020  | 1.0060  | 1.0240  | 1.0330  | 1.0160  | 1.0180  | 1.0330  |
| 5\* | 2.7500  | 2.6420  | 2.7320  | 2.7380  | 2.8220  | 2.8120  | 2.8010  | 2.7680  | 2.7820  | 2.7740  | 2.7620  |
| 12 | 1 | 0.0180  | 0.0190  | 0.0180  | 0.0190  | 0.0210  | 0.0200  | 0.0200  | 0.0200  | 0.0200  | 0.0200  | 0.0200  |
| 2 | 0.0670  | 0.0590  | 0.0670  | 0.0890  | 0.0740  | 0.0760  | 0.0930  | 0.0910  | 0.0830  | 0.0960  | 0.0970  |
| 3 | 0.3000  | 0.3000  | 0.3600  | 0.3700  | 0.3800  | 0.3600  | 0.3800  | 0.3700  | 0.4200  | 0.3800  | 0.3900  |
| 4 | 1.1200  | 1.1600  | 1.0700  | 1.0900  | 1.1200  | 1.1000  | 1.1900  | 1.0400  | 1.1800  | 1.2200  | 1.0900  |
| 5 | 3.1800  | 3.0300  | 2.6700  | 3.1300  | 2.9500  | 2.9900  | 3.2100  | 3.0400  | 2.8600  | 3.0100  | 3.1800  |
| 13 | 1 | 0.0175  | 0.0178  | 0.0173  | 0.0181  | 0.0177  | 0.0178  | 0.0176  | 0.0176  | 0.0182  | 0.0176  | 0.0177  |
| 2 | 0.0749  | 0.0751  | 0.0751  | 0.0756  | 0.0750  | 0.0749  | 0.0774  | 0.0770  | 0.0753  | 0.0755  | 0.0781  |
| 3 | 0.3260  | 0.3300  | 0.3280  | 0.3200  | 0.3170  | 0.3110  | 0.3190  | 0.3130  | 0.3040  | 0.3110  | 0.3100  |
| 4 | 1.0790  | 1.0430  | 1.0620  | 1.0700  | 0.9900  | 1.1140  | 1.0770  | 1.1230  | 1.0860  | 1.0760  | 1.1070  |
| 5 | 2.6200  | 2.6700  | 2.6700  | 2.6700  | 2.7000  | 2.7600  | 2.8300  | 2.7800  | 2.8000  | 2.7700  | 2.6800  |
| 14 | 1 | 0.0190  | 0.0185  | 0.0192  | 0.0184  | 0.0190  | 0.0190  | 0.0186  | 0.0184  | 0.0191  | — | — |
| 2 | 0.0894  | 0.0830  | 0.0837  | 0.0855  | 0.0853  | 0.0864  | 0.0811  | 0.0851  | 0.0835  | — | — |
| 3 | 0.3229  | 0.3249  | 0.3306  | 0.3259  | 0.3229  | 0.3243  | 0.3340  | 0.3279  | 0.3266  | — | — |
| 4 | 0.9217  | 0.9417  | 0.9746  | 0.9352  | 0.9170  | 0.9144  | 0.9345  | 0.8816  | 0.9099  | — | — |
| 5\* | 2.6575  | 2.6996  | 2.6737  | 2.6750  | 2.8051  | 2.6615  | 2.7516  | 2.7302  | 2.6987  | — | — |
| 15 | 1 | 0.0180  | 0.0170  | 0.0190  | 0.0170  | 0.0180  | 0.0180  | 0.0160  | 0.0190  | 0.0180  | 0.0170  | 0.0190  |
| 2 | 0.0860  | 0.0870  | 0.0820  | 0.0840  | 0.0840  | 0.0880  | 0.0840  | 0.0860  | 0.0870  | 0.0840  | 0.0870  |
| 3 | 0.3240  | 0.3260  | 0.3250  | 0.3190  | 0.3280  | 0.3250  | 0.3290  | 0.3200  | 0.3240  | 0.3280  | 0.3200  |
| 4 | 1.0270  | 1.0190  | 1.0210  | 1.0140  | 1.0170  | 1.0240  | 1.0110  | 1.0160  | 1.0290  | 1.0250  | 1.0320  |
| 5 | 2.7840  | 2.7740  | 2.7850  | 2.7960  | 2.7510  | 2.7650  | 2.7880  | 2.7650  | 2.7960  | 2.7700  | 2.7930  |
| 16 | 1 | 0.0160  | 0.0155  | 0.0156  | 0.0173  | 0.0170  | 0.0170  | 0.0166  | 0.0162  | 0.0159  | 0.0163  | 0.0178  |
| 2 | 0.0935  | 0.0954  | 0.0947  | 0.0927  | 0.0924  | 0.0914  | 0.0923  | 0.0921  | 0.0918  | 0.0919  | 0.0923  |
| 3 | 0.3262  | 0.3237  | 0.3334  | 0.3312  | 0.3313  | 0.3314  | 0.3299  | 0.3287  | 0.3334  | 0.3325  | 0.3319  |
| 4 | 1.0204  | 1.0336  | 1.0206  | 1.0485  | 1.0607  | 1.0430  | 1.0510  | 1.0657  | 1.0307  | 1.0093  | 1.0123  |
| 5 | 2.7055  | 2.7384  | 2.7447  | 2.7122  | 2.7510  | 2.7570  | 2.7341  | 2.7674  | 2.7435  | 2.7243  | 2.7003  |

* 1. 锌精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0159  | 0.0158  | 0.0158  | 0.0155  | 0.0156  | 0.0155  | 0.0153  | 0.0174  | 0.0179  | 0.0144  | 0.0145  |
| 2 | 0.0693  | 0.0687  | 0.0711  | 0.0697  | 0.0701  | 0.0693  | 0.0699  | 0.0693  | 0.0699  | 0.0692  | 0.0678  |
| 3 | 0.2010  | 0.2011  | 0.2017  | 0.2023  | 0.2023  | 0.2002  | 0.2020  | 0.2018  | 0.2012  | 0.2079  | 0.2035  |
| 4 | 0.5793  | 0.5783  | 0.5820  | 0.5811  | 0.5840  | 0.5798  | 0.5788  | 0.5809  | 0.5791  | 0.5515  | 0.5659  |
| 5 | 0.9718  | 0.9731  | 0.9476  | 0.9474  | 0.9426  | 0.9522  | 0.9366  | 0.9451  | 0.9492  | 0.9400  | 0.9447  |
| 2 | 1 | 0.0161  | 0.0157  | 0.0162  | 0.0165  | 0.0159  | 0.0154  | 0.0158  | 0.0158  | 0.0162  | 0.0154  | 0.0156  |
| 2 | 0.0702  | 0.0696  | 0.0720  | 0.0694  | 0.0702  | 0.0699  | 0.0698  | 0.0710  | 0.0708  | 0.0690  | 0.0688  |
| 3 | 0.1999  | 0.2002  | 0.2015  | 0.2022  | 0.2020  | 0.2102  | 0.2082  | 0.2067  | 0.2000  | 0.2019  | 0.2026  |
| 4 | 0.5762  | 0.5790  | 0.5612  | 0.5820  | 0.5839  | 0.5762  | 0.5821  | 0.5691  | 0.5718  | 0.5675  | 0.5859  |
| 5 | 0.9718  | 0.9731  | 0.9476  | 0.9474  | 0.9426  | 0.9522  | 0.9366  | 0.9451  | 0.9492  | 0.9400  | 0.9447  |
| 3 | 1 | 0.0158  | 0.0159  | 0.0160  | 0.0157  | 0.0156  | 0.0157  | 0.0156  | 0.0155  | 0.0156  | 0.0157  | 0.0160  |
| 2 | 0.0726  | 0.0736  | 0.0737  | 0.0744  | 0.0731  | 0.0718  | 0.0720  | 0.0736  | 0.0736  | 0.0747  | 0.0733  |
| 3 | 0.2172  | 0.2190  | 0.2165  | 0.2198  | 0.2253  | 0.2260  | 0.2207  | 0.2178  | 0.2206  | 0.2261  | 0.2218  |
| 4 | 0.5779  | 0.5783  | 0.5726  | 0.5800  | 0.5708  | 0.5733  | 0.5751  | 0.5804  | 0.5753  | 0.5732  | 0.5707  |
| 5 | 0.9457  | 0.9434  | 0.9417  | 0.9375  | 0.9439  | 0.9455  | 0.9487  | 0.9539  | 0.9532  | 0.9544  | 0.9531  |
| 4 | 1 | 0.0133  | 0.0134  | 0.0132  | 0.0132  | 0.0135  | 0.0131  | 0.0129  | 0.0130  | 0.0131  | — | — |
| 2 | 0.0680  | 0.0690  | 0.0695  | 0.0685  | 0.0700  | 0.0695  | 0.0715  | 0.0705  | 0.0705  | — | — |
| 3 | 0.2059  | 0.2084  | 0.2059  | 0.2064  | 0.2071  | 0.2071  | 0.2091  | 0.2056  | 0.2051  | — | — |
| 4 | 0.5502  | 0.5517  | 0.5522  | 0.5582  | 0.5612  | 0.5622  | 0.5622  | 0.5617  | 0.5592  | — | — |
| 5 | 0.9371  | 0.9251  | 0.9321  | 0.9227  | 0.9177  | 0.9222  | 0.9197  | 0.9138  | 0.9128  | — | — |
| 5 | 1 | 0.0148  | 0.0148  | 0.0153  | 0.0145  | 0.0148  | 0.0145  | 0.0158  | 0.0164  | 0.0175  | 0.0154  | 0.0145  |
| 2 | 0.0727  | 0.0724  | 0.0705  | 0.0707  | 0.0705  | 0.0704  | 0.0711  | 0.0710  | 0.0690  | 0.0699  | 0.0698  |
| 3 | 0.2112  | 0.2103  | 0.2115  | 0.2102  | 0.2123  | 0.2109  | 0.2124  | 0.2110  | 0.2111  | 0.2109  | 0.2103  |
| 4 | 0.6006  | 0.6161  | 0.5847  | 0.5954  | 0.6079  | 0.6001  | 0.5983  | 0.5999  | 0.6013  | 0.5917  | 0.5968  |
| 5 | 0.9462  | 0.9679  | 0.9604  | 0.9474  | 0.9483  | 0.9508  | 0.9457  | 0.9455  | 0.9598  | 0.9507  | 0.9464  |
| 6 | 1 | 0.0160  | 0.0160  | 0.0156  | 0.0156  | 0.0156  | 0.0158  | 0.0157  | 0.0166  | 0.0162  | 0.0162  | 0.0160  |
| 2 | 0.0651  | 0.0649  | 0.0657  | 0.0655  | 0.0660  | 0.0658  | 0.0648  | 0.0654  | 0.0660  | 0.0657  | 0.0654  |
| 3 | 0.2118  | 0.2112  | 0.2108  | 0.2112  | 0.2028  | 0.2115  | 0.2119  | 0.2129  | 0.2128  | 0.2115  | 0.2122  |
| 4 | 0.5782  | 0.5830  | 0.5835  | 0.5789  | 0.5738  | 0.5774  | 0.5702  | 0.5812  | 0.5738  | 0.5789  | 0.5772  |
| 5 | 0.9597  | 0.9541  | 0.9514  | 0.9598  | 0.9597  | 0.9549  | 0.9612  | 0.9559  | 0.9597  | 0.9655  | 0.9750  |
| 7 | 1 | 0.0130  | 0.0134  | 0.0132  | 0.0131  | 0.0131  | 0.0137  | 0.0135  | 0.0133  | 0.0133  | 0.0134  | 0.0133  |
| 2 | 0.0645  | 0.0637  | 0.0638  | 0.0647  | 0.0650  | 0.0694  | 0.0692  | 0.0692  | 0.0691  | 0.0687  | 0.0692  |
| 3 | 0.1930  | 0.1930  | 0.1960  | 0.1920  | 0.1930  | 0.2020  | 0.2020  | 0.2040  | 0.2050  | 0.2050  | 0.2010  |
| 4 | 0.5780  | 0.5830  | 0.5800  | 0.5860  | 0.5780  | 0.5590  | 0.5580  | 0.5670  | 0.5650  | 0.5630  | 0.5820  |
| 5 | 0.9530  | 0.9580  | 0.9590  | 0.9530  | 0.9520  | 0.9600  | 0.9660  | 0.9710  | 0.9720  | 0.9800  | 0.9760  |
| 8 | 1 | 0.0147  | 0.0147  | 0.0151  | 0.0145  | 0.0146  | 0.0148  | 0.0153  | — | — | — | — |
| 2 | 0.0709  | 0.0725  | 0.0722  | 0.0656  | 0.0706  | 0.0684  | 0.0695  | — | — | — | — |
| 3 | 0.2018  | 0.2136  | 0.2136  | 0.2132  | 0.2034  | 0.2083  | 0.2126  | — | — | — | — |
| 4 | 0.6009  | 0.5716  | 0.5872  | 0.5821  | 0.6020  | 0.5757  | 0.5881  | — | — | — | — |
| 5 | 0.9388  | 0.9660  | 0.9531  | 0.9820  | 0.9554  | 0.9375  | 0.9427  | — | — | — | — |
| 9 | 1 | 0.0154  | 0.0162  | 0.0158  | 0.0160  | 0.0164  | 0.0160  | 0.0162  | 0.0167  | 0.0163  | 0.0168  | 0.0165  |
| 2 | 0.0677  | 0.0685  | 0.0692  | 0.0686  | 0.0692  | 0.0687  | 0.0702  | 0.0707  | 0.0696  | 0.0702  | 0.0702  |
| 3 | 0.2029  | 0.2065  | 0.2055  | 0.2032  | 0.2062  | 0.2060  | 0.2048  | 0.2085  | 0.2105  | 0.2080  | 0.2114  |
| 4 | 0.5788  | 0.5847  | 0.5873  | 0.5891  | 0.5855  | 0.5793  | 0.5845  | 0.5797  | 0.5775  | 0.5742  | 0.5718  |
| 5 | 0.9132  | 0.9363  | 0.9499  | 0.9617  | 0.9649  | 0.9713  | 0.9662  | 0.9602  | 0.9593  | 0.9592  | 0.9831  |
| 10 | 1 | 0.0157  | 0.0161  | 0.0171  | 0.0162  | 0.0159  | 0.0157  | 0.0156  | 0.0172  | 0.0174  | 0.0176  | 0.0174  |
| 2 | 0.0732  | 0.0716  | 0.0728  | 0.0716  | 0.0724  | 0.0738  | 0.0739  | 0.0725  | 0.0723  | 0.0725  | 0.0736  |
| 3 | 0.2158  | 0.2167  | 0.2148  | 0.2158  | 0.2185  | 0.2173  | 0.2153  | 0.2163  | 0.2173  | 0.2146  | 0.2143  |
| 4 | 0.5565  | 0.5609  | 0.5572  | 0.5629  | 0.5576  | 0.5615  | 0.5538  | 0.5609  | 0.5629  | 0.5597  | 0.5609  |
| 5 | 1.0141  | 1.0132  | 1.0183  | 1.0154  | 1.0131  | 1.0122  | 1.0103  | 1.0104  | 1.0191  | 1.0162  | 1.0123  |
| 11 | 1\* | 0.0112  | 0.0115  | 0.0135  | 0.0142  | 0.0138  | 0.0122  | 0.0135  | 0.0118  | 0.0121  | 0.0142  | 0.0138  |
| 2 | 0.0675  | 0.0635  | 0.0671  | 0.0655  | 0.0701  | 0.0702  | 0.0684  | 0.0669  | 0.0662  | 0.0682  | 0.0684  |
| 3\* | 0.2010  | 0.2011  | 0.2017  | 0.2023  | 0.2023  | 0.2002  | 0.2020  | 0.2018  | 0.2012  | 0.2079  | 0.2035  |
| 4\* | 0.5620  | 0.5610  | 0.5670  | 0.5730  | 0.5880  | 0.5550  | 0.5570  | 0.5420  | 0.5450  | 0.5620  | 0.5480  |
| 5 | 0.9350  | 0.9240  | 0.9240  | 0.9270  | 0.9340  | 0.9120  | 0.9180  | 0.9220  | 0.9220  | 0.9260  | 0.9310  |
| 12 | 1 | 0.0170  | 0.0150  | 0.0200  | 0.0200  | 0.0230  | 0.0200  | 0.0160  | 0.0160  | 0.0160  | 0.0150  | 0.0150  |
| 2 | 0.0720  | 0.0780  | 0.0790  | 0.0740  | 0.0790  | 0.0760  | 0.0750  | 0.0730  | 0.0750  | 0.0730  | 0.0720  |
| 3 | 0.2000  | 0.2000  | 0.2000  | 0.1900  | 0.1900  | 0.1800  | 0.1900  | 0.1900  | 0.1900  | 0.1800  | 0.1900  |
| 4 | 0.4500  | 0.4800  | 0.4800  | 0.4600  | 0.4700  | 0.4700  | 0.4700  | 0.4700  | 0.4700  | 0.4700  | 0.4600  |
| 5 | 0.8600  | 0.8700  | 0.8700  | 0.8500  | 0.8600  | 0.8700  | 0.8600  | 0.8800  | 0.8600  | 0.8800  | 0.8800  |
| 13 | 1 | 0.0157  | 0.0156  | 0.0152  | 0.0155  | 0.0154  | 0.0154  | 0.0158  | 0.0155  | 0.0157  | 0.0156  | 0.0156  |
| 2 | 0.0722  | 0.0723  | 0.0725  | 0.0709  | 0.0728  | 0.0715  | 0.0713  | 0.0720  | 0.0709  | 0.0715  | 0.0718  |
| 3 | 0.2080  | 0.2110  | 0.2060  | 0.2080  | 0.2070  | 0.2060  | 0.2070  | 0.2060  | 0.2000  | 0.2060  | 0.2060  |
| 4 | 0.5720  | 0.5804  | 0.5903  | 0.5924  | 0.5826  | 0.5921  | 0.5898  | 0.5855  | 0.5895  | 0.5990  | 0.5882  |
| 5 | 0.9751  | 0.9735  | 0.9672  | 0.9859  | 0.9592  | 0.9563  | 0.9777  | 0.9690  | 0.9570  | 0.9469  | 0.9757  |
| 14 | 1 | 0.0142  | 0.0140  | 0.0144  | 0.0140  | 0.0146  | 0.0141  | 0.0141  | 0.0140  | 0.0140  | — | — |
| 2 | 0.0633  | 0.0629  | 0.0626  | 0.0624  | 0.0614  | 0.0625  | 0.0618  | 0.0643  | 0.0613  | — | — |
| 3 | 0.1932  | 0.1967  | 0.1988  | 0.1991  | 0.1930  | 0.1942  | 0.1989  | 0.1981  | 0.1947  | — | — |
| 4 | 0.5623  | 0.5745  | 0.5713  | 0.5680  | 0.5770  | 0.5714  | 0.5813  | 0.5789  | 0.5590  | — | — |
| 5 | 0.9481  | 0.9193  | 0.9200  | 0.9211  | 0.9119  | 0.8976  | 0.9632  | 0.9496  | 0.9317  | — | — |
| 15 | 1 | 0.0150  | 0.0160  | 0.0157  | 0.0154  | 0.0140  | 0.0160  | 0.0150  | 0.0150  | 0.0157  | 0.0154  | 0.0150  |
| 2 | 0.0690  | 0.0680  | 0.0640  | 0.0690  | 0.0690  | 0.0680  | 0.0650  | 0.0620  | 0.0690  | 0.0690  | 0.0680  |
| 3 | 0.2060  | 0.2010  | 0.2080  | 0.2090  | 0.2030  | 0.2050  | 0.2080  | 0.2090  | 0.2060  | 0.2040  | 0.2050  |
| 4 | 0.5720  | 0.5760  | 0.5710  | 0.5750  | 0.5720  | 0.5760  | 0.5790  | 0.5720  | 0.5770  | 0.5800  | 0.5730  |
| 5 | 0.9450  | 0.9380  | 0.9360  | 0.9520  | 0.9480  | 0.9460  | 0.9550  | 0.9450  | 0.9370  | 0.9410  | 0.9430  |
| 16 | 1 | 0.0139  | 0.0140  | 0.0141  | 0.0151  | 0.0143  | 0.0140  | 0.0141  | 0.0136  | 0.0136  | 0.0140  | 0.0147  |
| 2 | 0.0687  | 0.0679  | 0.0666  | 0.0665  | 0.0666  | 0.0670  | 0.0670  | 0.0671  | 0.0657  | 0.0663  | 0.0662  |
| 3 | 0.2067  | 0.2082  | 0.2066  | 0.2052  | 0.2061  | 0.2068  | 0.2051  | 0.2043  | 0.2052  | 0.2091  | 0.2047  |
| 4 | 0.5598  | 0.5581  | 0.5655  | 0.5526  | 0.5480  | 0.5493  | 0.5538  | 0.5534  | 0.5636  | 0.5584  | 0.5631  |
| 5 | 0.9315  | 0.9325  | 0.9342  | 0.9039  | 0.9013  | 0.9014  | 0.9124  | 0.9148  | 0.9269  | 0.9301  | 0.9236  |

* 1. 镉精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0027  | 0.0027  | 0.0025  | 0.0025  | 0.0024  | 0.0025  | 0.0025  |
| 2 | 0.0095  | 0.0098  | 0.0098  | 0.0103  | 0.0105  | 0.0105  | 0.0104  | 0.0104  | 0.0105  | 0.0097  | 0.0096  |
| 3 | 0.0317  | 0.0312  | 0.0318  | 0.0316  | 0.0307  | 0.0316  | 0.0317  | 0.0317  | 0.0319  | 0.0316  | 0.0315  |
| 4 | 0.0599  | 0.0601  | 0.0600  | 0.0599  | 0.0601  | 0.0604  | 0.0606  | 0.0606  | 0.0605  | 0.0590  | 0.0583  |
| 5 | 0.0959  | 0.0949  | 0.0950  | 0.0950  | 0.0952  | 0.0949  | 0.0952  | 0.0949  | 0.0937  | 0.0914  | 0.0909  |
| 2 | 1 | 0.0024  | 0.0026  | 0.0027  | 0.0026  | 0.0024  | 0.0027  | 0.0023  | 0.0025  | 0.0025  | 0.0026  | 0.0024  |
| 2 | 0.0094  | 0.0097  | 0.0106  | 0.0102  | 0.0106  | 0.0102  | 0.0106  | 0.0099  | 0.0105  | 0.0098  | 0.0103  |
| 3 | 0.0312  | 0.0314  | 0.0317  | 0.0302  | 0.0315  | 0.0312  | 0.0309  | 0.0319  | 0.0313  | 0.0306  | 0.0317  |
| 4 | 0.0599  | 0.0601  | 0.0600  | 0.0599  | 0.0601  | 0.0604  | 0.0606  | 0.0606  | 0.0605  | 0.0590  | 0.0583  |
| 5 | 0.0961  | 0.0947  | 0.0947  | 0.0950  | 0.0955  | 0.0947  | 0.0950  | 0.0951  | 0.0922  | 0.0936  | 0.0943  |
| 3 | 1 | 0.0025  | 0.0025  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0025  | 0.0026  |
| 2 | 0.0101  | 0.0102  | 0.0103  | 0.0101  | 0.0100  | 0.0100  | 0.0100  | 0.0102  | 0.0101  | 0.0102  | 0.0101  |
| 3 | 0.0318  | 0.0322  | 0.0312  | 0.0319  | 0.0314  | 0.0311  | 0.0312  | 0.0318  | 0.0318  | 0.0319  | 0.0322  |
| 4 | 0.0591  | 0.0595  | 0.0585  | 0.0590  | 0.0592  | 0.0593  | 0.0589  | 0.0597  | 0.0588  | 0.0588  | 0.0597  |
| 5 | 0.0896  | 0.0892  | 0.0894  | 0.0891  | 0.0897  | 0.0904  | 0.0918  | 0.0908  | 0.0905  | 0.0899  | 0.0896  |
| 4 | 1\* | 0.0010  | 0.0010  | 0.0010  | 0.0010  | 0.0010  | 0.0009  | 0.0010  | 0.0010  | 0.0010  | — | — |
| 2 | 0.0086  | 0.0087  | 0.0085  | 0.0085  | 0.0085  | 0.0085  | 0.0085  | 0.0084  | 0.0086  | — | — |
| 3 | 0.0291  | 0.0289  | 0.0291  | 0.0293  | 0.0297  | 0.0297  | 0.0296  | 0.0298  | 0.0294  | — | — |
| 4 | 0.0567  | 0.0572  | 0.0572  | 0.0572  | 0.0579  | 0.0579  | 0.0579  | 0.0574  | 0.0584  | — | — |
| 5 | 0.0908  | 0.0878  | 0.0888  | 0.0883  | 0.0887  | 0.0857  | 0.0892  | 0.0877  | 0.0872  | — | — |
| 5 | 1 | 0.0031  | 0.0032  | 0.0030  | 0.0028  | 0.0029  | 0.0029  | 0.0031  | 0.0032  | 0.0032  | 0.0031  | 0.0030  |
| 2 | 0.0119  | 0.0115  | 0.0116  | 0.0107  | 0.0103  | 0.0108  | 0.0099  | 0.0114  | 0.0100  | 0.0098  | 0.0106  |
| 3 | 0.0302  | 0.0307  | 0.0306  | 0.0310  | 0.0313  | 0.0315  | 0.0309  | 0.0307  | 0.0303  | 0.0306  | 0.0312  |
| 4 | 0.0604  | 0.0616  | 0.0621  | 0.0612  | 0.0620  | 0.0608  | 0.0614  | 0.0615  | 0.0600  | 0.0598  | 0.0608  |
| 5 | 0.0948  | 0.0968  | 0.0941  | 0.0932  | 0.0958  | 0.0947  | 0.0945  | 0.0947  | 0.0963  | 0.0945  | 0.0949  |
| 6 | 1 | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0024  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0026  | 0.0026  |
| 2 | 0.0104  | 0.0103  | 0.0104  | 0.0104  | 0.0100  | 0.0103  | 0.0103  | 0.0103  | 0.0103  | 0.0104  | 0.0103  |
| 3 | 0.0312  | 0.0310  | 0.0311  | 0.0311  | 0.0312  | 0.0312  | 0.0312  | 0.0308  | 0.0312  | 0.0312  | 0.0313  |
| 4 | 0.0597  | 0.0598  | 0.0600  | 0.0600  | 0.0599  | 0.0598  | 0.0598  | 0.0600  | 0.0599  | 0.0602  | 0.0600  |
| 5 | 0.0905  | 0.0911  | 0.0912  | 0.0905  | 0.0914  | 0.0910  | 0.0912  | 0.0915  | 0.0914  | 0.0909  | 0.0916  |
| 7 | 1 | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0023  | 0.0023  | 0.0023  | 0.0023  | 0.0024  |
| 2 | 0.0094  | 0.0094  | 0.0095  | 0.0094  | 0.0095  | 0.0091  | 0.0090  | 0.0090  | 0.0092  | 0.0092  | 0.0092  |
| 3 | 0.0309  | 0.0310  | 0.0313  | 0.0312  | 0.0307  | 0.0300  | 0.0298  | 0.0303  | 0.0299  | 0.0300  | 0.0296  |
| 4 | 0.0572  | 0.0565  | 0.0570  | 0.0569  | 0.0567  | 0.0583  | 0.0593  | 0.0586  | 0.0559  | 0.0588  | 0.0588  |
| 5 | 0.0887  | 0.0884  | 0.0890  | 0.0885  | 0.0890  | 0.0908  | 0.0909  | 0.0910  | 0.0919  | 0.0904  | 0.0900  |
| 8 | 1 | 0.0024  | 0.0025  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0025  | — | — | — | — |
| 2 | 0.0102  | 0.0102  | 0.0100  | 0.0094  | 0.0102  | 0.0098  | 0.0101  | — | — | — | — |
| 3 | 0.0320  | 0.0328  | 0.0314  | 0.0316  | 0.0318  | 0.0316  | 0.0312  | — | — | — | — |
| 4 | 0.0625  | 0.0605  | 0.0616  | 0.0612  | 0.0628  | 0.0605  | 0.0612  | — | — | — | — |
| 5 | 0.0905  | 0.0916  | 0.0937  | 0.0929  | 0.0947  | 0.0933  | 0.0925  | — | — | — | — |
| 9 | 1 | 0.0024  | 0.0023  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0023  | 0.0024  | 0.0024  | 0.0024  |
| 2 | 0.0095  | 0.0096  | 0.0097  | 0.0096  | 0.0097  | 0.0097  | 0.0098  | 0.0099  | 0.0098  | 0.0097  | 0.0098  |
| 3 | 0.0305  | 0.0309  | 0.0308  | 0.0305  | 0.0309  | 0.0309  | 0.0307  | 0.0312  | 0.0315  | 0.0311  | 0.0316  |
| 4 | 0.0586  | 0.0586  | 0.0592  | 0.0590  | 0.0587  | 0.0593  | 0.0592  | 0.0588  | 0.0594  | 0.0591  | 0.0586  |
| 5 | 0.0942  | 0.0929  | 0.0927  | 0.0941  | 0.0924  | 0.0939  | 0.0930  | 0.0936  | 0.0942  | 0.0940  | 0.0927  |
| 10 | 1 | 0.0025  | 0.0025  | 0.0025  | 0.0024  | 0.0025  | 0.0025  | 0.0025  | 0.0027  | 0.0027  | 0.0027  | 0.0027  |
| 2 | 0.0103  | 0.0097  | 0.0101  | 0.0101  | 0.0102  | 0.0102  | 0.0101  | 0.0101  | 0.0102  | 0.0103  | 0.0104  |
| 3 | 0.0324  | 0.0325  | 0.0324  | 0.0325  | 0.0328  | 0.0327  | 0.0326  | 0.0328  | 0.0330  | 0.0326  | 0.0325  |
| 4 | 0.0593  | 0.0595  | 0.0602  | 0.0596  | 0.0601  | 0.0595  | 0.0602  | 0.0606  | 0.0602  | 0.0598  | 0.0604  |
| 5 | 0.0947  | 0.0943  | 0.0955  | 0.0949  | 0.0951  | 0.0955  | 0.0948  | 0.0947  | 0.0944  | 0.0951  | 0.0951  |
| 11 | 1\* | 0.0023  | 0.0024  | 0.0023  | 0.0024  | 0.0025  | 0.0023  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0025  |
| 2\* | 0.0098  | 0.0097  | 0.0099  | 0.0094  | 0.0098  | 0.0094  | 0.0102  | 0.0095  | 0.0095  | 0.0097  | 0.0093  |
| 3\* | 0.0293  | 0.0292  | 0.0288  | 0.0287  | 0.0312  | 0.0302  | 0.0304  | 0.0316  | 0.0311  | 0.0296  | 0.0294  |
| 4\* | 0.0612  | 0.0622  | 0.0631  | 0.0624  | 0.0590  | 0.0594  | 0.0622  | 0.0584  | 0.0588  | 0.0582  | 0.0598  |
| 5\* | 0.0925  | 0.0932  | 0.0934  | 0.0932  | 0.0914  | 0.0911  | 0.0916  | 0.0925  | 0.0932  | 0.0937  | 0.0934  |
| 12 | 1 | 0.0022  | 0.0026  | 0.0026  | 0.0019  | 0.0029  | 0.0024  | 0.0020  | 0.0025  | 0.0030  | 0.0026  | 0.0027  |
| 2 | 0.0110  | 0.0120  | 0.0120  | 0.0098  | 0.0110  | 0.0110  | 0.0100  | 0.0098  | 0.0120  | 0.0120  | 0.0110  |
| 3 | 0.0420  | 0.0400  | 0.0400  | 0.0420  | 0.0420  | 0.0390  | 0.0410  | 0.0400  | 0.0400  | 0.0400  | 0.0400  |
| 4 | 0.0460  | 0.0490  | 0.0510  | 0.0500  | 0.0500  | 0.0470  | 0.0500  | 0.0510  | 0.0520  | 0.0500  | 0.0510  |
| 5 | 0.0780  | 0.0780  | 0.0770  | 0.0750  | 0.0780  | 0.0780  | 0.0780  | 0.0800  | 0.0790  | 0.0820  | 0.0810  |
| 13 | 1 | 0.0027  | 0.0028  | 0.0026  | 0.0027  | 0.0027  | 0.0027  | 0.0027  | 0.0027  | 0.0028  | 0.0027  | 0.0027  |
| 2 | 0.0103  | 0.0103  | 0.0104  | 0.0101  | 0.0105  | 0.0104  | 0.0105  | 0.0105  | 0.0104  | 0.0105  | 0.0104  |
| 3 | 0.0299  | 0.0308  | 0.0304  | 0.0305  | 0.0304  | 0.0302  | 0.0304  | 0.0301  | 0.0295  | 0.0303  | 0.0303  |
| 4 | 0.0588  | 0.0590  | 0.0602  | 0.0610  | 0.0601  | 0.0604  | 0.0606  | 0.0608  | 0.0608  | 0.0610  | 0.0610  |
| 5 | 0.0927  | 0.0938  | 0.0952  | 0.0966  | 0.0938  | 0.0941  | 0.0961  | 0.0966  | 0.0973  | 0.0956  | 0.0980  |
| 14 | 1 | 0.0028  | 0.0028  | 0.0028  | 0.0028  | 0.0029  | 0.0028  | 0.0028  | 0.0028  | 0.0028  | 0.0000  | 0.0000  |
| 2 | 0.0105  | 0.0104  | 0.0103  | 0.0102  | 0.0102  | 0.0103  | 0.0102  | 0.0102  | 0.0102  | — | — |
| 3 | 0.0304  | 0.0300  | 0.0304  | 0.0305  | 0.0300  | 0.0301  | 0.0302  | 0.0302  | 0.0300  | — | — |
| 4 | 0.0586  | 0.0590  | 0.0579  | 0.0582  | 0.0584  | 0.0572  | 0.0574  | 0.0563  | 0.0578  | — | — |
| 5 | 0.0903  | 0.0849  | 0.0857  | 0.0845  | 0.0879  | 0.0882  | 0.0837  | 0.0869  | 0.0856  | — | — |
| 15 | 1 | 0.0025  | 0.0025  | 0.0026  | 0.0024  | 0.0025  | 0.0026  | 0.0025  | 0.0024  | 0.0026  | 0.0025  | 0.0026  |
| 2 | 0.0100  | 0.0110  | 0.0110  | 0.0090  | 0.0110  | 0.0100  | 0.0110  | 0.0090  | 0.0100  | 0.0100  | 0.0100  |
| 3 | 0.0310  | 0.0320  | 0.0310  | 0.0300  | 0.0320  | 0.0310  | 0.0310  | 0.0300  | 0.0300  | 0.0310  | 0.0310  |
| 4 | 0.0590  | 0.0600  | 0.0580  | 0.0590  | 0.0580  | 0.0590  | 0.0600  | 0.0590  | 0.0580  | 0.0590  | 0.0590  |
| 5 | 0.0910  | 0.0940  | 0.0920  | 0.0890  | 0.0940  | 0.0910  | 0.0920  | 0.0910  | 0.0920  | 0.0910  | 0.0910  |
| 16 | 1 | 0.0023  | 0.0023  | 0.0024  | 0.0024  | 0.0024  | 0.0024  | 0.0023  | 0.0023  | 0.0023  | 0.0024  | 0.0025  |
| 2 | 0.0100  | 0.0101  | 0.0095  | 0.0094  | 0.0094  | 0.0095  | 0.0095  | 0.0096  | 0.0095  | 0.0095  | 0.0094  |
| 3 | 0.0293  | 0.0296  | 0.0287  | 0.0289  | 0.0289  | 0.0287  | 0.0287  | 0.0287  | 0.0296  | 0.0295  | 0.0285  |
| 4 | 0.0536  | 0.0535  | 0.0535  | 0.0539  | 0.0537  | 0.0538  | 0.0543  | 0.0543  | 0.0542  | 0.0551  | 0.0548  |
| 5 | 0.0826  | 0.0826  | 0.0827  | 0.0827  | 0.0825  | 0.0827  | 0.0830  | 0.0826  | 0.0829  | 0.0843  | 0.0837  |

* 1. 铅精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0032  | 0.0038  | 0.0030  | 0.0031  | 0.0037  | 0.0033  | 0.0034  | 0.0037  | 0.0029  | 0.0031  | 0.0032  |
| 2 | 0.0116  | 0.0113  | 0.0119  | 0.0117  | 0.0118  | 0.0115  | 0.0116  | 0.0115  | 0.0112  | 0.0128  | 0.0116  |
| 3 | 0.0330  | 0.0328  | 0.0348  | 0.0346  | 0.0308  | 0.0324  | 0.0342  | 0.0355  | 0.0335  | 0.0324  | 0.0337  |
| 4 | 0.0590  | 0.0639  | 0.0590  | 0.0587  | 0.0600  | 0.0604  | 0.0640  | 0.0578  | 0.0629  | 0.0590  | 0.0593  |
| 5 | 0.0967  | 0.0956  | 0.0951  | 0.0960  | 0.0960  | 0.0961  | 0.0960  | 0.0933  | 0.0958  | 0.0923  | 0.0932  |
| 2 | 1 | 0.0031  | 0.0035  | 0.0028  | 0.0031  | 0.0035  | 0.0034  | 0.0032  | 0.0036  | 0.0032  | 0.0031  | 0.0033  |
| 2 | 0.0116  | 0.0114  | 0.0120  | 0.0116  | 0.0115  | 0.0118  | 0.0114  | 0.0112  | 0.0110  | 0.0126  | 0.0121  |
| 3 | 0.0334  | 0.0322  | 0.0342  | 0.0347  | 0.0318  | 0.0309  | 0.0328  | 0.0343  | 0.0352  | 0.0341  | 0.0326  |
| 4 | 0.0590  | 0.0639  | 0.0590  | 0.0587  | 0.0600  | 0.0604  | 0.0640  | 0.0578  | 0.0629  | 0.0590  | 0.0593  |
| 5 | 0.0966  | 0.0952  | 0.0957  | 0.0960  | 0.0952  | 0.0959  | 0.0954  | 0.0930  | 0.0923  | 0.0946  | 0.0951  |
| 3 | 1 | 0.0031  | 0.0032  | 0.0034  | 0.0028  | 0.0032  | 0.0032  | 0.0032  | 0.0033  | 0.0030  | 0.0032  | 0.0031  |
| 2 | 0.0113  | 0.0111  | 0.0113  | 0.0111  | 0.0110  | 0.0109  | 0.0108  | 0.0113  | 0.0111  | 0.0110  | 0.0109  |
| 3 | 0.0354  | 0.0358  | 0.0356  | 0.0352  | 0.0362  | 0.0362  | 0.0361  | 0.0364  | 0.0365  | 0.0357  | 0.0353  |
| 4 | 0.0576  | 0.0572  | 0.0592  | 0.0594  | 0.0583  | 0.0581  | 0.0574  | 0.0564  | 0.0574  | 0.0574  | 0.0578  |
| 5 | 0.0889  | 0.0900  | 0.0892  | 0.0901  | 0.0910  | 0.0910  | 0.0906  | 0.0900  | 0.0902  | 0.0902  | 0.0893  |
| 4 | 1 | 0.0045  | 0.0045  | 0.0037  | 0.0044  | 0.0045  | 0.0041  | 0.0042  | 0.0042  | 0.0047  | — | — |
| 2 | 0.0117  | 0.0124  | 0.0122  | 0.0121  | 0.0120  | 0.0120  | 0.0122  | 0.0124  | 0.0120  | — | — |
| 3 | 0.0322  | 0.0328  | 0.0323  | 0.0325  | 0.0333  | 0.0328  | 0.0326  | 0.0334  | 0.0322  | — | — |
| 4 | 0.0572  | 0.0587  | 0.0597  | 0.0602  | 0.0594  | 0.0604  | 0.0604  | 0.0604  | 0.0604  | — | — |
| 5 | 0.0963  | 0.0943  | 0.0953  | 0.0953  | 0.0892  | 0.0922  | 0.0912  | 0.0892  | 0.0917  | — | — |
| 5 | 1 | 0.0027  | 0.0028  | 0.0031  | 0.0028  | 0.0027  | 0.0026  | 0.0024  | 0.0027  | 0.0031  | 0.0030  | 0.0030  |
| 2 | 0.0121  | 0.0125  | 0.0115  | 0.0115  | 0.0108  | 0.0117  | 0.0114  | 0.0110  | 0.0118  | 0.0118  | 0.0118  |
| 3 | 0.0300  | 0.0303  | 0.0316  | 0.0308  | 0.0311  | 0.0314  | 0.0315  | 0.0323  | 0.0306  | 0.0317  | 0.0321  |
| 4 | 0.0593  | 0.0577  | 0.0579  | 0.0597  | 0.0603  | 0.0602  | 0.0613  | 0.0598  | 0.0609  | 0.0597  | 0.0598  |
| 5 | 0.1052  | 0.1005  | 0.0985  | 0.0998  | 0.1006  | 0.1021  | 0.1015  | 0.1013  | 0.1008  | 0.0987  | 0.0992  |
| 6 | 1 | 0.0032  | 0.0031  | 0.0036  | 0.0030  | 0.0030  | 0.0035  | 0.0029  | 0.0030  | 0.0033  | 0.0030  | 0.0032  |
| 2 | 0.0126  | 0.0129  | 0.0124  | 0.0129  | 0.0121  | 0.0120  | 0.0125  | 0.0122  | 0.0126  | 0.0126  | 0.0122  |
| 3 | 0.0340  | 0.0340  | 0.0339  | 0.0342  | 0.0341  | 0.0338  | 0.0338  | 0.0339  | 0.0343  | 0.0339  | 0.0338  |
| 4\* | 0.0639  | 0.0632  | 0.0636  | 0.0644  | 0.0643  | 0.0635  | 0.0634  | 0.0628  | 0.0643  | 0.0638  | 0.0637  |
| 5 | 0.0945  | 0.0953  | 0.0951  | 0.0954  | 0.0955  | 0.0952  | 0.0952  | 0.0957  | 0.0955  | 0.0957  | 0.0954  |
| 7 | 1 | 0.0031  | 0.0030  | 0.0032  | 0.0031  | 0.0033  | 0.0038  | 0.0034  | 0.0038  | 0.0038  | 0.0037  | 0.0037  |
| 2 | 0.0114  | 0.0113  | 0.0115  | 0.0114  | 0.0113  | 0.0120  | 0.0120  | 0.0120  | 0.0123  | 0.0121  | 0.0126  |
| 3 | 0.0318  | 0.0326  | 0.0314  | 0.0316  | 0.0316  | 0.0327  | 0.0340  | 0.0333  | 0.0332  | 0.0323  | 0.0314  |
| 4 | 0.0539  | 0.0530  | 0.0551  | 0.0608  | 0.0562  | 0.0577  | 0.0573  | 0.0588  | 0.0646  | 0.0650  | 0.0638  |
| 5 | 0.0881  | 0.0881  | 0.0880  | 0.0918  | 0.0919  | 0.0937  | 0.0920  | 0.0914  | 0.0893  | 0.0887  | 0.0887  |
| 8 | 1 | 0.0040  | 0.0041  | 0.0034  | 0.0041  | 0.0035  | 0.0037  | 0.0035  | — | — | — | — |
| 2 | 0.0124  | 0.0125  | 0.0119  | 0.0126  | 0.0121  | 0.0115  | 0.0121  | — | — | — | — |
| 3 | 0.0333  | 0.0350  | 0.0345  | 0.0310  | 0.0335  | 0.0326  | 0.0335  | — | — | — | — |
| 4 | 0.0569  | 0.0604  | 0.0617  | 0.0615  | 0.0589  | 0.0573  | 0.0601  | — | — | — | — |
| 5 | 0.0948  | 0.0932  | 0.0928  | 0.0948  | 0.0918  | 0.0938  | 0.0947  | — | — | — | — |
| 9 | 1 | 0.0041  | 0.0038  | 0.0036  | 0.0042  | 0.0037  | 0.0040  | 0.0036  | 0.0034  | 0.0033  | 0.0037  | 0.0033  |
| 2 | 0.0126  | 0.0153  | 0.0126  | 0.0122  | 0.0132  | 0.0125  | 0.0126  | 0.0130  | 0.0125  | 0.0121  | 0.0123  |
| 3 | 0.0349  | 0.0327  | 0.0316  | 0.0345  | 0.0328  | 0.0314  | 0.0346  | 0.0330  | 0.0318  | 0.0340  | 0.0346  |
| 4 | 0.0625  | 0.0564  | 0.0629  | 0.0610  | 0.0629  | 0.0569  | 0.0611  | 0.0621  | 0.0591  | 0.0615  | 0.0619  |
| 5 | 0.0938  | 0.0949  | 0.0950  | 0.0968  | 0.0964  | 0.0962  | 0.0978  | 0.0959  | 0.0953  | 0.0967  | 0.0988  |
| 10 | 1 | 0.0048  | 0.0051  | 0.0050  | 0.0049  | 0.0047  | 0.0047  | 0.0047  | 0.0043  | 0.0042  | 0.0043  | 0.0043  |
| 2 | 0.0125  | 0.0130  | 0.0123  | 0.0122  | 0.0124  | 0.0123  | 0.0133  | 0.0120  | 0.0122  | 0.0123  | 0.0124  |
| 3 | 0.0391  | 0.0402  | 0.0402  | 0.0402  | 0.0383  | 0.0382  | 0.0397  | 0.0400  | 0.0403  | 0.0381  | 0.0381  |
| 4 | 0.0554  | 0.0556  | 0.0567  | 0.0572  | 0.0558  | 0.0562  | 0.0623  | 0.0560  | 0.0562  | 0.0576  | 0.0617  |
| 5 | 0.0914  | 0.0910  | 0.0923  | 0.0921  | 0.0914  | 0.0928  | 0.0912  | 0.0912  | 0.0904  | 0.0913  | 0.0911  |
| 11 | 1 | 0.0035  | 0.0037  | 0.0035  | 0.0034  | 0.0025  | 0.0032  | 0.0035  | 0.0037  | 0.0036  | 0.0032  | 0.0033  |
| 2 | 0.0105  | 0.0107  | 0.0132  | 0.0110  | 0.0122  | 0.0124  | 0.0125  | 0.0118  | 0.0122  | 0.0128  | 0.0114  |
| 3 | 0.0321  | 0.0322  | 0.0342  | 0.0326  | 0.0306  | 0.0311  | 0.0318  | 0.0329  | 0.0312  | 0.0314  | 0.0316  |
| 4\* | 0.0585  | 0.0601  | 0.0592  | 0.0575  | 0.0578  | 0.0582  | 0.0588  | 0.0592  | 0.0574  | 0.0576  | 0.0581  |
| 5 | 0.0967  | 0.0956  | 0.0951  | 0.0960  | 0.0960  | 0.0961  | 0.0960  | 0.0933  | 0.0958  | 0.0923  | 0.0932  |
| 12 | 1 | 0.0028  | 0.0027  | 0.0029  | 0.0026  | 0.0027  | 0.0028  | 0.0027  | 0.0029  | 0.0028  | 0.0028  | 0.0028  |
| 2 | 0.0100  | 0.0100  | 0.0100  | 0.0110  | 0.0100  | 0.0110  | 0.0100  | 0.0110  | 0.0110  | 0.0110  | 0.0100  |
| 3\* | 0.0310  | 0.0300  | 0.0290  | 0.0280  | 0.0290  | 0.0270  | 0.0280  | 0.0280  | 0.0280  | 0.0270  | 0.0280  |
| 4 | 0.0470  | 0.0500  | 0.0500  | 0.0490  | 0.0490  | 0.0490  | 0.0490  | 0.0490  | 0.0490  | 0.0490  | 0.0490  |
| 5 | 0.0840  | 0.0840  | 0.0840  | 0.0800  | 0.0840  | 0.0850  | 0.0840  | 0.0860  | 0.0840  | 0.0870  | 0.0860  |
| 13 | 1 | 0.0029  | 0.0028  | 0.0027  | 0.0028  | 0.0027  | 0.0027  | 0.0029  | 0.0029  | 0.0031  | 0.0028  | 0.0029  |
| 2\* | 0.0115  | 0.0106  | 0.0111  | 0.0103  | 0.0114  | 0.0116  | 0.0110  | 0.0113  | 0.0113  | 0.0110  | 0.0111  |
| 3 | 0.0414  | 0.0418  | 0.0404  | 0.0400  | 0.0415  | 0.0383  | 0.0402  | 0.0419  | 0.0419  | 0.0413  | 0.0419  |
| 4 | 0.0547  | 0.0539  | 0.0552  | 0.0528  | 0.0490  | 0.0543  | 0.0524  | 0.0517  | 0.0551  | 0.0523  | 0.0590  |
| 5\* | 0.0878  | 0.0883  | 0.0894  | 0.0904  | 0.0885  | 0.0888  | 0.0905  | 0.0909  | 0.0924  | 0.0901  | 0.0932  |
| 14 | 1 | 0.0037  | 0.0033  | 0.0030  | 0.0037  | 0.0035  | 0.0038  | 0.0036  | 0.0040  | 0.0031  | — | — |
| 2 | 0.0130  | 0.0123  | 0.0125  | 0.0128  | 0.0113  | 0.0128  | 0.0119  | 0.0118  | 0.0116  | — | — |
| 3 | 0.0336  | 0.0358  | 0.0354  | 0.0355  | 0.0341  | 0.0343  | 0.0335  | 0.0340  | 0.0336  | — | — |
| 4 | 0.0631  | 0.0596  | 0.0611  | 0.0613  | 0.0597  | 0.0574  | 0.0585  | 0.0601  | 0.0611  | — | — |
| 5 | 0.0911  | 0.0874  | 0.0874  | 0.0865  | 0.0896  | 0.0910  | 0.0880  | 0.0892  | 0.0878  | — | — |
| 15 | 1 | 0.0035  | 0.0035  | 0.0034  | 0.0036  | 0.0037  | 0.0035  | 0.0032  | 0.0031  | 0.0035  | 0.0032  | 0.0031  |
| 2 | 0.0120  | 0.0120  | 0.0130  | 0.0124  | 0.0125  | 0.0121  | 0.0123  | 0.0120  | 0.0140  | 0.0121  | 0.0122  |
| 3 | 0.0345  | 0.0346  | 0.0348  | 0.0342  | 0.0347  | 0.0348  | 0.0343  | 0.0342  | 0.0348  | 0.0345  | 0.0349  |
| 4 | 0.0584  | 0.0581  | 0.0589  | 0.0582  | 0.0586  | 0.0582  | 0.0586  | 0.0583  | 0.0584  | 0.0587  | 0.0587  |
| 5 | 0.0914  | 0.0915  | 0.0918  | 0.0916  | 0.0913  | 0.0912  | 0.0920  | 0.0914  | 0.0917  | 0.0916  | 0.0915  |
| 16 | 1 | 0.0033  | 0.0038  | 0.0032  | 0.0040  | 0.0031  | 0.0038  | 0.0031  | 0.0039  | 0.0032  | 0.0037  | 0.0035  |
| 2 | 0.0114  | 0.0132  | 0.0116  | 0.0121  | 0.0118  | 0.0100  | 0.0105  | 0.0117  | 0.0113  | 0.0115  | 0.0113  |
| 3 | 0.0321  | 0.0298  | 0.0272  | 0.0331  | 0.0324  | 0.0282  | 0.0281  | 0.0280  | 0.0288  | 0.0313  | 0.0308  |
| 4 | 0.0521  | 0.0555  | 0.0512  | 0.0493  | 0.0496  | 0.0500  | 0.0533  | 0.0578  | 0.0562  | 0.0540  | 0.0549  |
| 5 | 0.0874  | 0.0884  | 0.0888  | 0.0885  | 0.0878  | 0.0860  | 0.0878  | 0.0876  | 0.0883  | 0.0880  | 0.0896  |

* 1. 砷精密度试验原始数据

|  |  |  |
| --- | --- | --- |
| 实验室 | 水平 | *n* |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
| 1 | 1 | 0.0050  | 0.0057  | 0.0051  | 0.0049  | 0.0050  | 0.0050  | 0.0050  | 0.0050  | 0.0050  | 0.0050  | 0.0052  |
| 2 | 0.0094  | 0.0093  | 0.0104  | 0.0091  | 0.0097  | 0.0096  | 0.0096  | 0.0097  | 0.0093  | 0.0098  | 0.0095  |
| 3 | 0.0233  | 0.0253  | 0.0259  | 0.0258  | 0.0254  | 0.0254  | 0.0263  | 0.0253  | 0.0233  | 0.0239  | 0.0235  |
| 4 | 0.0987  | 0.0967  | 0.0983  | 0.0963  | 0.0993  | 0.0987  | 0.0991  | 0.0994  | 0.0946  | 0.0948  | 0.0961  |
| 2 | 1 | 0.0056  | 0.0052  | 0.0051  | 0.0050  | 0.0049  | 0.0048  | 0.0052  | 0.0055  | 0.0052  | 0.0049  | 0.0050  |
| 2 | 0.0096  | 0.0095  | 0.0106  | 0.0090  | 0.0098  | 0.0097  | 0.0099  | 0.0095  | 0.0092  | 0.0095  | 0.0096  |
| 3 | 0.0233  | 0.0253  | 0.0259  | 0.0258  | 0.0254  | 0.0254  | 0.0263  | 0.0253  | 0.0233  | 0.0239  | 0.0235  |
| 4 | 0.0977  | 0.0968  | 0.0968  | 0.0986  | 0.0979  | 0.0978  | 0.0982  | 0.0997  | 0.0953  | 0.0969  | 0.0972  |
| 3 | 1 | 0.0051  | 0.0052  | 0.0048  | 0.0050  | 0.0046  | 0.0048  | 0.0051  | 0.0051  | 0.0049  | 0.0048  | 0.0047  |
| 2 | 0.0096  | 0.0098  | 0.0094  | 0.0099  | 0.0097  | 0.0095  | 0.0099  | 0.0096  | 0.0094  | 0.0092  | 0.0096  |
| 3 | 0.0240  | 0.0237  | 0.0237  | 0.0236  | 0.0237  | 0.0239  | 0.0236  | 0.0244  | 0.0236  | 0.0244  | 0.0240  |
| 4 | 0.1001  | 0.1006  | 0.1001  | 0.0993  | 0.1003  | 0.1008  | 0.0990  | 0.1006  | 0.1012  | 0.0993  | 0.0996  |
| 4 | 1 | 0.0049  | 0.0051  | 0.0044  | 0.0044  | 0.0047  | 0.0038  | 0.0040  | 0.0045  | 0.0050  | — | — |
| 2 | 0.0119  | 0.0095  | 0.0110  | 0.0120  | 0.0110  | 0.0113  | 0.0096  | 0.0096  | 0.0100  | — | — |
| 3 | 0.0299  | 0.0269  | 0.0323  | 0.0249  | 0.0300  | 0.0275  | 0.0250  | 0.0300  | 0.0250  | — | — |
| 4\* | 0.0878  | 0.0798  | 0.0848  | 0.0798  | 0.0748  | 0.0798  | 0.0748  | 0.0985  | 0.0748  | — | — |
| 5 | 1 | 0.0050  | 0.0047  | 0.0051  | 0.0057  | 0.0055  | 0.0055  | 0.0048  | 0.0052  | 0.0045  | 0.0046  | 0.0048  |
| 2 | 0.0105  | 0.0114  | 0.0109  | 0.0102  | 0.0117  | 0.0104  | 0.0105  | 0.0107  | 0.0113  | 0.0102  | 0.0103  |
| 3 | 0.0214  | 0.0203  | 0.0209  | 0.0215  | 0.0223  | 0.0215  | 0.0228  | 0.0224  | 0.0215  | 0.0228  | 0.0225  |
| 4 | 0.0956  | 0.0945  | 0.0988  | 0.0975  | 0.0986  | 0.0975  | 0.0985  | 0.0987  | 0.0968  | 0.0952  | 0.0979  |
| 6 | 1 | 0.0051  | 0.0052  | 0.0052  | 0.0050  | 0.0050  | 0.0050  | 0.0051  | 0.0049  | 0.0050  | 0.0051  | 0.0049  |
| 2 | 0.0097  | 0.0098  | 0.0096  | 0.0099  | 0.0096  | 0.0097  | 0.0096  | 0.0097  | 0.0096  | 0.0098  | 0.0092  |
| 3 | 0.0246  | 0.0241  | 0.0252  | 0.0246  | 0.0241  | 0.0248  | 0.0245  | 0.0237  | 0.0241  | 0.0243  | 0.0249  |
| 4 | 0.0961  | 0.0954  | 0.0962  | 0.0955  | 0.0966  | 0.0967  | 0.0945  | 0.0948  | 0.0966  | 0.0978  | 0.0962  |
| 7 | 1 | 0.0054  | 0.0050  | 0.0050  | 0.0050  | 0.0050  | 0.0050  | 0.0049  | 0.0050  | 0.0049  | 0.0050  | 0.0050  |
| 2 | 0.0109  | 0.0111  | 0.0109  | 0.0110  | 0.0100  | 0.0101  | 0.0098  | 0.0100  | 0.0099  | 0.0108  | 0.0098  |
| 3 | 0.0257  | 0.0245  | 0.0245  | 0.0257  | 0.0252  | 0.0245  | 0.0248  | 0.0249  | 0.0247  | 0.0250  | 0.0251  |
| 4 | 0.1010  | 0.1000  | 0.1000  | 0.1010  | 0.1000  | 0.1000  | 0.1010  | 0.0990  | 0.1010  | 0.0990  | 0.0980  |
| 8 | 1 | 0.0051  | 0.0049  | 0.0047  | 0.0048  | 0.0050  | 0.0049  | 0.0051  | — | — | — | — |
| 2 | 0.0098  | 0.0096  | 0.0095  | 0.0097  | 0.0102  | 0.0103  | 0.0095  | — | — | — | — |
| 3 | 0.0241  | 0.0252  | 0.0237  | 0..0246 | 0.0250  | 0.0239  | 0.0247  | — | — | — | — |
| 4 | 0.0987  | 0.0974  | 0.0992  | 0.0967  | 0.0986  | 0.0979  | 0.0986  | — | — | — | — |
| 9 | 1 | 0.0052  | 0.0051  | 0.0053  | 0.0051  | 0.0052  | 0.0052  | 0.0052  | 0.0051  | 0.0050  | 0.0052  | 0.0053  |
| 2 | 0.0107  | 0.0105  | 0.0105  | 0.0104  | 0.0102  | 0.0102  | 0.0097  | 0.0098  | 0.0097  | 0.0097  | 0.0096  |
| 3 | 0.0241  | 0.0241  | 0.0241  | 0.0245  | 0.0244  | 0.0241  | 0.0246  | 0.0246  | 0.0241  | 0.0239  | 0.0248  |
| 4 | 0.0991  | 0.0976  | 0.0972  | 0.0970  | 0.0961  | 0.0983  | 0.0975  | 0.0973  | 0.0979  | 0.0974  | 0.0984  |
| 10 | 1 | 0.0044  | 0.0051  | 0.0041  | 0.0045  | 0.0043  | 0.0042  | 0.0052  | 0.0043  | 0.0045  | 0.0043  | 0.0044  |
| 2 | 0.0095  | 0.0099  | 0.0093  | 0.0092  | 0.0096  | 0.0095  | 0.0091  | 0.0095  | 0.0092  | 0.0092  | 0.0092  |
| 3 | 0.0239  | 0.0242  | 0.0240  | 0.0242  | 0.0238  | 0.0239  | 0.0245  | 0.0245  | 0.0245  | 0.0249  | 0.0247  |
| 4 | 0.1005  | 0.1001  | 0.1019  | 0.1001  | 0.1042  | 0.1008  | 0.0992  | 0.0992  | 0.1010  | 0.1012  | 0.1013  |
| 11 | 1\* | 0.0052  | 0.0052  | 0.0051  | 0.0055  | 0.0052  | 0.0054  | 0.0053  | 0.0056  | 0.0053  | 0.0055  | 0.0052  |
| 2 | 0.0094  | 0.0098  | 0.0099  | 0.0098  | 0.0095  | 0.0096  | 0.0096  | 0.0095  | 0.0094  | 0.0096  | 0.0096  |
| 3\* | 0.0243  | 0.0224  | 0.0234  | 0.0245  | 0.0238  | 0.0242  | 0.0233  | 0.0236  | 0.0238  | 0.0228  | 0.0232  |
| 4\* | 0.0978  | 0.0982  | 0.0994  | 0.0996  | 0.0982  | 0.0982  | 0.0984  | 0.0980  | 0.0984  | 0.0980  | 0.0986  |
| 12 | 1 | 0.0066  | 0.0065  | 0.0073  | 0.0068  | 0.0070  | 0.0061  | 0.0062  | 0.0065  | 0.0062  | 0.0068  | 0.0063  |
| 2 | 0.0120  | 0.0120  | 0.0120  | 0.0130  | 0.0120  | 0.0110  | 0.0100  | 0.0120  | 0.0100  | 0.0100  | 0.0110  |
| 3 | 0.0330  | 0.0310  | 0.0330  | 0.0330  | 0.0330  | 0.0300  | 0.0300  | 0.0290  | 0.0310  | 0.0280  | 0.0310  |
| 4 | 0.1100  | 0.1100  | 0.1200  | 0.1100  | 0.1100  | 0.1000  | 0.1000  | 0.1000  | 0.1100  | 0.1100  | 0.1000  |
| 13 | 1 | 0.0054  | 0.0056  | 0.0057  | 0.0053  | 0.0058  | 0.0048  | 0.0055  | 0.0056  | 0.0055  | 0.0056  | 0.0056  |
| 2 | 0.0118  | 0.0117  | 0.0117  | 0.0115  | 0.0111  | 0.0112  | 0.0112  | 0.0107  | 0.0111  | 0.0098  | 0.0108  |
| 3\* | 0.0272  | 0.0255  | 0.0255  | 0.0276  | 0.0285  | 0.0263  | 0.0276  | 0.0280  | 0.0276  | 0.0271  | 0.0272  |
| 4\* | 0.0979  | 0.0943  | 0.0951  | 0.0966  | 0.0938  | 0.0941  | 0.0955  | 0.0981  | 0.1005  | 0.1012  | 0.1012  |
| 14 | 1 | 0.0056  | 0.0052  | 0.0055  | 0.0048  | 0.0052  | 0.0051  | 0.0054  | 0.0056  | 0.0052  | — | — |
| 2 | 0.0093  | 0.0096  | 0.0096  | 0.0103  | 0.0095  | 0.0096  | 0.0097  | 0.0104  | 0.0097  | — | — |
| 3 | 0.0242  | 0.0237  | 0.0235  | 0.0237  | 0.0240  | 0.0234  | 0.0230  | 0.0245  | 0.0239  | — | — |
| 4 | 0.0947  | 0.0956  | 0.0953  | 0.0977  | 0.0961  | 0.0942  | 0.0936  | 0.0950  | 0.0967  | — | — |
| 15 | 1 | 0.0051  | 0.0052  | 0.0056  | 0.0057  | 0.0059  | 0.0058  | 0.0054  | 0.0056  | 0.0053  | 0.0056  | 0.0052  |
| 2 | 0.0098  | 0.0097  | 0.0094  | 0.0098  | 0.0096  | 0.0098  | 0.0094  | 0.0092  | 0.0095  | 0.0098  | 0.0096  |
| 3 | 0.0249  | 0.0246  | 0.0243  | 0.0241  | 0.0245  | 0.0246  | 0.0248  | 0.0243  | 0.0245  | 0.0246  | 0.0248  |
| 4 | 0.0982  | 0.0977  | 0.0986  | 0.0977  | 0.0969  | 0.0968  | 0.0986  | 0.0974  | 0.0966  | 0.0975  | 0.0983  |
| 16 | 1 | 0.0041  | 0.0044  | 0.0049  | 0.0043  | 0.0053  | 0.0046  | 0.0049  | 0.0051  | 0.0046  | 0.0048  | 0.0049  |
| 2 | 0.0092  | 0.0101  | 0.0097  | 0.0099  | 0.0101  | 0.0107  | 0.0101  | 0.0097  | 0.0098  | 0.0101  | 0.0099  |
| 3 | 0.0245  | 0.0247  | 0.0248  | 0.0252  | 0.0250  | 0.0250  | 0.0257  | 0.0256  | 0.0251  | 0.0249  | 0.0263  |
| 4 | 0.1031  | 0.1015  | 0.1017  | 0.1014  | 0.1021  | 0.1017  | 0.1015  | 0.1015  | 0.1018  | 0.1003  | 0.1019  |

