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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）

XXXX - XX - XX发布

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中 华 人 民 共 和 国 工 业 和 信 息 化 部  发布

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。

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 |

