**《锂离子电池正极材料前驱体副产 硫酸钠》**

**编制说明（预审稿）**

1. **工作简况**
2. **任务来源**

根据中国有色金属工业协会《关于下达2023年第三批协会标准制修订计划的通知》（中色协科字[2023]97号）的要求，中伟新材料股份有限公司承担团体标准《锂离子电池正极材料前驱体副产 硫酸钠》起草任务，项目计划编号：2023-027-T/CNIA，完成年限为2024年。

1. **标准的必要性**

硫酸钠，一种无机化合物，外观为无色透明的大结晶或颗粒性小结晶，也称为元明粉。硫酸钠吸湿性强，易溶于水，水溶液呈碱性，可溶于甘油，不溶于乙醇。硫酸钠可用于生产硫化钠，可用作分析试剂、干燥剂、蒸煮剂、助溶剂、凝固剂、缓泻剂等，被广泛应用在水玻璃、玻璃、造纸、纺织、皮革、冶金、瓷釉、医药等领域。

随着新能源行业的发展，在锂离子电池正极材料前驱体生产过程中会产生大量的硫酸钠废水，经废水处理后可将水中的镍钴锰等回收并且降低废水中的COD，以减小环保厂区水处理的压力，同时生产出杂质较少的硫酸钠溶液，这些溶液可以转运至对应的蒸发结晶车间得到硫酸钠晶体。硫酸钠废水处理主要有两条线，分别是来自MHP产线的硫酸钠废水和生产三元前驱体的硫酸钠废水。这类循环回收的硫酸钠与工业硫酸钠相比，需要检测镍、钴离子的含量，但其纯度达到工业硫酸钠的优等品级别，广泛销售与洗涤和印染行业。

《“十四五”工业绿色发展规划》 提出升级改造末端治理设施，在水污染防治重点领域，聚焦涉重金属、高盐、高有机物等高难度废水，开展深度高效治理应用示范，逐步提升印染、造纸、化学原料药、煤化工、有色金属等行业废水治理水平。《“十四五”节水型社会建设规划》 鼓励企业间串联用水、分质用水，实现一水多用和梯级利用，推行废水资源化利用。硫酸钠的应用领域广泛，锂离子电池正极材料前驱体的副产硫酸钠既保证了硫酸钠产品的质量，又减少了对工业制取硫酸钠所需的芒硝的使用，且通过废水综合处理获得的副产硫酸钠也符合国家提出废水治理的相关政策。

另外，锂离子电池主要应用于3C、储能、动力电池等领域。2023年2月23日，国家工信部电子信息司发布《2022年全国锂离子电池行业运行情况》，根据工信部公布的数据，2022年全国锂离子电池产量达750GWh，同比增长超过130%，行业总产值突破1.2万亿元，是上一年行业总产值6000亿元的约两倍。从2015年到2022年间，全国锂离子电池行业规模实现逐年攀升。虽然个别年份出现增长波动，但总体来看，中国锂电池行业的增长仍然非常迅速。然而在生产锂离子电池过程中，年产1.5万吨锂离子电池三元正极材料前驱体能够联产2.5万吨/年以上的无水硫酸钠，随着锂离子电池的需求不断增加，相应的回收硫酸钠的产量也会爆发式增长，因此急需相关特定的标准来规范不同程序生产的硫酸钠，为市场流通提供方便，扩大其流通市场。

1. **起草单位及主要工作过程**

**3.1主起草单位**

中伟新材料股份有限公司自2014年成立以来，依靠多年对锂电池正极材料前驱体行业的投入，利用完备的产业化平台，较快地建立了现代化的自主研发体系。公司以高镍、掺杂、烧结、循环等技术作为主要研发方向，组织人力、财力、物力不断进行技术攻关，基于共沉淀法最终形成多项核心技术。经过多年的发展，公司是LG化学三元前驱体原材料的核心供应商、厦门钨业四氧化三钴原材料的核心供应商，并已全面进入包括宁德时代、LG化学、比亚迪、三星SDI、ATL在内的全球领先锂离子电池产业链。

中伟新材料股份有限公司自主开发的高电压四氧化三钴、高镍NCM、NCA等核心产品跻身中国、欧美、日韩地区世界500强企业高端供应链，被广泛应用于3C数码领域、动力领域及储能领域。近三年公司三元前驱体、四氧化三钴出货量、出口量稳居全球第一。在国内，中伟股份已建立铜仁（上市主体）产业基地、宁乡产业基地、钦州产业基地、开阳产业基地四大产业基地，覆盖全国；在海外，公司建有印尼原料基地，并启动规划国际化产业基地，业务覆盖日韩、东南亚、欧洲以及北美等多个国家和地区。公司始终以研发创新为核心，专注新能源材料领域的研发，持续加大研发投入，以高镍低钴全系列三元前驱体、高电压四氧化三钴、综合循环回收利用、原材料冶炼、材料制造装备为主要研发方向，同时积极布局磷铁系、锰系以及钠系技术路线，打造多样化、定制化、快速开发与量产的技术服务能力及产业化应用能力，引领行业技术创新。

**3.2 标准主要工作人员及职责**

**3.3主要工作过程**

**2023年4月-2023年8月 立项阶段**

2023年3月中伟新材料股份有限公司向全国有色金属标准化技术委员会提出《锂离子电池正极材料前驱体副产 硫酸钠》项目申请。2023年4月，在武汉举行项目论证会议，会上介绍标准起草背景、制定思路与内容，标准内容、制定工作计划。2023年8月28日，有色金属标委会下发《全国有色金属标准化技术委员会 有色标委[2023]97号》文件，团体标准《锂离子电池正极材料前驱体副产 硫酸钠》正式立项。

**2023年9月-10月 起草阶段**

对湖南长远锂科股份有限公司进行调研。梳理汇总调研的情况，分析当前相关标准实施的问题，汇总标准化关键要求，编写标准草案。

**2023年11月-2024年1月征求意见阶段**

2023年1月17日，在琼海召开标准讨论会。

2024年6月18日，在烟台召开标准预审会议，对形成的预审稿向相关部门、企业、专家、公众征询意见及建议。  
 2024年\*月\*日，针对收集的反馈意见与建议，修改完善文本，并形成标准审定稿。  
 2024年\*月\*日，开审定会。

1. **标准编制原则和确定标准主要内容的依据**
2. **标准编制原则**

1.1本标准按照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》的要求制定，并符合国家标准编写模板的要求。

1.2 在编制过程中，始终遵循满足市场需求、技术内容科学合理、检测方法操作可行的原则，满足相关法律法规要求。

1.3 标准的编制应充分考虑生产企业的产品质量和相关单位的意见，同时要确保用户的需求，为印染和合成洗涤剂行业提供满意的使用原料。

1. **确定标准主要内容的依据**

**2.1企业调研数据**

根据锂离子电池前驱体全过程生产阶段，硫酸钠来源分为两类：原料硫酸镍产线产硫酸钠和三元母液产硫酸钠。企业A提供的原始数据详见**附件1。**

表1 企业A反馈数据

|  |  |  |  |
| --- | --- | --- | --- |
| 项目 | 一级品 | 二级品 | 三级品 |
| Na2SO4（≥%） | 99.00 | 99.00 | 98.00 |
| 氨（≤%） | 0.002 | 0.002 | 0.002 |
| Fe（≤%） | 0.002 | 0.002 | 0.010 |
| Ca（≤%） | 0.010 | 0.010 | 0.150 |
| Mg（≤%） | 0.010 | 0.010 | 0.150 |
| Cl（≤%） | 0.350 | 0.350 | 0.700 |
| 水不溶物（≤%） | 0.050 | 0.050 | 0.200 |
| 镍钴锰合量（≤%） | 0.005 | 0.005 | 0.005 |
| 水分（≤%） | 0.020 | 0.200 | 0.500 |
| pH | 6～9 | 6～9 | — |
| 白度（R457） | ≥85 | ≤84 | — |
| 外观质量 | 无色透明晶体 | 无色透明晶体 | 无色透明晶体 |

表2 企业B反馈数据

|  |  |
| --- | --- |
| 项目 | 三级品 |
| Na2SO4（≥%） | 98.00 |
| 氨（≤%） | - |
| Fe（≤%） | 0.010 |
| Ca（≤%） | 0.010 |
| Mg（≤%） | 0.005 |
| Cl（≤%） | - |
| 水不溶物（≤%） | - |
| 镍钴锰（≤%） | Ni（ppm）≤0.003 Co（ppm）≤0.002 Mn（ppm）≤0.002 |
| 水分（≤%） | - |
| pH | 7-10 |
| 白度（R457） | ≥78 |
| 外观质量 | 无色透明晶体 |

2.2产品主要指标和确定依据

2.2.1分子式和相对分子质量

分子式：Na2SO4

相对分子质量：142.02（按2011年国际相对原子质量）

2.2.2分类

根据硫酸钠的化学成分分为一级品、二级品和三级品

2.2.3技术要求

2.2.3.1化学成分

硫酸钠的化学成分应符合表3要求。

表3 化学成分

|  |  |  |  |
| --- | --- | --- | --- |
| 项目 | 一级品 | 二级品 | 三级品 |
| Na2SO4（≥%） | 99.00 | 99.00 | 98.00 |
| 氨（≤%） | 0.002 | 0.002 | - |
| Fe（≤%） | 0.002 | 0.002 | 0.010 |
| Ca（≤%） | 0.010 | 0.010 | 0.150 |
| Mg（≤%） | 0.010 | 0.010 | 0.150 |
| Cl（≤%） | 0.350 | 0.350 | - |
| 水不溶物（≤%） | 0.050 | 0.050 | - |
| 镍钴锰合量（≤%） | 0.005 | 0.005 | 0.007 |

2.2.3.2水分

一级品硫酸钠的水分应不大于0.020%，二级品的水分应不大于0.200%。

2.2.3.3 pH值

一级品和二级品硫酸钠的pH值应为6~9。

2.2.3.4白度

一级品硫酸钠的白度应不小于85，二级品的白度应不小于84。

2.2.3.5外观质量

硫酸钠外观应为无色透明晶体。

2.2.4试验方法

按GB/T 6009-2014、GB/T 23942和HJ 533中规定进行。

**三、标准中涉及专利的情况**

本标准不涉及专利问题。

四、**采用国际标准和国外先进标准的情况，与国际、国内同类标准水平的对比情况**

本文件在制定过程中没有采用国际标准。

现有的硫酸钠标准体系中已有GBT 6009-2014 工业无水硫酸钠，以及食品添加剂硫酸钠、化学试剂无水硫酸钠、铬盐副产硫酸钠等标准。镍盐、钴盐、氨等是制备锂离子正极材料前驱体的主要原材料，从锂离子正极材料前驱体废水中回收所得的硫酸钠，需要检测镍、钴、氨的含量，而现有GBT 6009-2014 工业无水硫酸钠未对其进行规范。HG/T 5560-2019铬盐副产硫酸钠中规范的硫酸钠含量≥88.0%，是用做生产硫化钠和元明粉的原材料，不适用于本项目锂离子电池正极材料前驱体副产硫酸钠。

**五、与有关的现行法律、法规和强制性国家标准的关系**

本标准的制定过程、技术指标的选定、检验项目的设置符合现行法律、法规和强制性国家标准的规定。

**六、重大分歧意见的处理经过和依据**

无

**七、标准作为强制性或推荐性标准的建议**

建议该标准作为推荐性团体标准。

**八、贯彻标准的要求和措施建议，包括（组织措施、技术措施、过渡办法）**

由于本标准首次制定，没有特殊要求。

**九、废止现有有关标准的建议**

无。

**十、预期效果**

本标准的制定填补了国内无锂离子电池正极材料前驱体副产硫酸钠专用标准的空白，标准的制定过程、技术指标的选定、检验项目的设置符合下游产业的要求。本标准的发布、实施，有力推动我国硫酸钠国产化、批量化的进程，为其发展起到积极作用。

**十一、其他应予说明的事项**

无

《锂离子电池正极材料前驱体副产 硫酸钠》标准编制组

二0二四年6月

附件1 企业A 2024.1~2024.6硫酸钠原始生产数据

表1 三元母液产硫酸钠 优等品

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ph | 水分 | 氨浓度 | 氯离子 | 钙离子 | 镁离子 | 铁元素 | 镍钴锰 | 主含量 | 白度 | 水不溶物 | 产量/t |
| 序号 | 6.0~9.0 | ≤0.02 | ≤0.002 | ≤0.35 | ≤0.01 | ≤0.01 | ≤0.002 | ≤0.005 | ≥99.0 | ≥85 | ≤0.05 | / |
| 1 | 6.090 | 0.020 | 0.0008 | 0.0017 | 0.0000 | 0.0003 | 0.0004 | 0.003 | 99.974 | 86.000 |  | 51 |
| 2 | 6.010 | 0.020 | 0.0006 | 0.0010 | 0.0000 | 0.0000 | 0.0002 | 0.001 | 99.977 | 87.1000 |  | 9 |
| 3 | 6.060 | 0.010 | 0.0006 | 0.0014 | 0.0002 | 0.0000 | 0.0001 | 0.002 | 99.986 | 87.0000 |  | 108 |
| 4 | 6.130 | 0.010 | 0.0007 | 0.0011 | 0.0000 | 0.0001 | 0.0012 | 0.002 | 99.986 | 86.3000 |  | 67 |
| 5 | 6.370 | 0.010 | 0.0007 | 0.0027 | 0.0022 | 0.0002 | 0.0003 | 0.001 | 99.983 | 87.100 |  | 202 |
| 6 | 6.610 | 0.010 | 0.0008 | 0.0009 | 0.0001 | 0.0001 | 0.0005 | 0.001 | 99.987 | 86.7000 |  | 116 |
| 7 | 6.290 | 0.004 | 0.0005 | 0.0027 | 0.0017 | 0.0002 | 0.0006 | 0.002 | 99.989 | 86.1000 |  | 218 |
| 8 | 6.330 | 0.020 | 0.0005 | 0.0011 | 0.0001 | 0.0002 | 0.0005 | 0.002 | 99.977 | 87.1000 |  | 138 |
| 9 | 6.700 | 0.020 | 0.0004 | 0.0020 | 0.0023 | 0.0004 | 0.0007 | 0.002 | 99.973 | 87.5000 |  | 206 |
| 10 | 6.780 | 0.020 | 0.0004 | 0.0031 | 0.0005 | 0.0003 | 0.0001 | 0.001 | 99.974 | 87.000 |  | 136 |
| 11 | 6.670 | 0.010 | 0.0007 | 0.0014 | 0.0008 | 0.0005 | 0.0005 | 0.002 | 99.985 | 87.000 | 0.001 | 146 |
| 12 | 7.120 | 0.020 | 0.0008 | 0.0019 | 0.0001 | 0.0001 | 0.0004 | 0.001 | 99.976 | 87.000 |  | 146 |
| 13 | 6.290 | 0.020 | 0.0006 | 0.0031 | 0.0016 | 0.0002 | 0.0000 | 0.002 | 99.973 | 87.000 |  | 120 |
| 14 | 6.300 | 0.020 | 0.0005 | 0.0025 | 0.0017 | 0.0003 | 0.0006 | 0.002 | 99.973 | 87.000 |  | 106 |
| 15 | 7.060 | 0.020 | 0.0005 | 0.0034 | 0.0020 | 0.0002 | 0.0006 | 0.002 | 99.972 | 87.600 |  | 100 |
| 16 | 6.580 | 0.020 | 0.0005 | 0.0012 | 0.0004 | 0.0003 | 0.0003 | 0.002 | 99.976 | 87.000 |  | 123 |
| 17 | 6.430 | 0.010 | 0.0008 | 0.0008 | 0.0000 | 0.0002 | 0.0002 | 0.003 | 99.986 | 87.600 |  | 110 |
| 18 | 6.100 | 0.010 | 0.0008 | 0.0011 | 0.0000 | 0.0000 | 0.0007 | 0.002 | 99.987 | 87.600 |  | 104 |
| 19 | 6.080 | 0.001 | 0.0005 | 0.0024 | 0.0000 | 0.0000 | 0.0006 | 0.001 | 99.995 | 87.000 |  | 141 |
| 20 | 6.090 | 0.010 | 0.0007 | 0.0007 | 0.0000 | 0.0000 | 0.0003 | 0.001 | 99.987 | 87.800 |  | 196 |
| 21 | 6.190 | 0.020 | 0.0006 | 0.0021 | 0.0000 | 0.0002 | 0.0000 | 0.002 | 99.976 | 87.700 |  | 142 |
| 22 | 6.140 | 0.010 | 0.0008 | 0.0009 | 0.0000 | 0.0001 | 0.0003 | 0.001 | 99.987 | 87.000 | 0.0000 | 122 |
| 23 | 6.230 | 0.010 | 0.0008 | 0.0018 | 0.0000 | 0.0001 | 0.0004 | 0.001 | 99.986 | 87.300 |  | 127 |
| 24 | 6.230 | 0.020 | 0.0007 | 0.0016 | 0.0000 | 0.0001 | 0.0003 | 0.001 | 99.976 | 87.300 |  | 194 |
| 25 | 6.580 | 0.020 | 0.0008 | 0.0012 | 0.0000 | 0.0000 | 0.0001 | 0.002 | 99.977 | 87.600 |  | 103 |
| 26 | 6.470 | 0.020 | 0.0004 | 0.0022 | 0.0000 | 0.0002 | 0.0003 | 0.0011 | 99.976 | 87.000 |  | 160 |
| 27 | 6.740 | 0.020 | 0.0007 | 0.0034 | 0.0000 | 0.0000 | 0.0003 | 0.0009 | 99.975 | 87.600 |  | 183 |
| 28 | 6.140 | 0.020 | 0.0008 | 0.0009 | 0.0000 | 0.0001 | 0.0004 | 0.0013 | 99.977 | 87.700 |  | 144 |
| 29 | 6.090 | 0.020 | 0.0007 | 0.0016 | 0.0000 | 0.0002 | 0.0003 | 0.0007 | 99.977 | 87.500 |  | 134 |
| 30 | 6.430 | 0.020 | 0.0007 | 0.0012 | 0.0001 | 0.0002 | 0.0004 | 0.0020 | 99.975 | 87.600 |  | 176 |
| 31 | 7.540 | 0.010 | 0.0005 | 0.0014 | 0.0001 | 0.0000 | 0.0002 | 0.0008 | 99.987 | 87.200 |  | 230 |
| 32 | 6.640 | 0.020 | 0.0010 | 0.0012 | 0.0000 | 0.0001 | 0.0005 | 0.0020 | 99.976 | 87.300 |  | 195 |
| 33 | 6.230 | 0.020 | 0.0009 | 0.0015 | 0.0000 | 0.0002 | 0.0004 | 0.0011 | 99.976 | 87.300 | 0.0050 | 220 |
| 34 | 6.270 | 0.010 | 0.0006 | 0.0021 | 0.0000 | 0.0000 | 0.0001 | 0.0016 | 99.986 | 87.000 |  | 166 |
| 35 | 6.140 | 0.020 | 0.0006 | 0.0017 | 0.0000 | 0.0000 | 0.0002 | 0.0017 | 99.976 | 87.100 |  | 176 |
| 36 | 6.700 | 0.020 | 0.0009 | 0.0014 | 0.0000 | 0.0006 | 0.0009 | 0.0025 | 99.965 | 87.000 |  | 156 |
| 37 | 6.690 | 0.010 | 0.0011 | 0.0022 | 0.0000 | 0.0007 | 0.0004 | 0.0027 | 99.983 | 87.200 |  | 138 |
| 38 | 6.310 | 0.010 | 0.0006 | 0.0021 | 0.0000 | 0.0000 | 0.0004 | 0.0025 | 99.985 | 87.500 |  | 141 |
| 39 | 6.010 | 0.010 | 0.0008 | 0.0017 | 0.0000 | 0.0001 | 0.0002 | 0.0021 | 99.985 | 87.400 |  | 226 |
| 40 | 6.020 | 0.020 | 0.0005 | 0.0013 | 0.0000 | 0.0000 | 0.0001 | 0.0020 | 99.976 | 87.400 |  | 174 |
| 41 | 6.180 | 0.010 | 0.0007 | 0.0008 | 0.0000 | 0.0001 | 0.0002 | 0.0015 | 99.987 | 87.400 |  | 104 |
| 42 | 6.120 | 0.010 | 0.0009 | 0.0010 | 0.0000 | 0.0001 | 0.0004 | 0.0029 | 99.985 | 87.500 |  | 130 |
| 43 | 6.090 | 0.010 | 0.0008 | 0.0006 | 0.0000 | 0.0002 | 0.0005 | 0.0032 | 99.985 | 87.400 |  | 57 |
| 44 | 6.030 | 0.010 | 0.0005 | 0.0011 | 0.0000 | 0.0000 | 0.0002 | 0.0010 | 99.987 | 87.000 | 0.0005 | 199 |
| 45 | 6.370 | 0.020 | 0.0005 | 0.0027 | 0.0000 | 0.0001 | 0.0000 | 0.0023 | 99.974 | 86.800 |  | 188 |
| 46 | 6.150 | 0.020 | 0.0006 | 0.0037 | 0.0000 | 0.0009 | 0.0000 | 0.0019 | 99.973 | 86.100 |  | 128 |
| 47 | 6.080 | 0.020 | 0.0006 | 0.0008 | 0.0000 | 0.0003 | 0.0003 | 0.0016 | 99.977 | 87.500 |  | 197 |
| 48 | 6.150 | 0.010 | 0.0006 | 0.0012 | 0.0000 | 0.0001 | 0.0004 | 0.0013 | 99.987 | 87.000 |  | 67 |
| 49 | 6.000 | 0.010 | 0.0004 | 0.0012 | 0.0000 | 0.0012 | 0.0000 | 0.0019 | 99.985 | 87.000 |  | 191 |
| 50 | 6.290 | 0.020 | 0.0006 | 0.0015 | 0.0000 | 0.0004 | 0.0003 | 0.0019 | 99.976 | 87.200 |  | 60 |
| 51 | 6.100 | 0.020 | 0.0005 | 0.0010 | 0.0000 | 0.0000 | 0.0002 | 0.0006 | 99.978 | 87.100 |  | 188 |
| 52 | 6.150 | 0.010 | 0.0005 | 0.0018 | 0.0000 | 0.0000 | 0.0003 | 0.0009 | 99.987 | 87.000 |  | 210 |
| 53 | 7.050 | 0.020 | 0.0008 | 0.0004 | 0.0000 | 0.0005 | 0.0005 | 0.0017 | 99.977 | 87.600 |  | 51 |
| 54 | 6.290 | 0.010 | 0.0005 | 0.0030 | 0.0002 | 0.0002 | 0.0003 | 0.0010 | 99.985 | 87.000 |  | 148 |
| 55 | 6.140 | 0.010 | 0.0008 | 0.0006 | 0.0000 | 0.0003 | 0.0004 | 0.0005 | 99.988 | 87.200 | 0.0095 | 42 |
| 56 | 6.180 | 0.020 | 0.0005 | 0.0015 | 0.0000 | 0.0000 | 0.0003 | 0.0010 | 99.977 | 87.300 |  | 140 |
| 57 | 6.210 | 0.020 | 0.0008 | 0.0008 | 0.0000 | 0.0003 | 0.0006 | 0.0016 | 99.977 | 87.300 |  | 189 |
| 58 | 6.080 | 0.020 | 0.0005 | 0.0017 | 0.0000 | 0.0000 | 0.0002 | 0.0009 | 99.977 | 87.200 |  | 130 |
| 59 | 6.100 | 0.010 | 0.0004 | 0.0032 | 0.0000 | 0.0001 | 0.0003 | 0.0013 | 99.985 | 87.000 |  | 190 |
| 60 | 6.130 | 0.020 | 0.0004 | 0.0025 | 0.0004 | 0.0002 | 0.0003 | 0.0013 | 99.975 | 87.200 |  | 44 |
| 61 | 7.040 | 0.010 | 0.0008 | 0.0004 | 0.0000 | 0.0002 | 0.0007 | 0.0025 | 99.985 | 87.300 |  | 134 |
| 62 | 6.060 | 0.002 | 0.0004 | 0.0030 | 0.0000 | 0.0002 | 0.0000 | 0.0019 | 99.993 | 87.100 |  | 200 |
| 63 | 6.120 | 0.010 | 0.0004 | 0.0002 | 0.0000 | 0.0000 | 0.0000 | 0.0019 | 99.988 | 87.200 |  | 138 |
| 64 | 6.020 | 0.010 | 0.0005 | 0.0017 | 0.0000 | 0.0000 | 0.0003 | 0.0014 | 99.986 | 87.300 |  | 122 |
| 65 | 6.030 | 0.020 | 0.0004 | 0.0023 | 0.0000 | 0.0001 | 0.0005 | 0.0018 | 99.975 | 87.300 |  | 136 |
| 66 | 6.120 | 0.020 | 0.0007 | 0.0002 | 0.0000 | 0.0003 | 0.0001 | 0.0014 | 99.977 | 87.300 | 0.0013 | 146 |
| 67 | 6.020 | 0.010 | 0.0006 | 0.0033 | 0.0000 | 0.0001 | 0.0006 | 0.0019 | 99.984 | 87.600 |  | 178 |
| 68 | 6.100 | 0.020 | 0.0005 | 0.0034 | 0.0019 | 0.0001 | 0.0000 | 0.0002 | 99.974 | 87.000 |  | 179 |
| 69 | 6.130 | 0.020 | 0.0006 | 0.0011 | 0.0033 | 0.0000 | 0.0001 | 0.0016 | 99.973 | 87.500 |  | 92 |
| 70 | 6.060 | 0.020 | 0.0006 | 0.0030 | 0.0032 | 0.0002 | 0.0003 | 0.0013 | 99.972 | 87.300 |  | 179 |
| 71 | 6.180 | 0.010 | 0.0006 | 0.0001 | 0.0035 | 0.0000 | 0.0003 | 0.0020 | 99.984 | 87.000 |  | 132 |
| 72 | 6.110 | 0.010 | 0.0006 | 0.0021 | 0.0035 | 0.0000 | 0.0003 | 0.0020 | 99.982 | 87.500 |  | 180 |
| 73 | 6.830 | 0.010 | 0.0006 | 0.0020 | 0.0028 | 0.0000 | 0.0003 | 0.0019 | 99.983 | 87.600 |  | 129 |
| 74 | 6.530 | 0.020 | 0.0008 | 0.0012 | 0.0020 | 0.0000 | 0.0005 | 0.0013 | 99.975 | 87.600 |  | 175 |
| 75 | 6.370 | 0.020 | 0.0006 | 0.0011 | 0.0011 | 0.0000 | 0.0003 | 0.0017 | 99.976 | 87.200 |  | 185 |
| 76 | 6.760 | 0.010 | 0.0004 | 0.0039 | 0.0030 | 0.0004 | 0.0005 | 0.0014 | 99.981 | 87.600 |  | 142 |
| 77 | 6.850 | 0.020 | 0.0006 | 0.0016 | 0.0019 | 0.0000 | 0.0002 | 0.0020 | 99.974 | 87.400 | 0.0010 | 146 |
| 78 | 6.990 | 0.010 | 0.0005 | 0.0014 | 0.0048 | 0.0000 | 0.0002 | 0.0012 | 99.982 | 87.600 |  | 82 |
| 79 | 6.210 | 0.020 | 0.0005 | 0.0013 | 0.0003 | 0.0000 | 0.0004 | 0.0012 | 99.977 | 87.400 |  | 79 |
| 80 | 6.290 | 0.010 | 0.0004 | 0.0010 | 0.0031 | 0.0000 | 0.0003 | 0.0018 | 99.984 | 87.000 |  | 79 |
| 81 | 6.600 | 0.020 | 0.0005 | 0.0010 | 0.0020 | 0.0000 | 0.0005 | 0.0015 | 99.975 | 87.600 |  | 122 |
| 82 | 6.240 | 0.010 | 0.0005 | 0.0030 | 0.0026 | 0.0000 | 0.0001 | 0.0015 | 99.982 | 87.300 |  | 56 |
| 83 | 6.180 | 0.010 | 0.0005 | 0.0031 | 0.0017 | 0.0000 | 0.0009 | 0.0021 | 99.983 | 87.700 |  | 116 |
| 84 | 6.630 | 0.020 | 0.0006 | 0.0027 | 0.0022 | 0.0000 | 0.0004 | 0.0029 | 99.972 | 87.600 |  | 80 |
| 85 | 7.440 | 0.020 | 0.0005 | 0.0025 | 0.0036 | 0.0000 | 0.0003 | 0.0024 | 99.971 | 87.600 |  | 118 |
| 86 | 6.890 | 0.010 | 0.0006 | 0.0023 | 0.0024 | 0.0003 | 0.0004 | 0.0026 | 99.982 | 87.500 |  | 121 |
| 87 | 6.060 | 0.010 | 0.0006 | 0.0017 | 0.0022 | 0.0003 | 0.0004 | 0.0015 | 99.984 | 87.600 |  | 139 |
| 88 | 6.480 | 0.010 | 0.0007 | 0.0018 | 0.0006 | 0.0000 | 0.0007 | 0.0044 | 99.983 | 87.300 | 0.0050 | 98 |
| 89 | 6.110 | 0.010 | 0.0005 | 0.0011 | 0.0017 | 0.0000 | 0.0000 | 0.0012 | 99.986 | 87.500 |  | 100 |
| 90 | 6.340 | 0.010 | 0.0005 | 0.0013 | 0.0021 | 0.0000 | 0.0002 | 0.0009 | 99.985 | 87.600 |  | 95 |
| 91 | 6.150 | 0.020 | 0.0006 | 0.0031 | 0.0023 | 0.0005 | 0.0008 | 0.0012 | 99.972 | 87.200 |  | 138 |
| 92 | 6.180 | 0.020 | 0.0006 | 0.0017 | 0.0025 | 0.0001 | 0.0008 | 0.0015 | 99.974 | 87.400 |  | 167 |
| 93 | 6.350 | 0.020 | 0.0006 | 0.0012 | 0.0044 | 0.0002 | 0.0007 | 0.0004 | 99.973 | 87.500 |  | 130 |
| 94 | 6.430 | 0.020 | 0.0007 | 0.0014 | 0.0012 | 0.0000 | 0.0009 | 0.0016 | 99.975 | 87.100 |  | 106 |
| 95 | 7.040 | 0.011 | 0.0005 | 0.0006 | 0.0056 | 0.0011 | 0.0001 | 0.0016 | 99.980 | 87.600 |  | 102 |
| 96 | 6.400 | 0.010 | 0.0004 | 0.0027 | 0.0012 | 0.0003 | 0.0006 | 0.0026 | 99.983 | 87.500 |  | 95 |
| 97 | 6.240 | 0.020 | 0.0004 | 0.0031 | 0.0001 | 0.0000 | 0.0006 | 0.0027 | 99.974 | 87.600 |  | 96 |
| 98 | 6.200 | 0.020 | 0.0006 | 0.0013 | 0.0000 | 0.0000 | 0.0005 | 0.0019 | 99.976 | 87.400 |  | 100 |
| 99 | 6.230 | 0.010 | 0.0004 | 0.0023 | 0.0014 | 0.0004 | 0.0007 | 0.0020 | 99.984 | 87.200 | 0.0010 | 95 |
| 100 | 6.140 | 0.010 | 0.0005 | 0.0010 | 0.0014 | 0.0000 | 0.0006 | 0.0017 | 99.985 | 87.500 |  | 93 |
| 101 | 6.010 | 0.020 | 0.0006 | 0.0027 | 0.0014 | 0.0002 | 0.0006 | 0.0025 | 99.968 | 87.400 |  | 86 |
| 102 | 6.190 | 0.010 | 0.0004 | 0.0021 | 0.0009 | 0.0000 | 0.0006 | 0.0021 | 99.985 | 87.200 |  | 120 |
| 103 | 6.200 | 0.010 | 0.0006 | 0.0020 | 0.0016 | 0.0004 | 0.0009 | 0.0006 | 99.985 | 87.500 |  | 90 |
| 104 | 6.090 | 0.010 | 0.0006 | 0.0027 | 0.0017 | 0.0000 | 0.0005 | 0.0010 | 99.984 | 87.400 |  | 92 |
| 105 | 6.020 | 0.010 | 0.0007 | 0.0027 | 0.0015 | 0.0000 | 0.0005 | 0.0009 | 99.984 | 87.500 |  | 96 |
| 106 | 6.020 | 0.010 | 0.0006 | 0.0021 | 0.0016 | 0.0000 | 0.0004 | 0.0024 | 99.983 | 87.400 |  | 91 |
| 107 | 6.02 | 0.010 | 0.0006 | 0.0015 | 0.0011 | 0.0000 | 0.0009 | 0.0012 | 99.986 | 87.4000 |  | 40 |
| 108 | 6.18 | 0.010 | 0.0006 | 0.0031 | 0.0011 | 0.0000 | 0.0007 | 0.0011 | 99.984 | 87.3000 |  | 196 |
| 109 | 6.40 | 0.010 | 0.0004 | 0.0024 | 0.0014 | 0.0002 | 0.0004 | 0.0007 | 99.985 | 87.5000 |  | 106 |
| 110 | 6.42 | 0.010 | 0.0005 | 0.0028 | 0.0015 | 0.0001 | 0.0006 | 0.0015 | 99.984 | 87.6000 | 0.0050 | 22 |
| 111 | 6.54 | 0.020 | 0.0006 | 0.0018 | 0.0023 | 0.0003 | 0.0009 | 0.0007 | 99.974 | 87.4000 |  | 168 |
| 112 | 7.80 | 0.010 | 0.0004 | 0.0031 | 0.0023 | 0.0009 | 0.0004 | 0.0013 | 99.982 | 87.6000 |  | 131 |
| 113 | 6.1300 | 0.010 | 0.0005 | 0.0024 | 0.0024 | 0.0000 | 0.0003 | 0.0010 | 99.984 | 87.4000 |  | 115 |
| 114 | 6.1200 | 0.010 | 0.0005 | 0.0036 | 0.0016 | 0.0002 | 0.0006 | 0.0018 | 99.979 | 87.4000 |  | 70 |
| 115 | 6.0600 | 0.010 | 0.0006 | 0.0027 | 0.0033 | 0.0006 | 0.0003 | 0.0012 | 99.982 | 87.4000 |  | 170 |
| 116 | 6.000 | 0.010 | 0.0006 | 0.0027 | 0.0027 | 0.0000 | 0.0003 | 0.0009 | 99.983 | 87.400 |  | 130 |
| 117 | 6.270 | 0.020 | 0.0007 | 0.0024 | 0.0023 | 0.0000 | 0.0011 | 0.0018 | 99.973 | 87.300 |  | 128 |
| 118 | 6.390 | 0.010 | 0.0006 | 0.0018 | 0.0016 | 0.0000 | 0.0008 | 0.0013 | 99.985 | 87.600 |  | 158 |
| 119 | 6.140 | 0.010 | 0.0004 | 0.0030 | 0.0021 | 0.0003 | 0.0008 | 0.0009 | 99.983 | 87.200 |  | 184 |
| 120 | 6.360 | 0.010 | 0.0004 | 0.0023 | 0.0021 | 0.0000 | 0.0008 | 0.0014 | 99.984 | 87.500 |  | 190 |
| 121 | 6.260 | 0.010 | 0.0006 | 0.0012 | 0.0023 | 0.0000 | 0.0002 | 0.0010 | 99.985 | 87.600 | 0.0030 | 119 |
| 122 | 6.560 | 0.010 | 0.0008 | 0.0023 | 0.0016 | 0.0001 | 0.0002 | 0.0010 | 99.984 | 87.600 |  | 131 |
| 123 | 6.270 | 0.020 | 0.0004 | 0.0022 | 0.0024 | 0.0002 | 0.0003 | 0.0012 | 99.974 | 87.400 |  | 135 |
| 124 | 6.320 | 0.010 | 0.0006 | 0.0014 | 0.0024 | 0.0000 | 0.0002 | 0.0009 | 99.985 | 87.200 |  | 130 |
| 125 | 6.410 | 0.020 | 0.0005 | 0.0011 | 0.0030 | 0.0000 | 0.0010 | 0.0016 | 99.974 | 87.600 |  | 178 |
| 126 | 6.670 | 0.020 | 0.0005 | 0.0013 | 0.0022 | 0.0000 | 0.0007 | 0.0012 | 99.975 | 87.500 |  | 112 |
| 127 | 6.280 | 0.010 | 0.0004 | 0.0012 | 0.0021 | 0.0000 | 0.0006 | 0.0015 | 99.985 | 87.500 |  | 162 |
| 128 | 6.680 | 0.010 | 0.0003 | 0.0023 | 0.0052 | 0.0000 | 0.0003 | 0.0007 | 99.980 | 87.600 |  | 122 |
| 129 | 6.590 | 0.020 | 0.0004 | 0.0020 | 0.0048 | 0.0000 | 0.0002 | 0.0006 | 99.972 | 87.400 |  | 46 |
| 130 | 7.120 | 0.020 | 0.0004 | 0.0023 | 0.0037 | 0.0010 | 0.0002 | 0.0019 | 99.971 | 87.500 |  | 90 |
| 131 | 6.600 | 0.020 | 0.0006 | 0.0018 | 0.0017 | 0.0000 | 0.0001 | 0.0008 | 99.975 | 87.400 |  | 172 |
| 132 | 6.110 | 0.020 | 0.0005 | 0.0014 | 0.0011 | 0.0000 | 0.0004 | 0.0010 | 99.976 | 87.600 | 0.0020 | 63 |
| 133 | 6.580 | 0.020 | 0.0007 | 0.0013 | 0.0044 | 0.0000 | 0.0008 | 0.0026 | 99.971 | 87.400 |  | 9 |
| 134 | 6.780 | 0.010 | 0.0010 | 0.0011 | 0.0001 | 0.0000 | 0.0004 | 0.0031 | 99.985 | 87.600 |  | 96 |
| 135 | 6.830 | 0.010 | 0.0006 | 0.0011 | 0.0002 | 0.0002 | 0.0013 | 0.0034 | 99.985 | 87.600 |  | 106 |
| 136 | 6.880 | 0.010 | 0.0005 | 0.0023 | 0.0020 | 0.0002 | 0.0007 | 0.0022 | 99.983 | 87.500 |  | 107 |
| 137 | 6.130 | 0.010 | 0.0005 | 0.0002 | 0.0014 | 0.0003 | 0.0009 | 0.0015 | 99.986 | 87.600 |  | 105 |
| 138 | 6.480 | 0.010 | 0.0005 | 0.0006 | 0.0018 | 0.0000 | 0.0008 | 0.0025 | 99.985 | 87.400 |  | 107 |
| 139 | 6.520 | 0.010 | 0.0005 | 0.0011 | 0.0042 | 0.0000 | 0.0012 | 0.0024 | 99.982 | 87.500 |  | 68 |
| 140 | 6.600 | 0.010 | 0.0007 | 0.0007 | 0.0027 | 0.0003 | 0.0008 | 0.0020 | 99.984 | 87.500 |  | 177 |
| 141 | 6.370 | 0.010 | 0.0006 | 0.0011 | 0.0061 | 0.0004 | 0.0007 | 0.0011 | 99.981 | 87.400 |  | 106 |
| 142 | 6.280 | 0.001 | 0.0005 | 0.0019 | 0.0033 | 0.0005 | 0.0004 | 0.0019 | 99.991 | 87.500 |  | 15 |
| 143 | 6.060 | 0.010 | 0.0006 | 0.0007 | 0.0030 | 0.0004 | 0.0005 | 0.0007 | 99.985 | 87.600 | 0.0040 | 140 |
| 144 | 6.300 | 0.010 | 0.0004 | 0.0013 | 0.0040 | 0.0005 | 0.0004 | 0.0008 | 99.983 | 87.200 |  | 216 |
| 145 | 6.180 | 0.010 | 0.0006 | 0.0002 | 0.0014 | 0.0001 | 0.0003 | 0.0004 | 99.987 | 87.400 |  | 163 |
| **备注：“0.0000”字样数据表示该元素/物质的浓度测量值＜0.0001%** | | | | | | | | | | | | |

表2 三元母液产硫酸钠 一等品

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ph | 水分 | 氨浓度 | 氯离子 | 钙离子 | 镁离子 | 铁元素 | 镍钴锰 | 主含量 | 白度 | 水不溶物 | 产量/t |
| 序号 | 6.0~9.0 | ≤0.2 | ≤0.002 | ≤0.35 | ≤0.01 | ≤0.01 | ≤0.002 | ≤0.005 | ≥99.0 | ≤84 | ≤0.05 |
| 1 | 7.010 | 0.030 | 0.0006 | 0.0027 | 0.0035 | 0.0011 | 0.0000 | 0.001 | 99.961 | 87.000 |  | 79 |
| 2 | 6.920 | 0.050 | 0.0004 | 0.0017 | 0.0011 | 0.0003 | 0.0006 | 0.002 | 99.945 | 87.100 |  | 42 |
| 3 | 6.810 | 0.050 | 0.0004 | 0.0016 | 0.0009 | 0.0004 | 0.0001 | 0.001 | 99.946 | 87.300 |  | 186 |
| 4 | 6.900 | 0.030 | 0.0004 | 0.0022 | 0.0023 | 0.0004 | 0.0006 | 0.002 | 99.963 | 86.300 |  | 198 |
| 5 | 6.260 | 0.040 | 0.0007 | 0.0029 | 0.0002 | 0.0000 | 0.0003 | 0.001 | 99.955 | 87.100 |  | 141 |
| 6 | 6.600 | 0.030 | 0.0005 | 0.0017 | 0.0019 | 0.0002 | 0.0006 | 0.002 | 99.964 | 87.200 |  | 86 |
| 7 | 6.370 | 0.030 | 0.0006 | 0.0029 | 0.0000 | 0.0000 | 0.0000 | 0.003 | 99.964 | 87.000 |  | 132 |
| 8 | 6.080 | 0.040 | 0.0006 | 0.0024 | 0.0000 | 0.0003 | 0.0000 | 0.001 | 99.956 | 87.000 |  | 146 |
| 9 | 6.380 | 0.040 | 0.0006 | 0.0027 | 0.0000 | 0.0001 | 0.0004 | 0.001 | 99.955 | 87.000 |  | 140 |
| 10 | 6.250 | 0.070 | 0.0006 | 0.0034 | 0.0005 | 0.0004 | 0.0001 | 0.002 | 99.924 | 87.000 |  | 150 |
| 11 | 6.320 | 0.070 | 0.0006 | 0.0029 | 0.0000 | 0.0005 | 0.0000 | 0.001 | 99.925 | 87.000 |  | 112 |
| 12 | 6.520 | 0.100 | 0.0006 | 0.0033 | 0.0000 | 0.0002 | 0.0002 | 0.0007 | 99.895 | 87.300 | 0 | 145 |
| 13 | 6.020 | 0.040 | 0.0007 | 0.0008 | 0.0000 | 0.0003 | 0.0006 | 0.0017 | 99.957 | 87.400 |  | 135 |
| 14 | 6.020 | 0.030 | 0.0008 | 0.0015 | 0.0000 | 0.0002 | 0.0003 | 0.0014 | 99.966 | 87.300 |  | 130 |
| 15 | 6.080 | 0.040 | 0.0003 | 0.0056 | 0.0000 | 0.0001 | 0.0000 | 0.0010 | 99.948 | 87.100 | 0.0050 | 210 |
| 16 | 6.670 | 0.040 | 0.0004 | 0.0032 | 0.0001 | 0.0001 | 0.0004 | 0.0012 | 99.955 | 86.300 |  | 136 |
| 17 | 8.190 | 0.040 | 0.0009 | 0.0015 | 0.0000 | 0.0001 | 0.0008 | 0.0020 | 99.956 | 86.700 |  | 189 |
| 18 | 8.850 | 0.030 | 0.0005 | 0.0017 | 0.0023 | 0.0000 | 0.0002 | 0.0010 | 99.965 | 87.000 |  | 68 |
| 19 | 8.420 | 0.030 | 0.0009 | 0.0016 | 0.0000 | 0.0001 | 0.0012 | 0.0021 | 99.965 | 87.000 |  | 145 |
| 20 | 6.120 | 0.060 | 0.0006 | 0.0038 | 0.0000 | 0.0001 | 0.0002 | 0.0003 | 99.935 | 87.100 |  | 196 |
| 21 | 6.300 | 0.070 | 0.0006 | 0.0025 | 0.0000 | 0.0005 | 0.0001 | 0.0012 | 99.925 | 87.000 |  | 125 |
| 22 | 6.110 | 0.0600 | 0.0005 | 0.0030 | 0.0001 | 0.0002 | 0.0008 | 0.0014 | 99.935 | 87.600 |  | 187 |
| 23 | 6.410 | 0.080 | 0.0006 | 0.0027 | 0.0000 | 0.0012 | 0.0001 | 0.0006 | 99.915 | 87.500 |  | 126 |
| 24 | 6.080 | 0.050 | 0.0006 | 0.0032 | 0.0000 | 0.0002 | 0.0003 | 0.0023 | 99.944 | 87.000 |  | 120 |
| 25 | 6.500 | 0.070 | 0.0005 | 0.0027 | 0.0000 | 0.0004 | 0.0000 | 0.0016 | 99.925 | 87.200 |  | 173 |
| 26 | 6.590 | 0.060 | 0.0005 | 0.0021 | 0.0000 | 0.0012 | 0.0000 | 0.0015 | 99.935 | 87.300 |  | 124 |
| 27 | 6.390 | 0.030 | 0.0007 | 0.0026 | 0.0000 | 0.0000 | 0.0008 | 0.0026 | 99.964 | 87.000 |  | 173 |
| 28 | 6.130 | 0.040 | 0.0006 | 0.0043 | 0.0000 | 0.0000 | 0.0000 | 0.0011 | 99.954 | 87.200 |  | 140 |
| 29 | 7.390 | 0.060 | 0.0005 | 0.0036 | 0.0000 | 0.0013 | 0.0000 | 0.0016 | 99.933 | 86.400 |  | 136 |
| 30 | 7.070 | 0.030 | 0.0006 | 0.0033 | 0.0000 | 0.0008 | 0.0001 | 0.0019 | 99.963 | 86.000 |  | 106 |
| 31 | 7.530 | 0.090 | 0.0006 | 0.0033 | 0.0000 | 0.0013 | 0.0000 | 0.0009 | 99.904 | 85.600 |  | 140 |
| 32 | 6.130 | 0.030 | 0.0006 | 0.0033 | 0.0000 | 0.0004 | 0.0000 | 0.0010 | 99.965 | 86.000 |  | 106 |
| 33 | 6.050 | 0.040 | 0.0009 | 0.0015 | 0.0000 | 0.0003 | 0.0002 | 0.0014 | 99.956 | 87.000 |  | 86 |
| 34 | 6.000 | 0.070 | 0.0007 | 0.0021 | 0.0000 | 0.0001 | 0.0000 | 0.0005 | 99.927 | 87.000 |  | 140 |
| 35 | 6.120 | 0.030 | 0.0006 | 0.0035 | 0.0000 | 0.0000 | 0.0003 | 0.0011 | 99.965 | 87.000 |  | 127 |
| 36 | 6.430 | 0.060 | 0.0006 | 0.0037 | 0.0000 | 0.0008 | 0.0000 | 0.0020 | 99.933 | 87.100 |  | 121 |
| 37 | 6.250 | 0.050 | 0.0006 | 0.0017 | 0.0000 | 0.0000 | 0.0008 | 0.0008 | 99.947 | 87.000 |  | 28 |
| 38 | 6.120 | 0.030 | 0.0009 | 0.0029 | 0.0000 | 0.0002 | 0.0003 | 0.0018 | 99.964 | 87.100 |  | 115 |
| 39 | 6.220 | 0.030 | 0.0006 | 0.0033 | 0.0000 | 0.0002 | 0.0005 | 0.0026 | 99.963 | 87.300 |  | 210 |
| 40 | 6.120 | 0.050 | 0.0006 | 0.0014 | 0.0000 | 0.0001 | 0.0002 | 0.0012 | 99.947 | 87.000 |  | 132 |
| 41 | 6.190 | 0.060 | 0.0005 | 0.0025 | 0.0000 | 0.0001 | 0.0004 | 0.0015 | 99.935 | 87.500 |  | 185 |
| 42 | 6.120 | 0.030 | 0.0006 | 0.0004 | 0.0000 | 0.0004 | 0.0003 | 0.0017 | 99.967 | 87.600 |  | 138 |
| 43 | 6.180 | 0.030 | 0.0005 | 0.0027 | 0.0000 | 0.0000 | 0.0006 | 0.0006 | 99.966 | 87.000 |  | 145 |
| 44 | 6.250 | 0.040 | 0.0006 | 0.0004 | 0.0000 | 0.0001 | 0.0011 | 0.0027 | 99.956 | 87.000 |  | 188 |
| 45 | 6.210 | 0.050 | 0.0008 | 0.0023 | 0.0000 | 0.0000 | 0.0000 | 0.0006 | 99.946 | 87.100 |  | 122 |
| 46 | 6.030 | 0.040 | 0.0009 | 0.0019 | 0.0019 | 0.0000 | 0.0001 | 0.0013 | 99.949 | 87.000 | 0.0050 | 93 |
| 47 | 6.120 | 0.030 | 0.0004 | 0.0024 | 0.0020 | 0.0001 | 0.0002 | 0.0004 | 99.965 | 87.200 |  | 177 |
| 48 | 6.190 | 0.070 | 0.0007 | 0.0002 | 0.0009 | 0.0000 | 0.0000 | 0.0006 | 99.928 | 87.100 |  | 109 |
| 49 | 6.120 | 0.050 | 0.0006 | 0.0022 | 0.0035 | 0.0002 | 0.0002 | 0.0009 | 99.943 | 87.000 |  | 94 |
| 50 | 6.350 | 0.030 | 0.0006 | 0.0028 | 0.0045 | 0.0007 | 0.0007 | 0.0016 | 99.960 | 87.500 |  | 123 |
| 51 | 6.280 | 0.030 | 0.0007 | 0.0029 | 0.0026 | 0.0000 | 0.0004 | 0.0023 | 99.962 | 87.600 |  | 52 |
| 52 | 6.470 | 0.060 | 0.0005 | 0.0031 | 0.0035 | 0.0005 | 0.0006 | 0.0013 | 99.931 | 87.600 |  | 128 |
| 53 | 6.430 | 0.030 | 0.0004 | 0.0041 | 0.0025 | 0.0007 | 0.0004 | 0.0016 | 99.961 | 87.600 |  | 180 |
| 54 | 6.310 | 0.030 | 0.0006 | 0.0017 | 0.0000 | 0.0000 | 0.0002 | 0.0012 | 99.967 | 87.400 |  | 92 |
| 55 | 6.510 | 0.070 | 0.0007 | 0.0019 | 0.0023 | 0.0000 | 0.0003 | 0.0016 | 99.924 | 87.200 |  | 82 |
| 56 | 6.300 | 0.040 | 0.0005 | 0.0041 | 0.0019 | 0.0000 | 0.0005 | 0.0019 | 99.952 | 87.300 | 0.0010 | 174 |
| 57 | 7.090 | 0.080 | 0.0006 | 0.0029 | 0.0037 | 0.0004 | 0.0003 | 0.0018 | 99.910 | 87.500 |  | 182 |
| 58 | 6.610 | 0.030 | 0.0006 | 0.0036 | 0.0031 | 0.0002 | 0.0003 | 0.0022 | 99.960 | 87.400 |  | 180 |
| 59 | 6.320 | 0.060 | 0.0004 | 0.0012 | 0.0046 | 0.0000 | 0.0005 | 0.0016 | 99.932 | 87.300 |  | 96 |
| 60 | 6.710 | 0.040 | 0.0006 | 0.0012 | 0.0033 | 0.0000 | 0.0007 | 0.0014 | 99.954 | 87.200 |  | 91 |
| 61 | 6.330 | 0.050 | 0.0006 | 0.0027 | 0.0043 | 0.0002 | 0.0006 | 0.0004 | 99.942 | 87.100 |  | 87 |
| 62 | 6.110 | 0.070 | 0.0007 | 0.0029 | 0.0006 | 0.0000 | 0.0006 | 0.0030 | 99.923 | 87.400 |  | 89 |
| 63 | 6.160 | 0.050 | 0.0005 | 0.0036 | 0.0017 | 0.0003 | 0.0006 | 0.0014 | 99.943 | 87.200 |  | 140 |
| 64 | 6.410 | 0.030 | 0.0006 | 0.0014 | 0.0012 | 0.0000 | 0.0010 | 0.0034 | 99.963 | 87.600 |  | 100 |
| 65 | 6.300 | 0.030 | 0.0006 | 0.0014 | 0.0011 | 0.0000 | 0.0003 | 0.0023 | 99.965 | 87.500 |  | 102 |
| 66 | 6.450 | 0.060 | 0.0005 | 0.0012 | 0.0000 | 0.0000 | 0.0010 | 0.0046 | 99.934 | 87.300 |  | 102 |
| 67 | 6.370 | 0.040 | 0.0005 | 0.0025 | 0.0000 | 0.0000 | 0.0006 | 0.0030 | 99.954 | 87.400 |  | 98 |
| 68 | 6.260 | 0.090 | 0.0005 | 0.0016 | 0.0009 | 0.0000 | 0.0008 | 0.0029 | 99.904 | 87.300 |  | 168 |
| 69 | 6.190 | 0.030 | 0.0005 | 0.0008 | 0.0014 | 0.0000 | 0.0007 | 0.0018 | 99.966 | 87.600 |  | 200 |
| 70 | 6.360 | 0.060 | 0.0004 | 0.0010 | 0.0012 | 0.0000 | 0.0009 | 0.0027 | 99.935 | 87.200 |  | 138 |
| 71 | 6.250 | 0.040 | 0.0005 | 0.0023 | 0.0018 | 0.0003 | 0.0010 | 0.0020 | 99.953 | 87.300 |  | 208 |
| 72 | 6.040 | 0.050 | 0.0004 | 0.0022 | 0.0015 | 0.0003 | 0.0006 | 0.0022 | 99.943 | 87.500 |  | 100 |
| 73 | 6.690 | 0.040 | 0.0005 | 0.0019 | 0.0014 | 0.0000 | 0.0007 | 0.0022 | 99.954 | 87.600 |  | 98 |
| 74 | 6.280 | 0.050 | 0.0004 | 0.0030 | 0.0019 | 0.0004 | 0.0008 | 0.0009 | 99.943 | 87.400 |  | 106 |
| 75 | 6.17 | 0.030 | 0.0005 | 0.0017 | 0.0008 | 0.0000 | 0.0008 | 0.0010 | 99.966 | 87.2000 |  | 208 |
| 76 | 6.39 | 0.050 | 0.0005 | 0.0021 | 0.0013 | 0.0000 | 0.0007 | 0.0020 | 99.944 | 87.4000 |  | 175 |
| 77 | 7.1500 | 0.030 | 0.0007 | 0.0017 | 0.0029 | 0.0000 | 0.0003 | 0.0006 | 99.964 | 87.4000 |  | 168 |
| 78 | 6.1100 | 0.040 | 0.0006 | 0.0019 | 0.0015 | 0.0000 | 0.0005 | 0.0010 | 99.955 | 87.3000 |  | 136 |
| 79 | 6.2400 | 0.070 | 0.0007 | 0.0012 | 0.0014 | 0.0000 | 0.0004 | 0.0009 | 99.926 | 87.5000 |  | 198 |
| 80 | 6.1800 | 0.050 | 0.0007 | 0.0026 | 0.0015 | 0.0000 | 0.0004 | 0.0010 | 99.944 | 87.4000 |  | 173 |
| 81 | 6.2400 | 0.040 | 0.0006 | 0.0020 | 0.0017 | 0.0000 | 0.0005 | 0.0015 | 99.954 | 87.6000 |  | 96 |
| 82 | 6.1100 | 0.070 | 0.0007 | 0.0025 | 0.0028 | 0.0002 | 0.0001 | 0.0010 | 99.923 | 88.4000 |  | 186 |
| 83 | 6.210 | 0.040 | 0.0007 | 0.0013 | 0.0014 | 0.0000 | 0.0005 | 0.0008 | 99.956 | 87.300 |  | 110 |
| 84 | 6.330 | 0.030 | 0.0006 | 0.0006 | 0.0018 | 0.0000 | 0.0017 | 0.0010 | 99.966 | 87.200 |  | 125 |
| 85 | 6.270 | 0.030 | 0.0005 | 0.0011 | 0.0021 | 0.0000 | 0.0009 | 0.0019 | 99.964 | 87.300 |  | 117 |
| 86 | 6.410 | 0.030 | 0.0005 | 0.0023 | 0.0023 | 0.0002 | 0.0004 | 0.0008 | 99.964 | 87.500 |  | 76 |
| 87 | 6.610 | 0.040 | 0.0005 | 0.0027 | 0.0033 | 0.0006 | 0.0010 | 0.0015 | 99.951 | 87.300 |  | 207 |
| 88 | 6.510 | 0.030 | 0.0006 | 0.0016 | 0.0054 | 0.0000 | 0.0008 | 0.0035 | 99.959 | 87.500 |  | 236 |
| 89 | 6.110 | 0.030 | 0.0005 | 0.0018 | 0.0011 | 0.0002 | 0.0005 | 0.0019 | 99.965 | 87.500 |  | 64 |
| 90 | 6.730 | 0.060 | 0.0004 | 0.0016 | 0.0018 | 0.0000 | 0.0012 | 0.0030 | 99.933 | 87.600 |  | 104 |
| 91 | 6.120 | 0.040 | 0.0005 | 0.0026 | 0.0021 | 0.0001 | 0.0006 | 0.0002 | 99.955 | 87.500 |  | 77 |
| 92 | 6.320 | 0.030 | 0.0004 | 0.0028 | 0.0025 | 0.0002 | 0.0007 | 0.0009 | 99.963 | 87.000 |  | 36 |
| 93 | 6.700 | 0.060 | 0.0004 | 0.0007 | 0.0040 | 0.0001 | 0.0010 | 0.0033 | 99.928 | 87.300 | 0.0040 | 103 |
| 94 | 6.680 | 0.050 | 0.0005 | 0.0008 | 0.0024 | 0.0003 | 0.0009 | 0.0038 | 99.942 | 87.300 |  | 72 |
| 95 | 6.300 | 0.030 | 0.0006 | 0.0023 | 0.0024 | 0.0004 | 0.0006 | 0.0025 | 99.962 | 87.300 |  | 138 |
| 96 | 6.110 | 0.050 | 0.0006 | 0.0023 | 0.0012 | 0.0004 | 0.0007 | 0.0008 | 99.945 | 87.400 |  | 120 |
| 97 | 6.440 | 0.040 | 0.0007 | 0.0009 | 0.0000 | 0.0000 | 0.0020 | 0.0025 | 99.956 | 87.400 |  | 28 |
| 98 | 6.250 | 0.060 | 0.0005 | 0.0007 | 0.0000 | 0.0000 | 0.0016 | 0.0024 | 99.936 | 87.600 |  | 127 |
| 99 | 6.180 | 0.040 | 0.0008 | 0.0002 | 0.0016 | 0.0000 | 0.0010 | 0.0027 | 99.955 | 87.500 |  | 197 |
| 100 | 6.270 | 0.040 | 0.0006 | 0.0002 | 0.0005 | 0.0000 | 0.0004 | 0.0007 | 99.958 | 87.400 |  | 146 |
| 101 | 6.330 | 0.030 | 0.0007 | 0.0004 | 0.0004 | 0.0000 | 0.0003 | 0.0017 | 99.967 | 87.500 |  | 40 |
| **备注：“0.0000”字样数据表示该元素/物质的浓度测量值＜0.0001%** | | | | | | | | | | | | |

表3 硫酸镍线产硫酸钠 一等品

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ph | 水分 | 氨浓度 | 氯离子 | 钙离子 | 镁离子 | 铁元素 | 镍钴锰 | 主含量 | 白度 | 水不溶物 | 产量/t |
| 序号 | 6.0~9.0 | ≤0.2 | ≤0.002 | ≤0.35 | ≤0.01 | ≤0.01 | ≤0.002 | ≤0.005 | ≥99.0 | ≤84 | ≤0.05 |
| 1 | 8.040 | 0.040 | 0.0006 | 0.0446 | 0.0017 | 0.0007 | 0.0006 | 0.002 | 99.910 | 75.000 |  | 78 |
| 2 | 8.970 | 0.050 | 0.0006 | 0.0713 | 0.0010 | 0.0003 | 0.0005 | 0.001 | 99.875 | 75.000 |  | 50 |
| 3 | 8.860 | 0.010 | 0.0013 | 0.0706 | 0.0008 | 0.0005 | 0.0004 | 0.003 | 99.914 | 70.000 |  | 52 |
| 4 | 8.930 | 0.070 | 0.0006 | 0.0445 | 0.0000 | 0.0006 | 0.0000 | 0.001 | 99.883 | 70.000 |  | 63 |
| 5 | 8.650 | 0.040 | 0.0011 | 0.0895 | 0.0012 | 0.0003 | 0.0009 | 0.002 | 99.866 | 70.000 |  | 13 |
| 6 | 8.250 | 0.010 | 0.0007 | 0.1244 | 0.0010 | 0.0006 | 0.0011 | 0.003 | 99.861 | 70.000 |  | 73 |
| 7 | 8.740 | 0.030 | 0.0009 | 0.1509 | 0.0004 | 0.0001 | 0.0003 | 0.002 | 99.816 | 70.000 |  | 77 |
| 8 | 8.780 | 0.010 | 0.0007 | 0.0894 | 0.0013 | 0.0004 | 0.0000 | 0.002 | 99.896 | 70.000 |  | 62 |
| 9 | 8.690 | 0.040 | 0.0011 | 0.1373 | 0.0004 | 0.0004 | 0.0006 | 0.002 | 99.819 | 75.000 |  | 75 |
| 10 | 8.670 | 0.060 | 0.0006 | 0.1251 | 0.0007 | 0.0006 | 0.0000 | 0.002 | 99.811 | 70.000 |  | 62 |
| 11 | 8.650 | 0.020 | 0.0011 | 0.1432 | 0.0000 | 0.0002 | 0.0004 | 0.002 | 99.834 | 70.000 |  | 11 |
| 12 | 8.410 | 0.070 | 0.0006 | 0.0786 | 0.0012 | 0.0002 | 0.0004 | 0.001 | 99.848 | 70.000 |  | 75 |
| 13 | 8.790 | 0.030 | 0.0010 | 0.1819 | 0.0000 | 0.0002 | 0.0005 | 0.002 | 99.785 | 70.000 |  | 63 |
| 14 | 8.990 | 0.080 | 0.0006 | 0.1069 | 0.0006 | 0.0009 | 0.0001 | 0.002 | 99.810 | 70.000 |  | 84 |
| 15 | 8.860 | 0.030 | 0.0011 | 0.2211 | 0.0000 | 0.0002 | 0.0005 | 0.002 | 99.746 | 70.000 |  | 55 |
| 16 | 8.850 | 0.110 | 0.0006 | 0.1782 | 0.0000 | 0.0005 | 0.0000 | 0.001 | 99.710 | 75.000 |  | 84 |
| 17 | 8.460 | 0.060 | 0.0008 | 0.2405 | 0.0000 | 0.0006 | 0.000 | 0.002 | 99.697 | 75.000 |  | 67 |
| 18 | 8.660 | 0.080 | 0.0006 | 0.0715 | 0.0000 | 0.0003 | 0.000 | 0.001 | 99.847 | 75.000 | 0.0001 | 50 |
| 19 | 8.480 | 0.030 | 0.0007 | 0.2140 | 0.0001 | 0.0004 | 0.000 | 0.001 | 99.754 | 75.000 |  | 78 |
| 20 | 8.640 | 0.040 | 0.0007 | 0.1790 | 0.0000 | 0.0005 | 0.000 | 0.001 | 99.779 | 75.000 |  | 76 |
| 21 | 8.820 | 0.050 | 0.0009 | 0.2673 | 0.0004 | 0.0005 | 0.000 | 0.002 | 99.679 | 70.000 |  | 75 |
| 22 | 8.560 | 0.050 | 0.0006 | 0.0357 | 0.0012 | 0.0020 | 0.001 | 0.002 | 99.909 | 75.000 |  | 57 |
| 23 | 7.000 | 0.030 | 0.0005 | 0.0529 | 0.0000 | 0.0000 | 0.000 | 0.003 | 99.914 | 75.000 |  | 9 |
| 24 | 7.900 | 0.010 | 0.0007 | 0.0357 | 0.0000 | 0.0001 | 0.000 | 0.002 | 99.952 | 75.000 |  | 80 |
| 25 | 8.480 | 0.010 | 0.0004 | 0.0533 | 0.0000 | 0.0001 | 0.000 | 0.002 | 99.934 | 70.000 |  | 52 |
| 26 | 8.740 | 0.040 | 0.0006 | 0.0803 | 0.0001 | 0.0005 | 0.000 | 0.003 | 99.876 | 70.000 | 0.0060 | 58 |
| 27 | 8.810 | 0.040 | 0.0006 | 0.1338 | 0.0010 | 0.0004 | 0.000 | 0.004 | 99.820 | 70.000 |  | 58 |
| 28 | 8.940 | 0.040 | 0.0006 | 0.1066 | 0.0000 | 0.0000 | 0.0001 | 0.0026 | 99.850 | 70.000 |  | 51 |
| 29 | 8.920 | 0.020 | 0.0008 | 0.0500 | 0.0000 | 0.0007 | 0.0004 | 0.0032 | 99.925 | 75.000 |  | 38 |
| 30 | 8.970 | 0.020 | 0.0007 | 0.0892 | 0.0000 | 0.0000 | 0.0004 | 0.0028 | 99.887 | 70.000 |  | 80 |
| 31 | 8.960 | 0.040 | 0.0006 | 0.0536 | 0.0000 | 0.0000 | 0.0002 | 0.0045 | 99.901 | 70.000 |  | 46 |
| 32 | 8.940 | 0.020 | 0.0007 | 0.0570 | 0.0000 | 0.0005 | 0.0007 | 0.0038 | 99.918 | 70.000 |  | 84 |
| 33 | 8.960 | 0.020 | 0.0006 | 0.0802 | 0.0000 | 0.0005 | 0.0007 | 0.0035 | 99.895 | 70.000 |  | 84 |
| 34 | 8.810 | 0.060 | 0.0007 | 0.1786 | 0.0000 | 0.0000 | 0.0000 | 0.0004 | 99.760 | 70.000 |  | 21 |
| 35 | 8.490 | 0.040 | 0.0008 | 0.1593 | 0.0000 | 0.0004 | 0.0005 | 0.0016 | 99.798 | 70.000 |  | 91 |
| 36 | 8.720 | 0.180 | 0.0006 | 0.0429 | 0.0002 | 0.0000 | 0.0005 | 0.0013 | 99.775 | 70.000 |  | 92 |
| 37 | 8.740 | 0.060 | 0.0007 | 0.0887 | 0.0001 | 0.0004 | 0.0005 | 0.0016 | 99.849 | 70.000 |  | 74 |
| 38 | 8.960 | 0.020 | 0.0007 | 0.1241 | 0.0002 | 0.0028 | 0.0010 | 0.0017 | 99.851 | 70.000 |  | 22 |
| 39 | 8.840 | 0.020 | 0.0008 | 0.0740 | 0.0000 | 0.0002 | 0.0004 | 0.0020 | 99.903 | 75.000 |  | 14 |
| 40 | 8.890 | 0.010 | 0.0008 | 0.0446 | 0.0011 | 0.0002 | 0.0004 | 0.0018 | 99.942 | 75.000 |  | 79 |
| 41 | 7.800 | 0.040 | 0.0016 | 0.0354 | 0.0000 | 0.0004 | 0.001 | 0.0020 | 99.921 | 75.000 |  | 24 |
| 42 | 7.010 | 0.020 | 0.0012 | 0.0600 | 0.0000 | 0.0005 | 0.001 | 0.0014 | 99.917 | 75.000 |  | 96 |
| 43 | 8.900 | 0.070 | 0.0005 | 0.0356 | 0.0000 | 0.0000 | 0.000 | 0.0007 | 99.893 | 70.000 |  | 92 |
| 44 | 8.290 | 0.060 | 0.0010 | 0.1068 | 0.0023 | 0.0000 | 0.000 | 0.0018 | 99.828 | 70.000 | 0.0230 | 62 |
| 45 | 8.870 | 0.020 | 0.0008 | 0.1400 | 0.0046 | 0.0000 | 0.002 | 0.0024 | 99.832 | 70.000 |  | 58 |
| 46 | 8.720 | 0.080 | 0.0007 | 0.1607 | 0.0040 | 0.0000 | 0.001 | 0.0024 | 99.752 | 70.000 |  | 28 |
| 47 | 8.860 | 0.050 | 0.0008 | 0.1759 | 0.0035 | 0.0000 | 0.001 | 0.0025 | 99.767 | 70.000 |  | 100 |
| 48 | 8.910 | 0.030 | 0.0008 | 0.1602 | 0.0034 | 0.0000 | 0.001 | 0.0022 | 99.803 | 70.000 |  | 24 |
| 49 | 7.870 | 0.0200 | 0.0007 | 0.0354 | 0.0026 | 0.0007 | 0.000 | 0.0015 | 99.939 | 75.000 |  | 36 |
| 50 | 7.250 | 0.040 | 0.0004 | 0.0713 | 0.0017 | 0.0000 | 0.000 | 0.0005 | 99.886 | 75.000 |  | 90 |
| 51 | 7.550 | 0.060 | 0.0006 | 0.0143 | 0.0049 | 0.0000 | 0.000 | 0.0017 | 99.919 | 75.000 |  | 88 |
| 52 | 8.750 | 0.010 | 0.0004 | 0.0536 | 0.0055 | 0.0000 | 0.000 | 0.0011 | 99.929 | 75.000 |  | 92 |
| 53 | 8.130 | 0.040 | 0.0007 | 0.0142 | 0.0008 | 0.0000 | 0.001 | 0.0013 | 99.943 | 75.000 |  | 94 |
| 54 | 8.040 | 0.020 | 0.0010 | 0.1064 | 0.0026 | 0.0000 | 0.0002 | 0.0017 | 99.868 | 75.000 |  | 70 |
| 55 | 8.170 | 0.020 | 0.0006 | 0.1000 | 0.0020 | 0.0000 | 0.0011 | 0.0032 | 99.874 | 70.000 |  | 66 |
| 56 | 8.400 | 0.100 | 0.0010 | 0.1699 | 0.0038 | 0.0000 | 0.0005 | 0.0012 | 99.724 | 74.000 |  | 96 |
| 57 | 8.630 | 0.100 | 0.0008 | 0.1758 | 0.0023 | 0.0000 | 0.001 | 0.0018 | 99.719 | 74.000 |  | 90 |
| 58 | 8.740 | 0.080 | 0.0008 | 0.1764 | 0.0011 | 0.0000 | 0.001 | 0.0041 | 99.738 | 74.200 |  | 79 |
| 59 | 8.870 | 0.120 | 0.0006 | 0.1967 | 0.0000 | 0.0000 | 0.001 | 0.0045 | 99.678 | 75.000 |  | 88 |
| 60 | 8.970 | 0.130 | 0.0007 | 0.2200 | 0.0004 | 0.0000 | 0.001 | 0.0033 | 99.646 | 75.000 |  | 87 |
| 61 | 6.790 | 0.001 | 0.0006 | 0.1700 | 0.0011 | 0.0000 | 0.001 | 0.0029 | 99.825 | 75.000 |  | 12 |
| 62 | 6.560 | 0.010 | 0.0008 | 0.0356 | 0.0016 | 0.0004 | 0.001 | 0.0020 | 99.950 | 75.000 |  | 91 |
| 63 | 7.610 | 0.010 | 0.0007 | 0.0714 | 0.0012 | 0.0000 | 0.001 | 0.0026 | 99.914 | 75.000 |  | 90 |
| 64 | 8.500 | 0.020 | 0.0007 | 0.0852 | 0.0016 | 0.0011 | 0.001 | 0.0023 | 99.889 | 75.000 |  | 88 |
| 65 | 8.180 | 0.080 | 0.0008 | 0.0894 | 0.0015 | 0.0000 | 0.001 | 0.0023 | 99.826 | 75.000 |  | 90 |
| 66 | 9.000 | 0.050 | 0.0008 | 0.1000 | 0.0022 | 0.0008 | 0.001 | 0.0014 | 99.845 | 74.000 |  | 92 |
| 67 | 8.460 | 0.060 | 0.0007 | 0.1784 | 0.0024 | 0.0000 | 0.0006 | 0.0029 | 99.756 | 74.000 |  | 90 |
| 68 | 8.650 | 0.004 | 0.0008 | 0.2200 | 0.0016 | 0.0000 | 0.0009 | 0.0017 | 99.772 | 74.000 |  | 85 |
| 69 | 8.880 | 0.050 | 0.0008 | 0.2500 | 0.0016 | 0.0000 | 0.001 | 0.0013 | 99.696 | 74.000 |  | 25 |
| 70 | 8.6100 | 0.0500 | 0.0010 | 0.0938 | 0.0019 | 0.0000 | 0.0008 | 0.0012 | 99.852 | 70.0000 |  | 81 |
| 71 | 8.550 | 0.060 | 0.0008 | 0.1500 | 0.0027 | 0.0000 | 0.000 | 0.0010 | 99.786 | 70.000 |  | 60 |
| 72 | 8.890 | 0.040 | 0.0009 | 0.0976 | 0.0022 | 0.0008 | 0.001 | 0.0013 | 99.857 | 70.000 |  | 26 |
| 73 | 8.640 | 0.050 | 0.0008 | 0.0940 | 0.0023 | 0.0000 | 0.001 | 0.0022 | 99.851 | 70.000 |  | 76 |
| 74 | 8.470 | 0.020 | 0.0007 | 0.0734 | 0.0014 | 0.0000 | 0.001 | 0.0036 | 99.901 | 75.000 |  | 102 |
| 75 | 8.770 | 0.020 | 0.0007 | 0.2800 | 0.0000 | 0.0000 | 0.001 | 0.0037 | 99.696 | 75.000 |  | 12 |
| 76 | 8.920 | 0.010 | 0.0008 | 0.2600 | 0.0023 | 0.0002 | 0.001 | 0.0008 | 99.726 | 75.000 |  | 41 |
| 77 | 6.340 | 0.070 | 0.0007 | 0.2200 | 0.0023 | 0.0001 | 0.001 | 0.0006 | 99.706 | 75.000 |  | 72 |
| 78 | 8.710 | 0.040 | 0.0008 | 0.1100 | 0.0029 | 0.0006 | 0.001 | 0.0022 | 99.844 | 75.000 | 0.0050 | 57 |
| 79 | 8.340 | 0.050 | 0.0007 | 0.1134 | 0.0039 | 0.0004 | 0.001 | 0.0040 | 99.828 | 75.000 |  | 16 |
| 80 | 8.730 | 0.040 | 0.0008 | 0.2200 | 0.0028 | 0.0006 | 0.001 | 0.0022 | 99.734 | 75.000 |  | 16 |
| **备注：“0.0000”字样数据表示该元素/物质的浓度测量值＜0.0001%** | | | | | | | | | | | | |

表4 硫酸镍线产硫酸钠 合格品

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | ph | 水分 | 氨浓度 | 氯离子 | 钙离子 | 镁离子 | 铁元素 | 镍钴锰 | 主含量 | 白度 | 水不溶物 | 产量/t |
| 序号 | / | ≤0.5 | ≤0.002 | ≤0.7 | ≤0.15 | ≤0.15 | ≤0.01 | ≤0.007 | ≥98.0 | / | ≤0.05 |
| 1 | 9.060 | 0.010 | 0.0010 | 0.1631 | 0.0007 | 0.0005 | 0.0007 | 0.003 | 99.822 | 70.000 |  | 64 |
| 2 | 9.130 | 0.020 | 0.0009 | 0.1141 | 0.0023 | 0.0010 | 0.0010 | 0.004 | 99.858 | 70.000 |  | 80 |
| 3 | 9.140 | 0.040 | 0.0006 | 0.0714 | 0.0007 | 0.0010 | 0.0006 | 0.003 | 99.883 | 70.000 |  | 65 |
| 4 | 9.150 | 0.050 | 0.0007 | 0.2907 | 0.0007 | 0.0000 | 0.0009 | 0.004 | 99.654 | 70.000 |  | 16 |
| 5 | 9.270 | 0.050 | 0.0006 | 0.1788 | 0.0019 | 0.0008 | 0.0000 | 0.002 | 99.766 | 75.000 |  | 62 |
| 6 | 9.260 | 0.050 | 0.0007 | 0.2134 | 0.0018 | 0.0009 | 0.0011 | 0.003 | 99.730 | 70.000 |  | 82 |
| 7 | 9.110 | 0.050 | 0.0005 | 0.2115 | 0.0009 | 0.0005 | 0.0002 | 0.002 | 99.735 | 70.000 | 0.0030 | 82 |
| 8 | 9.250 | 0.060 | 0.0007 | 0.2400 | 0.0011 | 0.0008 | 0.0003 | 0.002 | 99.695 | 70.000 |  | 21 |
| 9 | 9.410 | 0.030 | 0.0012 | 0.2332 | 0.0005 | 0.0003 | 0.0009 | 0.003 | 99.732 | 70.000 |  | 54 |
| 10 | 9.190 | 0.050 | 0.0007 | 0.2497 | 0.0029 | 0.0011 | 0.0008 | 0.003 | 99.693 | 70.000 |  | 21 |
| 11 | 9.140 | 0.020 | 0.0012 | 0.2161 | 0.0003 | 0.0005 | 0.0005 | 0.001 | 99.761 | 70.000 |  | 50 |
| 12 | 9.300 | 0.070 | 0.0010 | 0.2220 | 0.0004 | 0.0006 | 0.0005 | 0.001 | 99.705 | 70.000 |  | 76 |
| 13 | 9.510 | 0.030 | 0.0007 | 0.2100 | 0.0016 | 0.0005 | 0.0002 | 0.002 | 99.756 | 69.000 |  | 74 |
| 14 | 9.310 | 0.050 | 0.0009 | 0.3171 | 0.0029 | 0.0010 | 0.0013 | 0.004 | 99.625 | 65.000 |  | 20 |
| 15 | 9.180 | 0.040 | 0.0010 | 0.2500 | 0.0000 | 0.0002 | 0.001 | 0.003 | 99.706 | 70.000 |  | 68 |
| 16 | 9.170 | 0.060 | 0.0008 | 0.2700 | 0.0002 | 0.0005 | 0.001 | 0.003 | 99.666 | 70.000 |  | 10 |
| 17 | 9.400 | 0.030 | 0.0007 | 0.0713 | 0.0003 | 0.0004 | 0.001 | 0.002 | 99.895 | 70.000 |  | 48 |
| 18 | 9.160 | 0.050 | 0.0007 | 0.0892 | 0.0010 | 0.0000 | 0.000 | 0.002 | 99.857 | 70.000 |  | 48 |
| 19 | 9.270 | 0.020 | 0.0006 | 0.1496 | 0.0000 | 0.0005 | 0.001 | 0.003 | 99.827 | 70.000 |  | 82 |
| 20 | 9.070 | 0.040 | 0.0008 | 0.1508 | 0.0010 | 0.0000 | 0.000 | 0.002 | 99.805 | 70.000 |  | 58 |
| 21 | 9.180 | 0.020 | 0.0007 | 0.2140 | 0.0004 | 0.0007 | 0.000 | 0.003 | 99.762 | 70.000 |  | 82 |
| 22 | 9.160 | 0.050 | 0.0010 | 0.1948 | 0.0000 | 0.0000 | 0.000 | 0.003 | 99.751 | 70.000 |  | 64 |
| 23 | 9.270 | 0.040 | 0.0010 | 0.1424 | 0.0000 | 0.0007 | 0.001 | 0.005 | 99.811 | 70.000 |  | 24 |
| 24 | 9.200 | 0.040 | 0.0007 | 0.1422 | 0.0000 | 0.0000 | 0.000 | 0.001 | 99.816 | 70.000 |  | 57 |
| 25 | 9.340 | 0.060 | 0.0010 | 0.1600 | 0.0000 | 0.0006 | 0.0020 | 0.005 | 99.774 | 70.000 |  | 84 |
| 26 | 9.300 | 0.030 | 0.0006 | 0.1597 | 0.0000 | 0.0000 | 0.0002 | 0.002 | 99.807 | 70.000 |  | 84 |
| 27 | 9.360 | 0.010 | 0.0008 | 0.1687 | 0.0000 | 0.0006 | 0.0009 | 0.0039 | 99.816 | 70.000 |  | 21 |
| 28 | 9.280 | 0.030 | 0.0006 | 0.1510 | 0.0004 | 0.0002 | 0.0003 | 0.0023 | 99.816 | 70.000 |  | 77 |
| 29 | 9.400 | 0.030 | 0.0006 | 0.1400 | 0.0000 | 0.0002 | 0.0002 | 0.0020 | 99.827 | 68.000 |  | 74 |
| 30 | 9.550 | 0.060 | 0.0008 | 0.2138 | 0.0002 | 0.0002 | 0.0003 | 0.0020 | 99.723 | 60.000 |  | 22 |
| 31 | 9.680 | 0.070 | 0.0007 | 0.0891 | 0.0000 | 0.0007 | 0.0002 | 0.0029 | 99.837 | 60.000 |  | 58 |
| 32 | 9.460 | 0.060 | 0.0007 | 0.1775 | 0.0001 | 0.0004 | 0.0009 | 0.0043 | 99.757 | 70.000 |  | 79 |
| 33 | 9.340 | 0.090 | 0.0006 | 0.1430 | 0.0000 | 0.0012 | 0.0001 | 0.0016 | 99.764 | 70.000 |  | 85 |
| 34 | 9.450 | 0.050 | 0.0000 | 0.2280 | 0.0001 | 0.0013 | 0.000 | 0.0020 | 99.719 | 70.000 |  | 70 |
| 35 | 9.430 | 0.040 | 0.0008 | 0.1900 | 0.0000 | 0.0006 | 0.000 | 0.0025 | 99.766 | 70.000 |  | 63 |
| 36 | 9.340 | 0.080 | 0.0008 | 0.2400 | 0.0000 | 0.0007 | 0.001 | 0.0021 | 99.676 | 70.000 |  | 80 |
| 37 | 9.260 | 0.140 | 0.0006 | 0.3200 | 0.0000 | 0.0004 | 0.000 | 0.0033 | 99.536 | 70.000 |  | 76 |
| 38 | 9.580 | 0.040 | 0.0007 | 0.4100 | 0.0000 | 0.0000 | 0.000 | 0.0029 | 99.546 | 70.000 |  | 22 |
| 39 | 9.680 | 0.1800 | 0.0006 | 0.3200 | 0.0000 | 0.0013 | 0.000 | 0.0046 | 99.494 | 68.000 |  | 36 |
| 40 | 9.630 | 0.050 | 0.0008 | 0.3200 | 0.0000 | 0.0000 | 0.000 | 0.0014 | 99.628 | 70.000 |  | 68 |
| 41 | 9.800 | 0.060 | 0.0008 | 0.2800 | 0.0000 | 0.0011 | 0.001 | 0.0035 | 99.655 | 70.000 | 0.0185 | 54 |
| 42 | 9.730 | 0.220 | 0.0005 | 0.2848 | 0.0000 | 0.0000 | 0.0002 | 0.0033 | 99.491 | 70.000 |  | 14 |
| 43 | 9.330 | 0.050 | 0.0005 | 0.0626 | 0.0000 | 0.0001 | 0.0003 | 0.0010 | 99.886 | 70.000 |  | 88 |
| 44 | 9.090 | 0.010 | 0.0006 | 0.0800 | 0.0000 | 0.0000 | 0.0004 | 0.0017 | 99.908 | 70.000 |  | 22 |
| 45 | 9.210 | 0.110 | 0.0007 | 0.0535 | 0.0000 | 0.0002 | 0.0004 | 0.0013 | 99.834 | 70.000 |  | 56 |
| 46 | 9.370 | 0.050 | 0.0007 | 0.1385 | 0.0000 | 0.0008 | 0.0005 | 0.0030 | 99.807 | 70.000 |  | 71 |
| 47 | 9.100 | 0.080 | 0.0006 | 0.0800 | 0.0000 | 0.0017 | 0.0001 | 0.0025 | 99.835 | 70.000 |  | 60 |
| 48 | 9.350 | 0.060 | 0.0008 | 0.2133 | 0.0000 | 0.0014 | 0.0003 | 0.0026 | 99.722 | 70.000 |  | 25 |
| 49 | 9.640 | 0.100 | 0.0006 | 0.1857 | 0.0004 | 0.0012 | 0.0000 | 0.0020 | 99.710 | 70.000 |  | 58 |
| 50 | 9.480 | 0.040 | 0.0008 | 0.2700 | 0.0004 | 0.0025 | 0.0009 | 0.0046 | 99.682 | 70.000 |  | 17 |
| 51 | 9.480 | 0.040 | 0.0006 | 0.2323 | 0.0003 | 0.0005 | 0.0001 | 0.0028 | 99.724 | 70.000 |  | 77 |
| 52 | 9.580 | 0.110 | 0.0006 | 0.2500 | 0.0000 | 0.0006 | 0.0001 | 0.0038 | 99.635 | 70.000 |  | 78 |
| 53 | 9.540 | 0.060 | 0.0011 | 0.2111 | 0.0000 | 0.0013 | 0.0007 | 0.0046 | 99.722 | 70.000 |  | 24 |
| 54 | 9.290 | 0.070 | 0.0008 | 0.2305 | 0.0001 | 0.0016 | 0.0009 | 0.0045 | 99.693 | 70.000 |  | 60 |
| 55 | 9.570 | 0.030 | 0.0010 | 0.1818 | 0.0000 | 0.0006 | 0.0009 | 0.0043 | 99.782 | 70.000 |  | 27 |
| 56 | 9.320 | 0.030 | 0.0007 | 0.2300 | 0.0004 | 0.0009 | 0.0006 | 0.0044 | 99.734 | 70.000 |  | 78 |
| 57 | 9.330 | 0.070 | 0.0005 | 0.2464 | 0.0000 | 0.0006 | 0.0004 | 0.0025 | 99.680 | 70.000 |  | 86 |
| 58 | 9.490 | 0.070 | 0.0009 | 0.2357 | 0.0006 | 0.0005 | 0.0003 | 0.0015 | 99.691 | 70.000 |  | 71 |
| 59 | 9.560 | 0.050 | 0.0005 | 0.2624 | 0.0000 | 0.0005 | 0.0005 | 0.0023 | 99.684 | 70.000 |  | 76 |
| 60 | 9.740 | 0.050 | 0.0006 | 0.1400 | 0.0000 | 0.0002 | 0.0006 | 0.0022 | 99.807 | 68.000 | 0.0085 | 57 |
| 61 | 9.570 | 0.040 | 0.0008 | 0.2100 | 0.0000 | 0.0008 | 0.0011 | 0.0028 | 99.746 | 68.000 |  | 24 |
| 62 | 9.030 | 0.090 | 0.0006 | 0.0900 | 0.0000 | 0.0017 | 0.0001 | 0.0025 | 99.815 | 70.000 |  | 48 |
| 63 | 9.130 | 0.030 | 0.001 | 0.1423 | 0.0001 | 0.0011 | 0.0006 | 0.0016 | 99.824 | 70.000 |  | 86 |
| 64 | 9.600 | 0.090 | 0.001 | 0.1780 | 0.0000 | 0.0037 | 0.0001 | 0.0022 | 99.726 | 70.000 |  | 75 |
| 65 | 9.470 | 0.030 | 0.0004 | 0.1600 | 0.0000 | 0.0030 | 0.0001 | 0.0027 | 99.804 | 70.000 |  | 64 |
| 66 | 9.830 | 0.020 | 0.0008 | 0.1200 | 0.0000 | 0.0005 | 0.0001 | 0.0022 | 99.857 | 68.000 |  | 52 |
| 67 | 9.670 | 0.020 | 0.0008 | 0.1400 | 0.0000 | 0.0000 | 0.0006 | 0.0013 | 99.838 | 70.000 |  | 75 |
| 68 | 9.480 | 0.040 | 0.0009 | 0.2230 | 0.0000 | 0.0003 | 0.0004 | 0.0019 | 99.734 | 68.000 |  | 73 |
| 69 | 9.800 | 0.090 | 0.0008 | 0.4000 | 0.0000 | 0.0000 | 0.0003 | 0.0012 | 99.508 | 68.000 |  | 52 |
| 70 | 9.320 | 0.020 | 0.0006 | 0.0622 | 0.0000 | 0.0004 | 0.0006 | 0.0015 | 99.915 | 75.000 |  | 63 |
| 71 | 9.240 | 0.010 | 0.0008 | 0.0887 | 0.0007 | 0.0000 | 0.0001 | 0.0016 | 99.898 | 75.000 |  | 51 |
| 72 | 9.420 | 0.040 | 0.0006 | 0.0700 | 0.0000 | 0.0002 | 0.0007 | 0.0025 | 99.887 | 70.000 |  | 24 |
| 73 | 9.450 | 0.030 | 0.0006 | 0.1069 | 0.0015 | 0.0002 | 0.0002 | 0.0022 | 99.859 | 70.000 |  | 55 |
| 74 | 9.400 | 0.030 | 0.0006 | 0.0930 | 0.0000 | 0.0004 | 0.0008 | 0.0024 | 99.874 | 70.000 |  | 24 |
| 75 | 9.610 | 0.050 | 0.0008 | 0.1607 | 0.0015 | 0.0002 | 0.0003 | 0.0021 | 99.785 | 75.000 |  | 54 |
| 76 | 9.440 | 0.040 | 0.0009 | 0.1070 | 0.0007 | 0.0019 | 0.0009 | 0.0025 | 99.847 | 70.000 |  | 80 |
| 77 | 9.420 | 0.020 | 0.0006 | 0.1611 | 0.0012 | 0.0000 | 0.000 | 0.0015 | 99.816 | 70.000 |  | 80 |
| 78 | 9.440 | 0.010 | 0.0007 | 0.1246 | 0.0013 | 0.0008 | 0.000 | 0.0020 | 99.861 | 70.000 |  | 4 |
| 79 | 9.820 | 0.010 | 0.0018 | 0.1336 | 0.0000 | 0.0004 | 0.000 | 0.0030 | 99.851 | 70.000 |  | 41 |
| 80 | 9.310 | 0.040 | 0.0007 | 0.1300 | 0.0005 | 0.0007 | 0.000 | 0.0014 | 99.827 | 70.000 |  | 68 |
| 81 | 9.600 | 0.030 | 0.0015 | 0.1400 | 0.0000 | 0.0001 | 0.001 | 0.0028 | 99.826 | 70.000 | 0.0065 | 54 |
| 82 | 9.170 | 0.010 | 0.0008 | 0.1400 | 0.0001 | 0.0001 | 0.001 | 0.0022 | 99.847 | 70.000 |  | 69 |
| 83 | 9.700 | 0.010 | 0.0004 | 0.1590 | 0.0000 | 0.0001 | 0.000 | 0.0026 | 99.828 | 70.000 |  | 44 |
| 84 | 9.550 | 0.040 | 0.0007 | 0.1061 | 0.0000 | 0.0001 | 0.000 | 0.0023 | 99.851 | 70.000 |  | 57 |
| 85 | 9.780 | 0.100 | 0.0008 | 0.0536 | 0.0000 | 0.0003 | 0.001 | 0.0025 | 99.843 | 70.000 |  | 58 |
| 86 | 9.470 | 0.030 | 0.0008 | 0.1667 | 0.0000 | 0.0000 | 0.001 | 0.0016 | 99.801 | 70.000 |  | 26 |
| 87 | 9.540 | 0.050 | 0.0007 | 0.1800 | 0.0000 | 0.0000 | 0.001 | 0.0014 | 99.768 | 70.000 |  | 61 |
| 88 | 9.410 | 0.030 | 0.0006 | 0.1966 | 0.0000 | 0.0000 | 0.001 | 0.0014 | 99.771 | 70.000 |  | 90 |
| 89 | 9.450 | 0.020 | 0.0005 | 0.1400 | 0.0000 | 0.0003 | 0.001 | 0.0024 | 99.837 | 68.000 |  | 82 |
| 90 | 9.380 | 0.070 | 0.0008 | 0.1760 | 0.0000 | 0.0005 | 0.001 | 0.0017 | 99.751 | 70.000 |  | 75 |
| 91 | 9.440 | 0.060 | 0.0008 | 0.1876 | 0.0003 | 0.0002 | 0.002 | 0.0025 | 99.749 | 70.000 |  | 94 |
| 92 | 9.400 | 0.070 | 0.0008 | 0.2300 | 0.0000 | 0.0004 | 0.001 | 0.0024 | 99.696 | 67.000 |  | 77 |
| 93 | 9.020 | 0.070 | 0.0010 | 0.0890 | 0.0003 | 0.0000 | 0.000 | 0.0006 | 99.839 | 70.000 |  | 97 |
| 94 | 9.030 | 0.020 | 0.0008 | 0.0893 | 0.0024 | 0.0002 | 0.000 | 0.0005 | 99.887 | 70.000 |  | 27 |
| 95 | 9.200 | 0.030 | 0.0009 | 0.1250 | 0.0021 | 0.0001 | 0.000 | 0.0008 | 99.841 | 70.000 |  | 82 |
| 96 | 9.220 | 0.020 | 0.0008 | 0.1600 | 0.0011 | 0.0000 | 0.000 | 0.0009 | 99.817 | 70.000 |  | 59 |
| 97 | 9.320 | 0.030 | 0.0009 | 0.1415 | 0.0038 | 0.0006 | 0.001 | 0.0017 | 99.822 | 70.000 |  | 78 |
| 98 | 9.210 | 0.040 | 0.0008 | 0.1150 | 0.0037 | 0.0004 | 0.001 | 0.0019 | 99.838 | 70.000 |  | 23 |
| 99 | 9.140 | 0.030 | 0.0005 | 0.1680 | 0.0041 | 0.0000 | 0.001 | 0.0015 | 99.796 | 70.000 |  | 59 |
| 100 | 9.360 | 0.030 | 0.0008 | 0.1600 | 0.0041 | 0.0000 | 0.001 | 0.0015 | 99.804 | 70.000 |  | 24 |
| 101 | 9.190 | 0.070 | 0.0005 | 0.2139 | 0.0058 | 0.0000 | 0.001 | 0.0022 | 99.708 | 70.000 |  | 67 |
| 102 | 9.370 | 0.060 | 0.0008 | 0.1859 | 0.0069 | 0.0013 | 0.002 | 0.0026 | 99.743 | 70.000 |  | 66 |
| 103 | 9.530 | 0.090 | 0.0009 | 0.2100 | 0.0045 | 0.0013 | 0.0017 | 0.0022 | 99.691 | 70.000 |  | 93 |
| 104 | 9.550 | 0.030 | 0.0008 | 0.1960 | 0.0038 | 0.0021 | 0.001 | 0.0024 | 99.765 | 70.000 |  | 65 |
| 105 | 9.520 | 0.060 | 0.0008 | 0.2300 | 0.0027 | 0.0000 | 0.001 | 0.0015 | 99.705 | 70.000 |  | 27 |
| 106 | 9.220 | 0.010 | 0.0003 | 0.1056 | 0.0033 | 0.0000 | 0.000 | 0.0020 | 99.879 | 75.000 |  | 90 |
| 107 | 9.300 | 0.030 | 0.0007 | 0.1065 | 0.0026 | 0.0002 | 0.0002 | 0.0017 | 99.858 | 75.000 |  | 90 |
| 108 | 9.310 | 0.020 | 0.0007 | 0.1237 | 0.0021 | 0.0001 | 0.0005 | 0.0015 | 99.852 | 75.000 |  | 85 |
| 109 | 9.250 | 0.060 | 0.0008 | 0.1060 | 0.0035 | 0.0005 | 0.0006 | 0.0018 | 99.827 | 75.000 | 0.0030 | 44 |
| 110 | 9.460 | 0.060 | 0.0007 | 0.2825 | 0.0022 | 0.0000 | 0.0006 | 0.0025 | 99.652 | 75.000 |  | 97 |
| 111 | 9.410 | 0.070 | 0.0009 | 0.1412 | 0.0028 | 0.0002 | 0.0004 | 0.0023 | 99.783 | 75.000 |  | 80 |
| 112 | 9.140 | 0.040 | 0.0005 | 0.1777 | 0.0022 | 0.0002 | 0.0006 | 0.0027 | 99.777 | 75.000 |  | 67 |
| 113 | 9.270 | 0.060 | 0.0004 | 0.1600 | 0.0000 | 0.0000 | 0.0008 | 0.0032 | 99.776 | 75.000 |  | 86 |
| 114 | 9.270 | 0.020 | 0.0008 | 0.1239 | 0.0017 | 0.0000 | 0.0001 | 0.0014 | 99.852 | 74.000 |  | 73 |
| 115 | 9.530 | 0.040 | 0.0007 | 0.1588 | 0.0028 | 0.0000 | 0.000 | 0.0008 | 99.797 | 74.000 |  | 90 |
| 116 | 9.470 | 0.080 | 0.0008 | 0.1781 | 0.0049 | 0.0004 | 0.001 | 0.0006 | 99.735 | 74.300 |  | 84 |
| 117 | 9.550 | 0.050 | 0.0009 | 0.1642 | 0.0029 | 0.0008 | 0.001 | 0.0026 | 99.779 | 74.000 |  | 51 |
| 118 | 9.480 | 0.020 | 0.0010 | 0.1788 | 0.0031 | 0.0005 | 0.001 | 0.0028 | 99.794 | 75.300 |  | 92 |
| 119 | 9.560 | 0.100 | 0.0008 | 0.2100 | 0.0025 | 0.0006 | 0.001 | 0.0023 | 99.684 | 75.000 |  | 94 |
| 120 | 9.740 | 0.030 | 0.0008 | 0.1950 | 0.0054 | 0.0005 | 0.001 | 0.0006 | 99.768 | 75.000 |  | 93 |
| 121 | 9.350 | 0.010 | 0.0009 | 0.1789 | 0.0017 | 0.0000 | 0.001 | 0.0018 | 99.807 | 75.000 |  | 89 |
| 122 | 9.690 | 0.050 | 0.0009 | 0.1967 | 0.0017 | 0.0000 | 0.000 | 0.0009 | 99.750 | 75.000 |  | 28 |
| 123 | 9.640 | 0.060 | 0.0008 | 0.1700 | 0.0011 | 0.0000 | 0.001 | 0.0035 | 99.765 | 75.000 |  | 90 |
| 124 | 9.590 | 0.050 | 0.0007 | 0.1900 | 0.0012 | 0.0000 | 0.000 | 0.0029 | 99.755 | 75.000 |  | 90 |
| 125 | 9.460 | 0.060 | 0.0008 | 0.2136 | 0.0013 | 0.0007 | 0.001 | 0.0039 | 99.720 | 75.000 |  | 87 |
| 126 | 9.880 | 0.050 | 0.0006 | 0.2100 | 0.0010 | 0.0002 | 0.001 | 0.0028 | 99.735 | 75.000 |  | 33 |
| 127 | 9.650 | 0.050 | 0.0008 | 0.2100 | 0.0004 | 0.0000 | 0.001 | 0.0023 | 99.737 | 75.000 |  | 88 |
| 128 | 9.810 | 0.070 | 0.0006 | 0.2100 | 0.0014 | 0.0007 | 0.001 | 0.0023 | 99.715 | 75.000 |  | 87 |
| 129 | 9.720 | 0.020 | 0.0007 | 0.2100 | 0.0014 | 0.0000 | 0.001 | 0.0022 | 99.766 | 75.000 |  | 85 |
| 130 | 9.780 | 0.080 | 0.0008 | 0.1900 | 0.0015 | 0.0005 | 0.001 | 0.0026 | 99.725 | 75.000 | 0.0240 | 86 |
| 131 | 9.790 | 0.020 | 0.0008 | 0.2000 | 0.0016 | 0.0001 | 0.001 | 0.0014 | 99.776 | 75.000 |  | 85 |
| 132 | 9.490 | 0.110 | 0.0007 | 0.1900 | 0.0030 | 0.0000 | 0.001 | 0.0030 | 99.693 | 75.000 |  | 24 |
| 133 | 9.100 | 0.050 | 0.0008 | 0.1066 | 0.0019 | 0.0008 | 0.001 | 0.0011 | 99.839 | 74.000 |  | 90 |
| 134 | 9.140 | 0.040 | 0.0008 | 0.1500 | 0.0023 | 0.0004 | 0.001 | 0.0016 | 99.805 | 74.000 |  | 86 |
| 135 | 9.220 | 0.020 | 0.0008 | 0.1770 | 0.0002 | 0.0000 | 0.0008 | 0.0017 | 99.800 | 74.000 |  | 84 |
| 136 | 9.030 | 0.040 | 0.0007 | 0.2300 | 0.0016 | 0.0000 | 0.0003 | 0.0013 | 99.726 | 74.000 |  | 83 |
| 137 | 9.450 | 0.050 | 0.0007 | 0.2100 | 0.0013 | 0.0000 | 0.001 | 0.0016 | 99.736 | 74.000 |  | 55 |
| 138 | 9.380 | 0.050 | 0.0009 | 0.2500 | 0.0021 | 0.0005 | 0.001 | 0.0013 | 99.695 | 74.000 |  | 76 |
| 139 | 9.350 | 0.090 | 0.0007 | 0.2100 | 0.0020 | 0.0000 | 0.001 | 0.0030 | 99.694 | 73.000 |  | 62 |
| 140 | 9.450 | 0.060 | 0.0008 | 0.2400 | 0.0017 | 0.0002 | 0.001 | 0.0012 | 99.696 | 74.500 |  | 75 |
| 141 | 9.4 | 0.0200 | 0.0008 | 0.2500 | 0.0026 | 0.0005 | 0.0004 | 0.0010 | 99.725 | 74.000 |  | 60 |
| 142 | 9.45 | 0.0700 | 0.0007 | 0.2400 | 0.0033 | 0.0008 | 0.0005 | 0.0017 | 99.684 | 73.2000 |  | 72 |
| 143 | 9.38 | 0.1200 | 0.0008 | 0.2200 | 0.0024 | 0.0002 | 0.0003 | 0.0012 | 99.655 | 74.0000 |  | 52 |
| 144 | 9.15 | 0.1200 | 0.0009 | 0.1600 | 0.0022 | 0.0000 | 0.0003 | 0.0013 | 99.716 | 75.0000 |  | 77 |
| 145 | 9.08 | 0.0600 | 0.0001 | 0.1900 | 0.0018 | 0.0000 | 0.0005 | 0.0012 | 99.747 | 75.0000 |  | 62 |
| 146 | 9.02 | 0.0300 | 0.0008 | 0.1960 | 0.0016 | 0.0000 | 0.0003 | 0.0011 | 99.771 | 75.0000 |  | 6 |
| 147 | 9.29 | 0.0400 | 0.0009 | 0.2000 | 0.0023 | 0.0011 | 0.0008 | 0.0020 | 99.754 | 75.0000 | 0.0060 | 63 |
| 148 | 9.1800 | 0.1800 | 0.0008 | 0.1968 | 0.0021 | 0.0009 | 0.0006 | 0.0017 | 99.618 | 75.0000 |  | 22 |
| 149 | 9.1600 | 0.0700 | 0.0008 | 0.2283 | 0.0016 | 0.0006 | 0.0007 | 0.0017 | 99.697 | 74.0000 |  | 59 |
| 150 | 9.2100 | 0.1200 | 0.0009 | 0.2325 | 0.0017 | 0.0002 | 0.0001 | 0.0018 | 99.643 | 75.0000 |  | 92 |
| 151 | 9.4300 | 0.0800 | 0.0008 | 0.2100 | 0.0024 | 0.0006 | 0.0009 | 0.0010 | 99.705 | 74.0000 |  | 85 |
| 152 | 9.5200 | 0.0700 | 0.0007 | 0.1941 | 0.0019 | 0.0001 | 0.0007 | 0.0009 | 99.732 | 73.0000 |  | 80 |
| 153 | 9.3500 | 0.0700 | 0.0007 | 0.2900 | 0.0031 | 0.0006 | 0.0011 | 0.0017 | 99.634 | 70.0000 |  | 19 |
| 154 | 9.2600 | 0.0200 | 0.0006 | 0.2300 | 0.0018 | 0.0000 | 0.0009 | 0.0022 | 99.745 | 75.0000 |  | 87 |
| 155 | 9.130 | 0.040 | 0.0008 | 0.1123 | 0.0025 | 0.0001 | 0.000 | 0.0014 | 99.843 | 75.000 |  | 27 |
| 156 | 9.060 | 0.030 | 0.0010 | 0.1400 | 0.0021 | 0.0000 | 0.000 | 0.0010 | 99.826 | 75.000 |  | 60 |
| 157 | 9.300 | 0.040 | 0.0008 | 0.1500 | 0.0026 | 0.0005 | 0.000 | 0.0015 | 99.805 | 75.000 |  | 76 |
| 158 | 9.240 | 0.020 | 0.0010 | 0.1800 | 0.0022 | 0.0003 | 0.000 | 0.0013 | 99.795 | 75.000 |  | 47 |
| 159 | 9.280 | 0.090 | 0.0007 | 0.1600 | 0.0027 | 0.0003 | 0.001 | 0.0016 | 99.745 | 75.000 |  | 23 |
| 160 | 9.400 | 0.030 | 0.0008 | 0.2300 | 0.0024 | 0.0000 | 0.000 | 0.0011 | 99.736 | 75.000 |  | 64 |
| 161 | 9.140 | 0.060 | 0.0007 | 0.1300 | 0.0027 | 0.0000 | 0.001 | 0.0019 | 99.805 | 75.000 |  | 89 |
| 162 | 9.170 | 0.020 | 0.0007 | 0.2262 | 0.0025 | 0.0001 | 0.001 | 0.0015 | 99.749 | 77.000 |  | 88 |
| 163 | 9.070 | 0.060 | 0.0006 | 0.1886 | 0.0022 | 0.0000 | 0.001 | 0.0014 | 99.747 | 78.000 |  | 24 |
| 164 | 9.610 | 0.090 | 0.0012 | 0.1889 | 0.0050 | 0.0000 | 0.000 | 0.0010 | 99.714 | 78.000 | 0.0030 | 62 |
| 165 | 9.430 | 0.030 | 0.0010 | 0.1833 | 0.0052 | 0.0000 | 0.000 | 0.0010 | 99.780 | 77.000 |  | 24 |
| 166 | 9.500 | 0.020 | 0.0010 | 0.1600 | 0.0027 | 0.0013 | 0.001 | 0.0015 | 99.814 | 78.000 |  | 68 |
| 167 | 9.310 | 0.060 | 0.0015 | 0.1700 | 0.0019 | 0.0007 | 0.001 | 0.0013 | 99.765 | 75.000 |  | 88 |
| 168 | 9.800 | 0.050 | 0.0008 | 0.2800 | 0.0033 | 0.0006 | 0.001 | 0.0024 | 99.663 | 75.000 |  | 91 |
| 169 | 9.770 | 0.040 | 0.0008 | 0.2600 | 0.0020 | 0.0000 | 0.001 | 0.0007 | 99.697 | 70.000 |  | 79 |
| 170 | 9.630 | 0.020 | 0.0006 | 0.2200 | 0.0001 | 0.0000 | 0.001 | 0.0038 | 99.756 | 75.000 |  | 57 |
| 171 | 9.380 | 0.040 | 0.0008 | 0.1500 | 0.0008 | 0.0002 | 0.000 | 0.0016 | 99.807 | 75.000 |  | 29 |
| 172 | 9.540 | 0.050 | 0.0009 | 0.2267 | 0.0002 | 0.0006 | 0.001 | 0.0045 | 99.717 | 75.000 |  | 66 |
| 173 | 9.900 | 0.040 | 0.0009 | 0.2393 | 0.0021 | 0.0004 | 0.001 | 0.0038 | 99.714 | 76.000 |  | 27 |
| 174 | 9.740 | 0.110 | 0.0008 | 0.2600 | 0.0017 | 0.0000 | 0.001 | 0.0038 | 99.624 | 75.000 |  | 64 |
| 175 | 10.170 | 0.070 | 0.0009 | 0.2255 | 0.0020 | 0.0001 | 0.001 | 0.0030 | 99.699 | 76.000 |  | 16 |
| 176 | 10.160 | 0.040 | 0.0004 | 0.2600 | 0.0019 | 0.0002 | 0.001 | 0.0014 | 99.696 | 70.000 |  | 41 |
| 177 | 9.990 | 0.040 | 0.0009 | 0.2000 | 0.0033 | 0.0008 | 0.001 | 0.0025 | 99.753 | 75.000 |  | 37 |
| 178 | 10.210 | 0.040 | 0.0008 | 0.2200 | 0.0019 | 0.0008 | 0.001 | 0.0042 | 99.732 | 75.000 |  | 47 |
| 179 | 9.950 | 0.050 | 0.0009 | 0.2600 | 0.0058 | 0.0003 | 0.001 | 0.0025 | 99.681 | 75.000 |  | 32 |
| 180 | 10.380 | 0.090 | 0.0009 | 0.2600 | 0.0071 | 0.0010 | 0.001 | 0.0018 | 99.639 | 75.000 |  | 38 |
| 181 | 10.050 | 0.040 | 0.0008 | 0.2400 | 0.0056 | 0.0000 | 0.001 | 0.0019 | 99.712 | 75.000 |  | 5 |
| 182 | 9.740 | 0.030 | 0.0007 | 0.2200 | 0.0084 | 0.0000 | 0.001 | 0.0035 | 99.737 | 75.000 |  | 37 |
| 183 | 10.190 | 0.020 | 0.0008 | 0.2800 | 0.0065 | 0.0008 | 0.001 | 0.0021 | 99.690 | 75.000 |  | 16 |
| 184 | 9.850 | 0.110 | 0.0007 | 0.3200 | 0.0004 | 0.0000 | 0.002 | 0.0039 | 99.565 | 70.000 |  | 46 |
| 185 | 10.150 | 0.030 | 0.0008 | 0.2900 | 0.0065 | 0.0012 | 0.001 | 0.0036 | 99.668 | 70.000 |  | 14 |
| 186 | 9.380 | 0.120 | 0.0009 | 0.1700 | 0.0090 | 0.0000 | 0.001 | 0.0032 | 99.697 | 70.000 |  | 32 |
| 187 | 10.220 | 0.080 | 0.0008 | 0.3356 | 0.0094 | 0.0010 | 0.001 | 0.0020 | 99.571 | 70.000 |  | 40 |
| 188 | 9.850 | 0.060 | 0.0007 | 0.3022 | 0.0072 | 0.0001 | 0.001 | 0.0031 | 99.627 | 70.000 |  | 48 |
| 189 | 10.380 | 0.080 | 0.0008 | 0.3600 | 0.0074 | 0.0008 | 0.001 | 0.0009 | 99.550 | 70.000 |  | 60 |
| 190 | 10.010 | 0.080 | 0.0008 | 0.3535 | 0.0027 | 0.0004 | 0.000 | 0.0008 | 99.562 | 70.000 |  | 58 |
| 191 | 10.150 | 0.090 | 0.0010 | 0.3573 | 0.0058 | 0.0006 | 0.000 | 0.0008 | 99.545 | 70.000 |  | 39 |
| 192 | 9.670 | 0.050 | 0.0008 | 0.0374 | 0.0076 | 0.0012 | 0.001 | 0.0014 | 99.902 | 70.000 |  | 14 |
| 193 | 9.800 | 0.020 | 0.0008 | 0.0937 | 0.0062 | 0.0011 | 0.001 | 0.0013 | 99.877 | 70.000 |  | 48 |
| 194 | 9.440 | 0.010 | 0.0008 | 0.1500 | 0.0078 | 0.0010 | 0.001 | 0.0008 | 99.830 | 70.000 |  | 41 |
| 195 | 9.910 | 0.040 | 0.0006 | 0.0370 | 0.0014 | 0.0005 | 0.000 | 0.0006 | 99.920 | 70.000 |  | 37 |
| 196 | 9.750 | 0.040 | 0.0007 | 0.0370 | 0.0012 | 0.0003 | 0.001 | 0.0004 | 99.920 | 70.000 | 0.0062 | 52 |
| 197 | 9.900 | 0.030 | 0.0010 | 0.1600 | 0.0068 | 0.0006 | 0.001 | 0.0009 | 99.801 | 75.000 |  | 50 |
| **备注：“0.0000”字样数据表示该元素/物质的浓度测量值＜0.0001%** | | | | | | | | | | | | |