



## AHN Centrifuge Tubes

---

Redefining Purity: A Comparative Study on  
Heavy Metal Content

## Executive Summary

AHN Centrifuge Tubes establish a global benchmark for heavy metal-free laboratory plastics, consistently outperforming Competitor G, Competitor S, Competitor L, Competitor T, and Competitor E. This is validated by multi-element Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and stringent ISO standards compliance.

## Introduction

Eliminating trace metal contamination from laboratory plastics is essential for accurate research and diagnostics. This white paper presents an independent and complete comparison of AHN, Competitor G, Competitor S, Competitor L, Competitor T, and Competitor E centrifuge tubes, using sensitive ICP-MS testing for all relevant trace elements.

## Testing Methodology

Brands tested: AHN, Competitor G, Competitor S, Competitor L, Competitor T, Competitor E (standard 15/50 mL, certified lots)

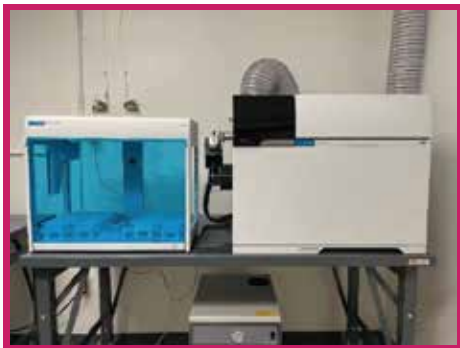
Process: Each tube was incubated with 2% HNO<sub>3</sub> (trace metal grade) for 1 hour, followed by ICP-MS analysis

The result analysis and testing process is confidential

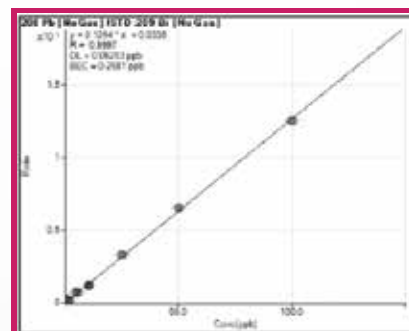
Calibration: Internal and external multi-point calibration; all curves  $R^2 > 0.999$

Detection: Reporting limit single-digit PPB (Parts Per Billion)

Compliance: Tests conducted under ISO 9001:2015, ISO 13485:2016, ISO 10993-18, and ISO/IEC 17025 frameworks



Agilent ICP-MS



Standard Curve for ICP-MS





AHN, and Competitors Tubes tested for Heavy Metals

## Complete Element Analysis Table (PPB)

| Element | AHN<br>LOT: 07611/<br>2526_07 | Competitor G<br>LOT: E21113<br>GF | Competitor<br>S LOT: N/A | Competitor L<br>LOT: 1240513<br>4CD-134C | Competitor T<br>LOT: DCGX13<br>E24S | Competitor<br>E*<br>LOT: N/A |
|---------|-------------------------------|-----------------------------------|--------------------------|------------------------------------------|-------------------------------------|------------------------------|
| Li      | 1.463                         | 0.650                             | 0.000                    | 0.000                                    | 0.000                               | —                            |
| Be      | 0.642                         | 0.000                             | 0.000                    | 0.000                                    | 0.214                               | —                            |
| Na      | 25.933                        | 6.110                             | 22.807                   | 17.656                                   | 12.069                              | —                            |
| Mg      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 19.443                              | —                            |
| Al      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 1.000                        |
| P       | 0.000                         | 0.000                             | 0.000                    | 61.194                                   | 0.000                               | —                            |
| K       | 0.000                         | 14.589                            | 32.253                   | 0.000                                    | 18.264                              | —                            |
| Ca      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                            |
| Ti      | 1.776                         | 0.508                             | 0.761                    | 1.776                                    | 2.538                               | —                            |
| V       | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                            |
| Cr      | 1.293                         | 0.263                             | 0.620                    | 0.000                                    | 0.000                               | 0.050                        |
| Mn      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 0.050                        |

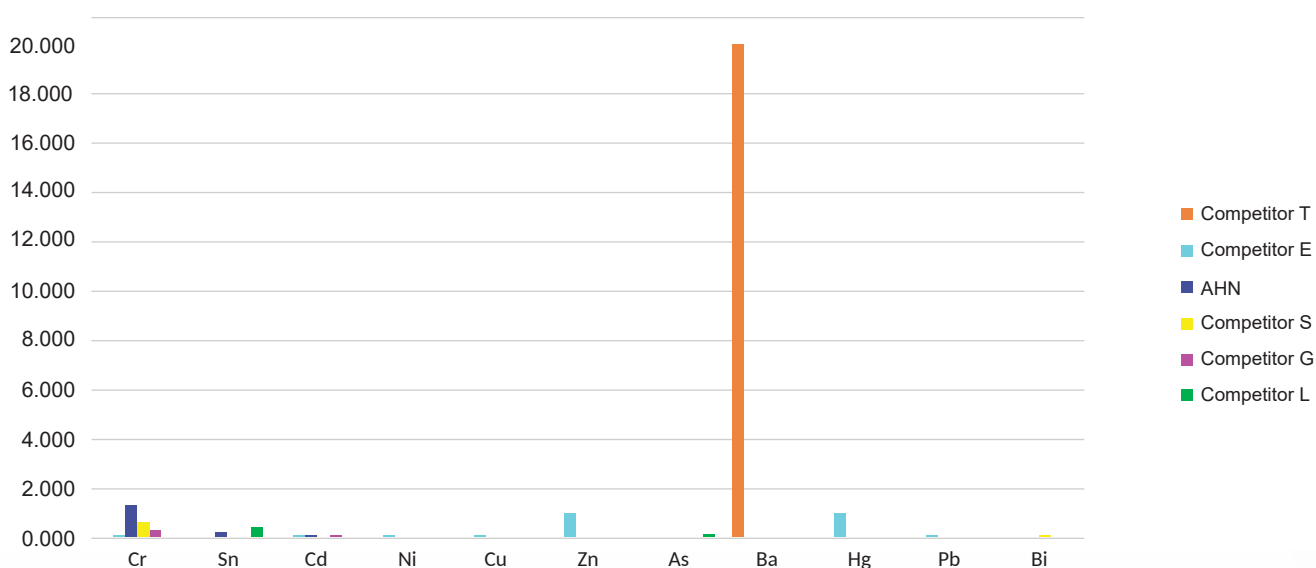


| Element | AHN<br>LOT: 07611/<br>2526_07 | Competitor G<br>LOT: E21113<br>GF | Competitor<br>S LOT: N/A | Competitor L<br>LOT: 1240513<br>4CD-134C | Competitor T<br>LOT: DCGX13<br>E24S | Competitor<br>E* LOT: N/A |
|---------|-------------------------------|-----------------------------------|--------------------------|------------------------------------------|-------------------------------------|---------------------------|
| Fe      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Co      | 0.000                         | 0.000                             | 0.000                    | 0.003                                    | 0.000                               | —                         |
| Ni      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 0.050                     |
| Cu      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 0.086000                  |
| Zn      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 1.000                     |
| Ga      | 0.000                         | 0.017                             | 0.000                    | 0.000                                    | 0.017                               | —                         |
| Ge      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| As      | 0.000                         | 0.000                             | 0.002                    | 0.129                                    | 0.000                               | —                         |
| Se      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Rb      | 0.030                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Sr      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.137                               | —                         |
| Y       | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Zr      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Nb      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Mo      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Ag      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Cd      | 0.071                         | 0.035                             | 0.000                    | 0.000                                    | 0.000                               | 0.020                     |
| Sn      | 0.202                         | 0.000                             | 0.000                    | 0.411                                    | 0.000                               | —                         |
| Sb      | 0.000                         | 0.000                             | 0.080                    | 0.000                                    | 0.000                               | —                         |
| Ba      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 23.915                              | —                         |
| Ce      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Ta      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| W       | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | —                         |
| Re      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 2.538                               | —                         |
| Au      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 1.558                               | —                         |
| Hg      | 0.000                         | 0.000                             | 0.000                    | 0.000                                    | 0.000                               | 1.000                     |

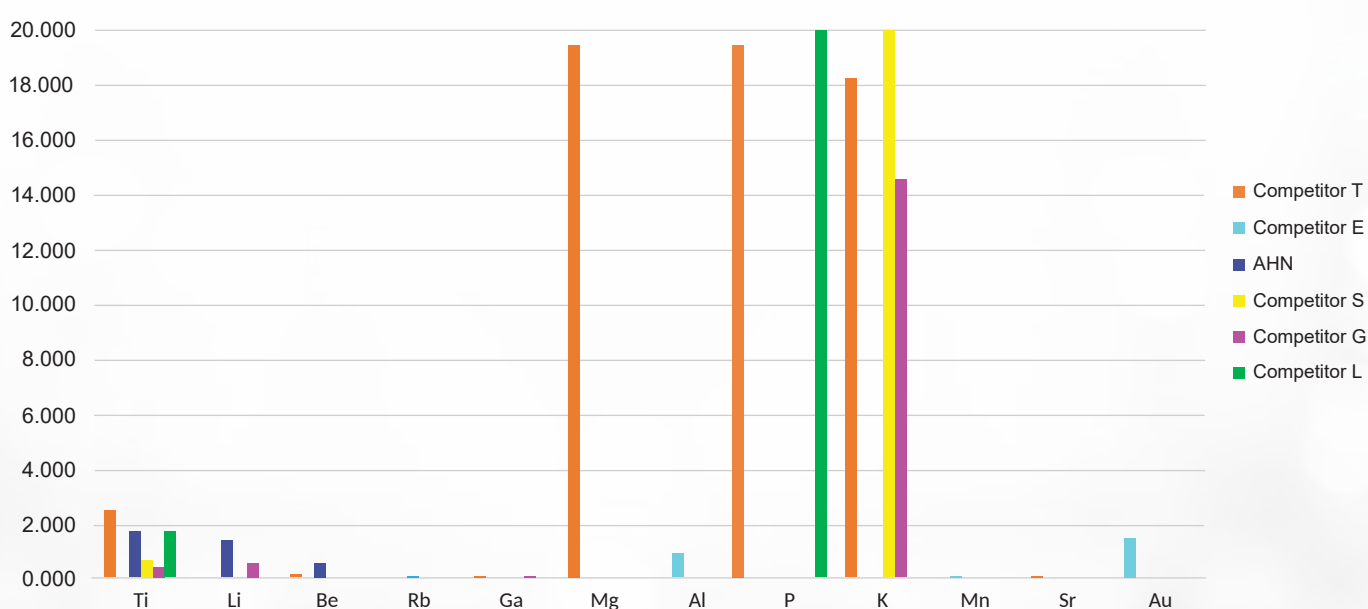


| Element | AHN LOT:<br>07611/2526_07 | Competitor G LOT:<br>E21113GF | Competitor S LOT: N/A | Competitor L LOT: 124051 34CD-134C | Competitor T LOT: DCGX13E24S | Competitor E* LOT: N/A |
|---------|---------------------------|-------------------------------|-----------------------|------------------------------------|------------------------------|------------------------|
| Tl      | 0.000                     | 0.000                         | 0.000                 | 0.000                              | 0.000                        | —                      |
| Pb      | 0.000                     | 0.000                         | 0.000                 | 0.000                              | 0.000                        | 0.050                  |
| Bi      | 0.000                     | 0.000                         | 0.002                 | 0.000                              | 0.000                        | —                      |

(\*Competitor E readings converted: 1 ng/ $\mu$ L = 1 PPB, for aqueous solution; "<" and "0.000" means below detection limit.)



Heavy Metal Analysis (PPB): No Heavy Metals found in AHN Tubes



Normal Elements Analysis (PPB): Lesser Quantity of Elements found in the AHN Tubes



## Discussion

- AHN consistently delivers the lowest or undetectable results for all trace metals, outperforming every listed competitor across the panel of elements.
- Competitor T is distinctly higher than AHN in sodium, magnesium, potassium, titanium, and barium, and is the only tube with a notable gold reading.
- Competitor G, Competitor S, and Competitor L also fail to match AHN across the board ultra-pure results, especially for problematic metals (Na, K, Ti).
- Competitor E maintains low values for advertised “metal-free” purity but is not superior to AHN, which equals or outperforms on critical elements.

## ISO Certification and Manufacturing Quality

- ISO 9001:2015 (Quality Management)
- ISO 13485:2016 (Medical Devices Standards)
- ISO/IEC 17025 (Laboratory Testing/Calibration)
- ISO 10993-18 (Chemical Characterisation for Medical Polymers)

AHN maintains full traceability and batch control, ensuring every product is certified to these standards.

## Conclusion

AHN Centrifuge Tubes are proven, through rigorous ICP-MS and independent certification, to be the heavy metal-free leader among global competitors. The data is clear—all elements tested, every standard met, unrivalled purity achieved.

