# AA Furnace Performance Figures

## *Introduction*

This table provides data on Detection Limits and Characteristic Masses available from Agilent graphite furnace instruments.

These figures have been determined using an AA220 Zeeman with UltrAA lamps (where available for the elements).  The sample volume used was 20 µL.  All Agilent Zeeman systems, including the AA240Z, AA280Z and AA880Z should at least match these performance figures.

Although based on Zeeman performance, these figures are also representative of the performance achieved when using a deuterium furnace system.  The deuterium furnace system should at least match these figures, and should provide better performance for those elements that have MSRs < 100 %.

| Element | Wavelength $\lambda$ (nm) | Characteristic Mass (pg) | Absolute Detection Limit (pg) | Detection Limit ($\mu$g/L) |
|---------|---------------------------|--------------------------|-------------------------------|----------------------------|
| Ag | 328.1 | 1.5 | 0.40 | 0.020 |
| Al | 309.3 | 7.5, 8.0 | 1.2 | 0.060 |
| Al | 396.2 | 12, 14 | 2.0 | 0.10 |
| As | 193.7 | 13, 20, 22 | 4.4 | 0.22 |
| Au | 242.8 | 9, 11 | 6.1 | 0.30 |
| B | 249.8 | | | |

| | | | | |
|---|---|---|---|---|
| Ba | 553.6 | 11 | | |
| Be | 234.9 | 0.8 | 0.20 | 0.010 |
| Bi | 306.8 | 18 | 5.8 | 0.29 |
| Ca | 422.7 | 0.51 | | |
| Cd | 228.8 | 0.5, 0.7 | 0.18 | 0.009 |
| Ce | | | | |
| Co | 240.7 | 8 | 4.0 | 0.20 |
| Cr | 357.9 | 2.5, 3.5 | 0.75 | 0.038 |
| Cs | 852.1 | | | |
| Cu | 324.8 | 5, 6 | | |
| Cu | 327.4 | 10, 11 | 2.9 | 0.15 |
| Dy | 421.2 | | | |
| Er | 400.8 | | | |
| Eu | 459.4 | | | |
| Fe | 248.3 | 4, 5.5 | 3.1 | 0.16 |
| Ga | 294.4 | | | |
| Gd | 368.4 | | | |
| Ge | 265.2 | | | |
| Hf | 307.3 | | | |
| Hg | 253.7 | | | |

| | | | | |
|---|---|---|---|---|
| Ho | 410.4 | | | |
| In | 303.9 | | | |
| Ir | 208.9 | | | |
| K | 766.5 | 1.0 | | |
| La | 550.1 | | | |
| Li | 670.8 | | | |
| Lu | 336.0 | | | |
| Mg | 285.2 | 0.4 | 0.08 | 0.004 |
| Mn | 279.5 | 1.7, 2.0 | 0.75 | 0.038 |
| Mo | 313.3 | 7.5, 9.0 | | |
| Na | 589.0 | 0.67 | | |
| Nb | 334.9 | | | |
| Nd | 492.5 | | | |
| Ni | 232.0 | 9, 11 | 7.5 | 0.38 |
| Os | 290.9 | | | |
| P | 213.6 | 5600 | 1800 | 90 |
| Pb | 217.0 | 6.5, 8 | 2.2 | 0.11 |
| Pb | 283.3 | 12, 16, 18 | 4.0 | 0.20 |
| Pd | 247.6 | 16.8 | 7.5 | 0.38 |
| Pr | 495.1 | | | |

| | | | |
|---|---|---|---|
| Pt | 265.9 | 140 | | |
| Rb | 780.0 | | | |
| Re | 346.1 | | | |
| Rh | 343.5 | | | |
| Ru | 349.9 | | | |
| Sb | 217.6 | 25, 26, 30 | 10 | 0.50 |
| Sc | 391.2 | | | |
| Se | 196.0 | 23, 30 | 4.6 | 0.23 |
| Si | 251.6 | 38 | 20 | 1.00 |
| Sm | 429.7 | | | |
| Sn | 286.3 | 23 | 10 | 0.50 |
| Sr | 460.7 | 1.3 | | |
| Ta | 271.5 | | | |
| Tb | 432.7 | | | |
| Te | 214.3 | 16, 18, 20 | 12 | 0.60 |
| Th | | | | |
| Ti | 364.3 | | | |
| Tl | 276.8 | 20, 22 | 5.0 | 0.25 |
| Tm | 371.8 | | | |
| V | 318.5 | 22 | 5.2 | 0.26 |

| | | | | |
|---|---|---|---|---|
| W | 255.1 | | | |
| Y | 410.2 | | | |
| Yb | 398.8 | | | |
| Zn | 213.9 | 0.61, 0.68 | | |
| Zr | 360.1 | | | |

**Notes:**

- These detection limits are 3 sigma values - that is, the detection limit is defined as the concentration of a solution which gives an absorbance equal to 3 times the standard deviation of the blank. This value establishes the minimum determinable quantity for an element.
- The absolute detection limit is simply the detection limit (in concentration terms) converted to a mass basis. This conversion can be made by multiplying the detection limit (in µg/L) by the sample volume (in µL).
- The characteristic mass is simply the characteristic concentration converted to a mass basis. This conversion can be made by multiplying the characteristic concentration (in µg/L) by the sample volume (in µL). The characteristic concentration is the slope of the calibration curve, i.e., the concentration required to give 0.0044 absorbance.
- Blank and standard solutions were prepared in a 1 % (v/v) nitric acid and diluted using de-ionized water.

**Acknowledgements:**

**Agilent Technologies**