**SUPPLEMENTAL INFORMATION**

**Table S1.** List of potential interferences for analyzing 52Cr in urine. Masses determined using ThermoFinnigan Element2 ICP-MS Interference Workshop software.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **52Cr**  **(m/z)** | **Potential Interference (AB)** | **Isotopic**  **Abundance A %** | **Expected Concentration of A in Urine (µg L-1)** | **Isotopic**  **Abundance B %** | **Expected Concentration of B in Urine (µg L-1)** |
| **51.4528** | **103Rh++** | **100** | **0.001 - 0.039** | **-** | **-** |
| **51.9520** | **104Pd++** | **11.1** | **0.07 - 0.64** | **-** | **-** |
| **51.9527** | **104Ru++** | **18.7** | **Expected to be low** | **-** | **-** |
| **51.9620** | **36S16O+** | **0.02** | **High** | **99.8** | **atmosphere** |
| **51.9624** | **12C40Ar+** | **98.9** | **High** | **99.6** | **ICP gas** |
| **51.9625** | **36Ar16O+** | **0.3** | **ICP gas** | **99.8** | **atmosphere** |
| **51.9658** | **14N38Ar+** | **99.6** | **atmosphere** | **0.06** | **ICP gas** |
| **51.9680** | **35Cl17O+** | **75.8** | **≤ 5,900,000** | **0.04** | **atmosphere** |
| **52.4530** | **105Pd++** | **22.3** | **0.07 - 0.64** | **-** | **-** |
| **51.9518** | **51V1H+** | **99.8** | **0.2 - 10** | **100** | **atmosphere** |
| **51.9626** | **40Ca12C+** | **96.9** | **30,000 – 200,000** | **98.9** | **~ 5,000,000** |
| **51.9671** | **39K13C+** | **93.3** | **542,000 - 9,770,000** | **1.1** | **~ 5,000,000** |
| **51.9660** | **37Cl15N+** | **24.2** | **≤ 5,900,000** | **0.4** | **atmosphere** |
| **51.9768** | **37Cl14N1H+** | **24.2** | **≤ 5,900,000** | **99.6/100** | **atmosphere** |
| **51.9716** | **35Cl16O1H+** | **75.8** | **≤ 5,900,000** | **99.8/100** | **atmosphere** |
| **51.9699** | **33S19F+** | **0.8** | **High** | **100** | **200 - 3,200** |
| **51.9676** | **21Ne31P+** | **0.3** | **Expected to be low** | **100** | **220,000 - 2,600,000** |
| **51.9645** | **20Ne32S+** | **90.5** | **Expected to be low** | **95.0** | **~ 5,000,000** |

**Table S2.** List of potential interferences for analyzing 60Ni in urine. Masses determined using ThermoFinnigan Element2 ICP-MS Interference Workshop software.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **60Ni**  **(m/z)** | **Potential Interference (AB)** | **Isotopic**  **Abundance A %** | **Expected Concentration of A in Urine (µg L-1)** | **Isotopic**  **Abundance B %** | **Expected Concentration of B in Urine (µg L-1)** |
| **59.4516** | **119Sn++** | **8.6** | **0.05 - 2.28** | **-** | **-** |
| **59.9504** | **44Ca16O+** | **2.1** | **30,000 - 200,000** | **99.8** | **atmosphere** |
| **59.9511** | **120Sn++** | **32.6** | **0.05 - 2.28** | **-** | **-** |
| **59.9520** | **120Te++** | **0.1** | **Expected to be low** | **-** | **-** |
| **59.9526** | **24Mg36Ar+** | **79** | **40,500 - 243,000** | **0.3** | **ICP gas** |
| **59.9541** | **22Ne38Ar+** | **9.2** | **Expected to be low** | **0.06** | **ICP gas** |
| **59.9548** | **20Ne40Ar+** | **90.5** | **Expected to be low** | **99.6** | **ICP gas** |
| **60.4519** | **121Sb++** | **57.3** | **0.12 - 10.0** | **-** | **-** |
| **59.9410** | **59Co1H+** | **100** | **0.28 - 2.0** | **100** | **atmosphere** |
| **59.9495** | **58Ni2H+** | **68.3** | **0.055 - 20.0** | **0.02** | **atmosphere** |
| **59.9480** | **48Ti12C+** | **73.8** | **0.1 - 3.7** | **98.9** | **~ 5,000,000** |
| **59.9525** | **48Ca12C+** | **0.2** | **30,000 - 200,000** | **98.9** | **~ 5,000,000** |
| **59.9551** | **47Ti13C+** | **7.3** | **0.1 - 3.7** | **1.1** | **~ 5,000,000** |
| **59.9557** | **46Ti14N+** | **8.0** | **0.1 - 3.7** | **99.6** | **atmosphere** |
| **59.9560** | **45Sc15N+** | **100** | **-** | **0.4** | **atmosphere** |
| **59.9668** | **45Sc14N1H+** | **100** | **-** | **99.6/100** | **atmosphere** |
| **59.9615** | **43Ca16O1H+** | **0.1** | **30,000 - 200,000** | **99.8/100** | **atmosphere** |
| **59.9688** | **41K18O1H+** | **6.7** | **542,000 - 9,770,00** | **0.2/99.9** | **atmosphere** |
| **59.9602** | **41K19F+** | **6.7** | **542,000 - 9,770,00** | **100** | **200 - 3,200** |
| **59.9503** | **29Si31P+** | **4.7** | **100 - 51,600** | **100** | **220,000 - 2,600,000** |
| **59.9490** | **28Si32S+** | **92.2** | **100 - 51,600** | **95.0** | **~ 5,000,000** |
| **59.9505** | **26Mg34S+** | **11.0** | **40,500 - 243,000** | **4.2** | **~ 5,000,000** |
| **59.9521** | **24Mg36S+** | **79.0** | **40,500 - 243,000** | **0.02** | **~ 5,000,000** |
| **59.9530** | **27Al33S+** | **100** | **5 - 30** | **0.8** | **~ 5,000,000** |
| **59.9547** | **25Mg35Cl+** | **10.0** | **40,500 - 243,000** | **75.8** | **~ 6,000,000** |
| **59.9557** | **23Na37Cl+** | **100** | **281 - 10,110** | **24.2** | **~ 6,000,000** |

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**Figure S1a.** The effects of cell gas flow rate on ion signal intensity at m/z 52 using methane gas on Cr analysis in urine samples spiked with 1 µg L-1 Cr, 1% ethanol (40Ar12C+), and/or 1% HCl (35Cl16O1H+).

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**Figure S1b.** The effects of cell gas flow rate on ion signal intensity at m/z 52 using oxygen gas on Cr analysis in urine samples spiked with 1 µg L-1 Cr, 1% ethanol (40Ar12C+), and/or 1% HCl (35Cl16O1H+).

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**Figure S1c.** The effects of cell gas flow rate on ion signal intensity at m/z 52 using ammonia gas on Cr analysis in urine samples spiked with 1 µg L-1 Cr, 1% ethanol (40Ar12C+), and/or 1% HCl (35Cl16O1H+).

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**Figure S1d.** The effects of cell gas flow rate on ion signal intensity at m/z 52 using argon/hydrogen gas on Cr analysis in urine samples spiked with 1 µg L-1 Cr, 1% ethanol (40Ar12C+), and/or 1% HCl (35Cl16O1H+).

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**Figure S1e.** The effects of cell gas flow rate on ion signal intensity at m/z 52 using helium gas on Cr analysis in urine samples spiked with 1 µg L-1 Cr, 1% ethanol (40Ar12C+), and/or 1% HCl (35Cl16O1H+).

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**Figure S2a.** The effects of cell gas flow rate on ion signal intensity at m/z 60 using methane gas on Ni analysis in urine samples spiked with 1 µg L-1 Ni and/or 1% ethanol + 20 mg L-1 Ca (44Ca16O+).

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**Figure S2b.** The effects of cell gas flow rate on ion signal intensity at m/z 60 using oxygen gas on Ni analysis in urine samples spiked with 1 µg L-1 Ni and/or 1% ethanol + 20 mg L-1 Ca (44Ca16O+).

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**Figure S2c.** The effects of cell gas flow rate on ion signal intensity at m/z 60 using ammonia gas on Ni analysis in urine samples spiked with 1 µg L-1 Ni and/or 1% ethanol + 20 mg L-1 Ca (44Ca16O+).

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**Figure S2d.** The effects of cell gas flow rate on ion signal intensity at m/z 60 using argon/hydrogen gas on Ni analysis in urine samples spiked with 1 µg L-1 Ni and/or 1% ethanol + 20 mg L-1 Ca (44Ca16O+).

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**Figure S2e.** The effects of cell gas flow rate on ion signal intensity at m/z 60 using helium gas on Ni analysis in urine samples spiked with 1 µg L-1 Ni and/or 1% ethanol + 20 mg L-1 Ca (44Ca16O+).

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**Figure S3.** Displays the response at m/z 52 for 2% HNO3, 1% EtOH, and/or 1 µg L-1 Cr under increasing helium cell gas flow rates in KED mode.

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**Figure S4.** Displays the response at m/z 60 for 2% HNO3, 1% EtOH and 20 mg L-1 Ca, and/or 1 µg L-1 Ni under increasing helium cell gas flow rates in KED mode.

**Table S3.** ESI FAST method control parameters that control the functions for the autosampler events during the NexION ICP-MS wash time.

|  |  |  |  |
| --- | --- | --- | --- |
| **Event** | **Action** | **Parameters** | **Parameter Units** |
| On Probe Down | Vacuum1 On |  |  |
| On Probe Down | Load1 |  |  |
| Probe In Sample | Timer A | 4 | seconds |
| Timer A Expires | Inject1 |  |  |
| Timer A Expires | Move Rinse |  |  |
| Rinse Completed | Probe Up |  |  |
| On Rinse | Vacuum1 On |  |  |
| On Rinse | Load1 |  |  |
| On Rinse | Probe Down |  |  |
| On Rinse | Timer B | 2 | seconds |
| Timer B Expires | Probe Up |  |  |
| Timer B Expires | Timer C | 2 | seconds |
| Timer C Expires | Probe Down |  |  |
| Timer C Expires | Timer D | 2 | seconds |
| Timer D Expires | Probe Up |  |  |
| Timer D Expires | Timer E | 2 | seconds |
| Timer E Expires | Probe Down |  |  |
| Timer E Expires | Timer F | 2 | seconds |
| Timer F Expires | Move Next |  |  |

**Table S4.** In house CDC quality control samples used to show % recovery of the method. N = 5.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | **Cr** | | |
| **Sample ID** |  | **Target**  **(µg L-1)** | **Average ± 1 SD**  **(µg L-1)** | **% Recovery ± 1 SD** |
| **Low QC** |  | 0.820 | 0.885 ± 0.128 |  |
| **+ 1 µg L-1** |  | 1.82 | 1.75 ± 0.13 | 96.3 ± 7.1 |
| **+ 3 µg L-1** |  | 3.82 | 3.87 ± 0.53 | 101 ± 14 |
| **+ 10 µg L-1** |  | 10.8 | 10.6 ± 0.2 | 98.4 ± 1.9 |
|  |  | **Ni** | | |
| **Sample ID** |  | **Target**  **(µg L-1)** | **Average ± 1 SD**  **(µg L-1)** | **% Recovery ± 1 SD** |
| **Low QC** |  | 1.36 | 1.59 ± 0.10 |  |
| **+ 1 µg L-1** |  | 2.36 | 2.44 ± 0.12 | 103 ± 5 |
| **+ 3 µg L-1** |  | 4.36 | 4.38 ± 0.40 | 101 ± 9 |
| **+ 10 µg L-1** |  | 11.4 | 11.1 ± 0.3 | 97.9 ± 2.6 |