**Table S1:** Three factor factorial Analysis of Variance tests run on each of the 12 ANZECC elements. Factorial analysis of variance tests were run on elemental concentration under the factors of Biosorbent, pH (Fixed) and Time (Random). Type III sum of squares was used. All tests met the assumption of homogeneity of variance, normality of residuals and independence. Transformation of the data were required for some elements, the transformation applied is listed next to the title. Factors in bold indicate significance under alpha of 0.05.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor | Effect | DF | SS | MS | F | p |
| Aluminium |
| **Biosorbent** | **Fixed** | **3** | **2.9E+07** | **9.6E+06** | **159** | **<0.001** |
| **pH** | **Fixed** | **2** | **4.2E+05** | **2.1E+05** | **56.9** | **<0.001** |
| Time | Random | 5 | 5.8E+05 | 1.2E+05 | 2.12 | 0.132 |
| **Biosorbent\*pH** | **Fixed** | **6** | **3.7E+05** | **6.1E+04** | **6.75** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **9.1E+05** | **6.1E+04** | **6.67** | **<0.001** |
| pH\*Time | Random | 10 | 3.7E+04 | 3.7E+03 | 0.41 | 0.933 |
| Biosorbent\*pH\*Time | Random | 30 | 2.7E+05 | 9.1E+03 | 0.27 | 1.000 |
| Error |  | 144 | 4.9E+06 | 3.4E+04 |  |  |
| Arsenic [Cuberoot] |
| **Biosorbent** | **Fixed** | **3** | **39.3** | **13.1** | **81.0** | **<0.001** |
| **pH** | **Fixed** | **2** | **0.09** | **0.04** | **17.9** | **<0.001** |
| Time | Random | 5 | 1.56 | 0.31 | 1.93 | 0.149 |
| **Biosorbent\*pH** | **Fixed** | **6** | **0.34** | **0.06** | **20.6** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **2.43** | **0.16** | **58.7** | **<0.001** |
| pH\*Time | Random | 10 | 0.02 | 0.00 | 0.89 | 0.555 |
| Biosorbent\*pH\*Time | Random | 30 | 0.08 | 0.00 | 0.05 | 1.000 |
| Error |   | 144 | 7.73 | 0.05 |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor | Effect | DF | SS | MS | F | p |
| Boron |
| **Biosorbent** | **Fixed** | **3** | **5.5E+06** | **1.8E+06** | **3.81** | **0.033** |
| pH | Fixed | 2 | 4.7E+05 | 2.4E+05 | 2.18 | 0.164 |
| **Time** | **Random** | **5** | **2.2E+07** | **4.3E+06** | **10.8** | **0.001** |
| Biosorbent\*pH | Fixed | 6 | 2.0E+06 | 3.3E+05 | 1.78 | 0.138 |
| **Biosorbent\*Time** | **Random** | **15** | **7.2E+06** | **4.8E+05** | **2.59** | **0.013** |
| pH\*Time | Random | 10 | 1.1E+06 | 1.1E+05 | 0.58 | 0.815 |
| Biosorbent\*pH\*Time | Random | 30 | 5.6E+06 | 1.9E+05 | 0.08 | 1.000 |
| Error |   | 144 | 3.3E+08 | 2.3E+06 |  |  |
| Cadmium |
| **Biosorbent** | **Fixed** | **3** | **33.3** | **11.1** | **125** | **<0.001** |
| **pH** | **Fixed** | **2** | **4.97** | **2.49** | **24.2** | **<0.001** |
| Time | Random | 5 | 0.65 | 0.13 | 0.94 | 0.491 |
| **Biosorbent\*pH** | **Fixed** | **6** | **5.47** | **0.91** | **17.0** | **<0.001** |
| Biosorbent\*Time | Random | 15 | 1.33 | 0.09 | 1.66 | 0.116 |
| pH\*Time | Random | 10 | 1.03 | 0.10 | 1.92 | 0.082 |
| Biosorbent\*pH\*Time | Random | 30 | 1.61 | 0.05 | 1.19 | 0.243 |
| Error |   | 144 | 6.47 | 0.04 |  |  |
| Chromium [Squareroot] |
| **Biosorbent** | **Fixed** | **3** | **4815** | **1605** | **418** | **<0.001** |
| **pH** | **Fixed** | **2** | **3.20** | **1.60** | **7.03** | **0.012** |
| **Time** | **Random** | **5** | **104** | **20.8** | **5.37** | **0.005** |
| **Biosorbent\*pH** | **Fixed** | **6** | **6.06** | **1.01** | **5.24** | **0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **57.6** | **3.84** | **19.9** | **<0.001** |
| pH\*Time | Random | 10 | 2.28 | 0.23 | 1.18 | 0.341 |
| Biosorbent\*pH\*Time | Random | 30 | 5.78 | 0.19 | 0.13 | 1.000 |
| Error |   | 144 | 221 | 1.53 |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor | Effect | DF | SS | MS | F | p |
| Copper [Cuberoot] |
| **Biosorbent** | **Fixed** | **3** | **570** | **190** | **816** | **<0.001** |
| **pH** | **Fixed** | **2** | **0.08** | **0.04** | **4.66** | **0.037** |
| Time | Random | 5 | 2.39 | 0.48 | 2.06 | 0.129 |
| **Biosorbent\*pH** | **Fixed** | **6** | **1.61** | **0.27** | **32.4** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **3.49** | **0.23** | **28.1** | **<0.001** |
| pH\*Time | Random | 10 | 0.08 | 0.01 | 0.97 | 0.488 |
| Biosorbent\*pH\*Time | Random | 30 | 0.25 | 0.01 | 0.06 | 1.000 |
| Error |   | 144 | 21.6 | 0.15 |  |   |
| Lead [Squareroot] |
| **Biosorbent** | **Fixed** | **3** | **167** | **55.7** | **129** | **<0.001** |
| **pH** | **Fixed** | **2** | **0.87** | **0.44** | **9.79** | **0.004** |
| Time | Random | 5 | 2.01 | 0.40 | 0.90 | 0.504 |
| Biosorbent\*pH | Fixed | 6 | 0.40 | 0.07 | 2.36 | 0.055 |
| **Biosorbent\*Time** | **Random** | **15** | **6.46** | **0.43** | **15.2** | **<0.001** |
| pH\*Time | Random | 10 | 0.45 | 0.04 | 1.58 | 0.162 |
| Biosorbent\*pH\*Time | Random | 30 | 0.85 | 0.03 | 0.87 | 0.663 |
| Error |   | 144 | 4.68 | 0.03 |   |   |
| Manganese [Log] |
| **Biosorbent** | **Fixed** | **3** | **225** | **75.0** | **330** | **<0.001** |
| **pH** | **Fixed** | **2** | **28.6** | **14.3** | **127** | **<0.001** |
| Time | Random | 5 | 3.50 | 0.70 | 2.49 | 0.074 |
| **Biosorbent\*pH** | **Fixed** | **6** | **52.3** | **8.72** | **147** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **3.41** | **0.23** | **3.84** | **<0.001** |
| pH\*Time | Random | 10 | 1.13 | 0.11 | 1.90 | 0.085 |
| Biosorbent\*pH\*Time | Random | 30 | 1.78 | 0.06 | 0.88 | 0.653 |
| Error |   | 144 | 9.73 | 0.07 |   |   |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor | Effect | DF | SS | MS | F | p |
| Molybdenum [Cuberoot] |
| **Biosorbent** | **Fixed** | **3** | **984** | **328** | **47.1** | **<0.001** |
| **pH** | **Fixed** | **2** | **14.0** | **6.98** | **113** | **<0.001** |
| Time | Random | 5 | 52.3 | 10.5 | 1.52 | 0.244 |
| **Biosorbent\*pH** | **Fixed** | **6** | **45.1** | **7.52** | **54.0** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **104** | **6.96** | **50.0** | **<0.001** |
| pH\*Time | Random | 10 | 0.62 | 0.06 | 0.45 | 0.911 |
| Biosorbent\*pH\*Time | Random | 30 | 4.17 | 0.14 | 0.61 | 0.946 |
| Error |   | 144 | 33.1 | 0.23 |   |   |
| Nickel [Log] |
| **Biosorbent** | **Fixed** | **3** | **355** | **118** | **183** | **<0.001** |
| **pH** | **Fixed** | **2** | **2.04** | **1.02** | **10.5** | **0.003** |
| Time | Random | 5 | 1.90 | 0.38 | 0.57 | 0.722 |
| **Biosorbent\*pH** | **Fixed** | **6** | **1.60** | **0.27** | **3.58** | **0.008** |
| **Biosorbent\*Time** | **Random** | **15** | **9.68** | **0.65** | **8.68** | **<0.001** |
| pH\*Time | Random | 10 | 0.97 | 0.10 | 1.31 | 0.271 |
| Biosorbent\*pH\*Time | Random | 30 | 2.23 | 0.07 | 0.90 | 0.621 |
| Error |   | 144 | 11.9 | 0.08 |   |   |
| Selenium |
| **Biosorbent** | **Fixed** | **3** | **86006** | **28669** | **49.4** | **<0.001** |
| **pH** | **Fixed** | **2** | **1556** | **778** | **13.7** | **0.001** |
| Time | Random | 5 | 7719 | 1544 | 2.73 | 0.064 |
| **Biosorbent\*pH** | **Fixed** | **6** | **4729** | **788** | **10.9** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **8709** | **581** | **8.05** | **<0.001** |
| pH\*Time | Random | 10 | 567 | 57 | 0.79 | 0.642 |
| **Biosorbent\*pH\*Time** | **Random** | **30** | **2164** | **72** | **1.91** | **0.006** |
| Error |   | 144 | 5447 | 38 |   |   |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Factor | Effect | DF | SS | MS | F | p |
| Zinc [Cuberoot] |
| **Biosorbent** | **Fixed** | **3** | **849** | **283** | **30.9** | **<0.001** |
| **pH** | **Fixed** | **2** | **157** | **78.6** | **96.8** | **<0.001** |
| Time | Random | 5 | 7.29 | 1.46 | 0.17 | 0.970 |
| **Biosorbent\*pH** | **Fixed** | **6** | **152** | **25.4** | **19.4** | **<0.001** |
| **Biosorbent\*Time** | **Random** | **15** | **137** | **9.16** | **7.00** | **<0.001** |
| pH\*Time | Random | 10 | 8.12 | 0.81 | 0.62 | 0.784 |
| **Biosorbent\*pH\*Time** | **Random** | **30** | **39.2** | **1.31** | **4.03** | **<0.001** |
| Error |   | 144 | 46.8 | 0.33 |   |   |