**Supplement Information**

**Metals in select beers commercially available in the US: Unmonitored concerning metal source of exposure**

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Table 1. Used wavelengths for selected metals measurements by ICP-OES

|  |  |
| --- | --- |
| Metal | Wavelength (nm) |
| Al | **308.2**; 309.2 |
| Ag | **328.0**; 243.7 |
| As | **189.0**; 193.7 |
| Ba | **493.4**; 455.4 |
| Be | **234.8**; 313.0 |
| Bi | **223.0**; 306.7 |
| Cd | **226.5**; 228.8 |
| Co | **228.6**; 238.8 |
| Cr | **283.5**; 357.8 |
| Cu | **224.7**; 324.7 |
| Fe | **259.9**; 371.9 |
| Li | **610.3**; 670.7 |
| Mn | **259.3**; 279.4 |
| Mo | **202.0**; 281.6 |
| Ni | **221.6**; 341.4 |
| Pb | **220.3**; 216.9 |
| Sb | **217.5**; 206.8 |
| Se | **196.0**; 217.5 |
| Sr | **407.7**; 421.5 |
| Tl | **190.8**; 276.7 |
| V | **310.2**; 309.3 |
| Zn | **213.8**; 202.5 |

\* Reported metal concentration results refer to bolded wavelengths which showed to be more sensitive for tested samples.

**Table 2.** Concentration of metals in 82 select beers commercially available in the US

|  |  |  |
| --- | --- | --- |
| Metal  | Average (range) metal concentration, ug/L | Number of samples with detected metals |
| As | 21 (nd\*-63) | 62  |
| Se | 11 (nd-121) | 31 |
| Sb | 2 (nd-84) | 5 |
| Pb | 1 (nd-48) | 3 |
| Ba | 81 (11-192) | 82 |
| Cu | 29 (nd-138) | 60 |
| Cr | 4 (nd-37) | 25 |
| Al | 264 (nd-691) | 65 |
| Mn | 135 (nd-390) | 78 |
| Fe | 53 (nd-308) | 74 |
| Zn | 17 (nd-137) | 66 |
| Ag | 13 (nd-53) | 46 |
| V | 38 (nd-117) | 60 |
| Sr | 195 (nd-766) | 75 |
| Mo | 4 (nd-23) | 30 |

\*nd = Not detected

**Table 3.** Concentration of metals in beers with respect to their regional origin and grain ingredients

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Metal/Beer’s group | As | Se | Sb | Pb | Al | Mn | V |
| Average (range) metal concentration, ug/L |
| *Continent* |
|  |  |  |  |  |  |  |  |
| Europe | 20 (nd-53) | 4 (nd-38) | 2(nd-84) | 1(nd-41) | 270(nd-631) | 116(nd-290) | 46(nd-117) |
| North America | 19(nd-53) | 18(nd-121) | 2(nd-35) | nd\* | 199(nd-604) | 184(nd-390) | 33 (nd-77) |
| Asia | 28 (nd-63) | 19 (nd-82) | 2 (nd-25) | nd | 346 (nd-562) | 105 (nd-189) | 35 (nd-69) |
| Australia | 4(nd-8) | 3(nd-8) | nd | 16(nd-48) | 176(106-259) | 135102-191) | 12(nd-36) |
| Africa | 32(27-37) | nd | nd | nd | 434(178-691) | 127(118-136) | 20(nd-40) |
| South America | nd | nd | 7 | nd | 325 | 45 | 58 |
| *Country* |
| USA | 19(nd-49) | 24(nd-121) | 2(nd-35) | nd | 156(nd-604) | 214 (nd-390) | 33(nd-63) |
| Mexico | 38(22-53) | 5(nd-12) | nd | nd | 299(nd-484) | 162(111-253) | 53(19-77) |
| Germany | 17(nd-49) | 6(nd-32) | nd | nd | 183(nd-454) | 118(66-185) | 34(nd-63) |
| England | 21(nd-36) | 4(nd-22) | 14(nd-84) | 7(nd-41) | 268(nd-460) | 181(61-290) | 52(nd-96) |
| Ireland | 15(nd-30) | 13(nd-38) | nd | nd | 474(450-492) | 148(130-182) | 41(36-45) |
| China | 53(39-63) | 5(nd-22) | nd | nd | 382(311-460) | 102(nd-154) | 29(nd-41) |
| Japan | 4(nd-11) | 9(nd-16) | 8(nd-25) | nd | 434(351-562) | 97(44-138) | 45(25-69) |
| *Grain ingredients* |
| Barley | 22(nd-63) | 11(nd-121) | 1(nd-35) | 1(nd-48) | 281(nd-691) | 135(nd-390) | 41(nd-117) |
| Wheat | 14(nd-35) | 16(nd-48) | nd | nd | 96(nd-454) | 137(nd-203) | 17(nd-59) |
| Rice | 6(nd-19) | 13(nd-36) | 5(nd-25) | nd | 358(142-562) | 98(44-138) | 39(nd-69) |
| Oatmeal | 33(31-36) | nd | 42(nd-84) | 20(nd-41) | 147(nd-293) | 215(192-238) | 28(nd-55) |

\*nd = Not detected