**Automation of boron chromatographic purification for δ11B analysis of coral aragonite**

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| --- | --- | --- | --- |
| δ11B JCp-1 (‰) | 2sd (‰) | Reference | Boron separation |
| 24.4 | 0.1 | Dissard et al26 | Anion exchange chromatography |
| 24.2 | 0.24 | Liu et al6 | Micro sublimation |
| 24.3 | 0.34 | McCulloch et al25 | Cation and anion exchange chromatography |
| 24.3 | 0.25 | Henehan et al27 | Anion exchange chromatography |

Table S1. Published δ11B measurements of the carbonate reference material JCp-1 with boron separation methods used. All measurements were conducted on MC-ICPMS.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Reference material | Matrix type | Long term δ11B (‰) |  | **Sample load (μL/min)** |
| **100** | **200** | **500** |
| NIST 951 | No matrix | 0 | δ11B (‰) | 0 | -0.08 | -0.2 |
| JCp-1 | Carbonate | 24.25 | 24.45 | 24.5 | 24 |
| Seawater  | ionic | 39.61 | 39.52 | 39.47 | 38.65 |

Table S2. δ11B values of standards and reference materials processed at different flow rate.



Figure S1. (A) Illustration of the prepFAST-MC device automated system (ULPA filter and polypropylene enclosure was not used at Southampton), the equipment uses reagents (Milli-Q and 0.5M HNO3) that are taken up according to the protocol described in Table 2, and dispensed to various locations thanks to a rotary multivalve (valve V1). Reagents are taken up in a coil (not illustrated) before being dispensed to either the probe (bypassing the column), the column (in forward or reverse flow) or the waste. Syringes control the flow through the system via valve V2 that is connected to the coil and valve 1 in order to take up or dispense reagents with controlled volume and flow rate. A separate milli-Q bottle (DI water on the illustration) rinses the line through valve 2, coil, valve 1 and to waste between each action of reagents take up/dispensing. (B) Hand-made Teflon micro-column used with the standard method and (C) prepFAST column, both filled with Amberlite resin IRA743. Red arrows indicate direction of flow forward (F) or reverse (R).



Fig S2. Illustration of ion exchange chromatography. Buffered sample is loaded onto a resin (A) preconditioned with milli-Q water (increasing the partition coefficient KD between boron and resin to 104). Matrix is removed with milli-Q water (B), and boron eluted with 0.5M nitric acid (C).



Fig S3. δ11B offset between the prepFAST and manual standard method as a function of Na in purified samples. (r2=0.04. p=0.20) showing no correlation between the two.



Fig S4. (A) Boron yield and (B) elution check as a function of speed of sample load.