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High precision 11B/10B analysis with a simplified MC-ICP-MS

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Boron isotope ratio is a powerful tracer in the fields of geochemistry, biochemistry, and environmental chemistry. One important application of 11B/10B isotope ratio in geochemistry is as an indicator for paleo pH of seawater recorded in marine carbonates in deep-sea sediments. Boron isotope ratios are determined by TIMS or MC-ICP-MS with precisions of better than 0.1 % RSD, but a large inter-lab discrepancy of 0.6 % is still observed for actual carbonate samples (Foster, 2008). Here, we tried to determine B isotope ratio by MC-ICP-MS with a simple and common analytical techniques using a quartz sample introduction system with a PFA nebulizer, and compared to recently developed precise B isotope ratio analysis techniques by TIMS in positive ion detection mode determined as $Cs2BO_2+$ ions with sample amount of <100 ng (Ishikawa and Nagaishi, 2011) and by MC-ICP-MS (Foster, 2008, Louvat et al., 2011). 11B/10B isotope ratios of a 50 ppb B solution dissolved in a HNO_3, mannitol, HF-mixed solution were determined against an isotopic reference NIST-SRM 951 with a standard sample bracketing technique in the wet plasma condition. Resultant analytical reproducibility (twice standard deviation) was +/-0.02 % with a consumption of 50 ng B, and the washout time was comparable to that of NH3 gas addition to the introduction system (Foster, 2008). 11B/10B isotope ratios of actual carbonate sample and seawater were determined after simple chemical purification with a common cation exchange resin instead of a boron selective resin. Their relative differences from the standard were consistent with those determined by the positive TIMS within analytical uncertainty. Current potential of MC-ICP-MS for precise B isotopic analysis will be discussed.

Foster, G., 2008. Seawater pH, pCO_2 and $[CO_32-]$ variations in the Caribbean Sea over the last 130kyr: A boron isotope and B/Ca study of planktic foraminifera, Earth Planet. Sci. Lett., 271, 254-266.
Ishikawa, T. and Nagaishi, K., 2011. High-precision isotopic analysis of boron by positive thermal ionization mass spectrometry with sample preheating, J. Anal. At. Spectrom., 26, 359-365.
Louvat, P., Bouchez, J, and Paris, G., 2011. MC-ICP-MS isotope measurements with direct injection nebulisation (d-DIHEN): Optimisation and application to boron in seawater and carbonate samples., Geostand. Geoanal. Res., 35, 75-88.