

Boron isotopic ratio measurements at ng levels with the μ -dDIHEN introduction system

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The newly developed μ -dDIHEN introduction system¹ combines a demountable direct injection high efficiency nebulizer (d-DIHEN, Analab), a flow injection valve (FAST, ESI) and a gas displacement pump. It allows the measurement of 100 μ L sample volumes at low uptake rates down to 5 μ L/min. Because boron is both sticky in spray chambers and volatile in acidic conditions (thus lost in desolvating systems), it can be very efficiently measured by direct injection nebulisation^{2,3}: a long nebulizer is directly plugged into the torch in place of the regular injector, and sprays the sample directly into the plasma. This results in enhanced sensitivity and short wash times compared to the classical introduction system (concentric nebulizer and spray chamber).

The μ -dDIHEN was tested for MC-ICP-MS boron isotopic ratio ($\delta^{11}\text{B}$) measurements of reference materials and natural samples with B concentrations between 10 and 200 ppb and uptake rates between 5 and 75 μ L/min. The results are in good agreement with those using our previous d-DIHEN measurement method². Different detection systems (Faraday cups with 10^{11} and 10^{12} ohms amplifiers and secondary electron multipliers, SEM) were tested, aiming at ppb B concentration solutions. Transient and continuous modes, with sample loops of 10 and 50 μ L, were also compared.

¹Louvat, Tharaud & al., 2019, JAAS (submitted)

²Louvat, Bouchez, Paris, 2011, GGR, 35, 75-88.

³Louvat, Moureau & al., 2014, JAAS, 29, 1698.