

In situ Ba isotopes analyses in barites using LA-MC-ICP-MS

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Barite is the main occurrence mineral of barium in nature, mainly produced in hydrothermal deposits. The composition of Ba isotope in barite can indicate the origin of barite deposits[1]. In this study, we present the first high precision method to analyze stable Ba isotope ratios in barite using laser ablation multiple collector inductively coupled plasma mass spectrometry (LA-MC-ICP-MS). The powder of barium sulfate standards (NBS127, IAEA-SO-5, IAEA-SO-6) were sintered at high temperature and pressure with the multi-anvil apparatus to form standard substance pellets for in-situ determination of Ba isotope. The analysis mode of small laser spot sizes (16-44 μ m) and low laser ablation frequency (1Hz) combined with a “wave” signal-smoothing device was used. The obtained analytical precision was significantly improved by using the signal-smoothing device in comparison with that without the signal-smoothing device. NBS127 pellet was selected as the external reference material for matrix-matched calibration. Two barium sulfate standard materials (IAEA-SO-5, IAEA-SO-6) and four natural barite samples (Ba-Fra, Ba-FJ, Ba-YN, Ba-HN) were analyzed. Typical intermediate precisions for $\delta^{137/134}\text{Ba}$ was 0.15‰ (2SD, standard deviation). The determined $\delta^{137/134}\text{Ba}_{\text{NBS127}}$ values of barium sulfate standard materials (IAEA-SO-5, IAEA-SO-6) and four natural barite samples by LA-MC-ICP-MS were consistent with recommended values analyzed by double spike method combined with solution MC-ICP-MS. Barium sulfate standard material NBS127 as well as two natural barite samples (Ba-Fra, Ba-FJ) were recommended as the potential standards for in situ Ba isotope ratios analysis by LA-MC-ICP-MS.

[1] Crockford et al. (2019) *EPSL*. **519**, 234-244.