

A simple determination of major- and trace-element composition for peridotite by ICP-MS: an application of acid-digested fused-glass bead

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A simple analytical procedure for determination of whole-rock major- and trace-element composition by inductively coupled plasma-mass spectrometer (ICP-MS) using fused-glass bead (sample + lithium tetraborate) is presented. In the case of peridotite, chromite is one of the minerals resistant to acids and interferes with accurate and reproducible determination of whole-rock composition. Such resistant minerals were not observed in the fused-glass beads prepared here, suggesting complete digestion of the samples including chromites. The fused-glass beads were properly dissolved into a nitric acid solution to analyze with sector magnetic field ICP-MS (ICP-SFMS) and Q-pole mass filter ICP-MS (ICP-QMS). The analytical procedure was optimized and evaluated with five geological reference materials, BIR-1, JB-3, JGb-1, JP-1, and W-2. The results demonstrate that the whole-rock compositions were reasonably quantified with the analyses of ICP-MSs.

Since only fused-glass beads are required as an analytical target to determine whole-rock major- and trace-element composition, the sample amount consumed through the series of analytical procedure can be constrained to a minute amount (e.g. <0.4 g). The analytical procedures with ICP-MSs are considered appropriate for tiny and/or precious samples, such as xenoliths and samples collected by dredging, diving, and drilling from the world's ocean basins.

Keywords: whole-rock composition, ICP-MS, XRF, lithium tetraborate glass