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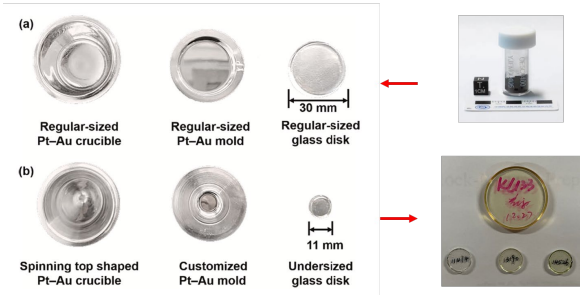

A simple and rapid method for precisely determining trace elements by LA-ICP-MS analysis in bulk precious geological specimens that have been prepared as lithium borate glasses following customized procedures for XRF analysis with 10 mg sample sizes

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A simple and rapid method is described for precisely determining trace elements by laser ablation (LA)-ICP-MS analysis in bulk precious geological specimens that have been prepared as lithium borate glasses following our customized procedures for XRF analysis with 10 mg sample sizes.

This method reliably achieves complete sample digestion and provides for complementary XRF and LA-ICP-MS analysis of a full suite of major and trace elements from a single sample preparation which is quite important for precious geological samples. Capabilities of the method are demonstrated by determination of thirty trace elements (Sc, V, Cr, Cu, Zn, Ga, Rb, Sr, Y, Zr, Nb, Ba, REE, Hf, Ta, Th and U) in a diverse range of geological reference materials that includes basalts (BHVO-2, BIR-1a, BCR-2, JB-2 and GSR-3), andesite (AGV-2 and GSR-2), granites (AC-E and GSR-1) and diabase (W-2a).

-XRF and LA-ICP-MS was used to test the homogeneity of trace elements in the lithium borate glasses of the prepared granite reference material GSR-1. Besides, a lot of analysis condition optimization experiments have been done to obtain accurate analysis results: comparison of different internal standard elements (Si, Ca, Mg and Al), selection of external standard (NIST SRM 610 and 612 with mismatched matrix, self-made BHVO-2 or BIR-1a lithium borate fused glass with matched matrix), beam spot size, etc.

For most analytical elements, the deviation between the measured value and the recommended value is within 10%, which is equivalent to the accuracy of the solution analysis method(SN-ICP-MS). A few heavy REEs have a large deviation due to their low content level.

Reference

[1] Xue, D.-S., Tian, H.-C., Zhang, D.-P., Liu, Y.-H., Sun, J.-F., Wu, S.-T., Liu, S.-K., Guo, S. and Wan, B. (2022) Quantitative verification of 1:35 diluted fused glass disks with 10 mg sample sizes for the wavelength-dispersive X-ray fluorescence analysis of the whole-rock major elements of precious geological specimens. *Spectrochimica Acta Part B: Atomic Spectroscopy* 193, 106433.