Preparation of a borate glass calibration standard for LA-ICPMS analysis of sulphides

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Currently available standards for LA-ICPMS analysis of a wide range of trace elements in sulphide minerals either contain a limited range of elements [1] or have low and/or often unevenly distributed volatile elements and precious metals (e.g. Se, Te, Tl, Pt, Au) [2]. In order to overcome these difficulties we have experimented with fusing sulphide mineral mixes in a variety of borate-based fluxes. A range of flux compositions, heating and cooling regimes and time at high temperatures have been tested in order to produce a homogeneous glass disk with an appropriate proportion of sulphide, while retaining volatile elements.

Best results were achieved with using Li tetraborate as a flux with Na or Li nitrate as oxidizing agent at gas fluxer (M4 by Claisse). Selenium was added as elemental Se, while thallium was added as carbonate (Tl_2CO_3). New standard glass STDGL-3 contains homogeneously distributed volatile elements (Se, Te, Tl, Sn) and precious metals (Au, Pt). For example, Se values variation is within 3%, compared to 17% in STDGL-2 [1]. Lower temperatures, vigorous continuous mixing and shorter fluxing experiment times allowed for better retention of volatile elements. For example, 85% of Se and more than 95% of Tl were lost during making of STDGL-2, whereas > 50% of Se and Tl were retained with the new procedure. Suitability of the new standard for LA-ICPMS analysis of sulphide minerals will be demonstrated.

[1] Wilson *et al* 2002. *JAAS,* v.**17**, pp.406–409 [2] Danyushevsky *et al* 2001. *GEEA*,. v.**11**, pp. 51-60