

Further studies of the Borate Fusion Method of Sample Preparation: The applications

Maggi Loubser^a, Peet H van Rooyen^b and Johan PR de Villiers^c.

^aX-ray Analytical Facility, Geology Department, University of Pretoria, Pretoria, 0002, South Africa. E-mail: mloubser@postino.up.ac.za

^bChemistry Department, University of Pretoria, Pretoria, 0002, South Africa. E-mail: phvr@up.ac.za

^cDepartment of Materials Science and Metallurgical Engineering, University of Pretoria, Pretoria, 0002, South Africa. E-mail: jpdev@postino.up.ac.za

In a previous paper an overview was given of a study of the reactions occurring during a lithium borate fusion by using analytical techniques like TGA/DSC, XRD and Raman Spectroscopy. In this paper the application of the abovementioned techniques to real life problems will be illustrated, proving that a thorough investigation can solve laboratory sample preparation problems.

Some of the problems addressed using this approach were metallic content in samples. XRF spectroscopy is one of the major tools used in evaluation of refractory failures, but pressed powder briquettes have analytical limitations when metal particles are present in the interface between the refractory and melt phases. Fused bead preparation of such samples has always been problematic due to reaction of metal with platinum crucibles. XRD was used to evaluate a pre-oxidation step, which was included into the preparation. This method was further developed to fuse pure metallic samples with a simple pre-oxidation step. Sample preparation for sulphide-bearing matrixes was also optimised using TGA and XRD to evaluate the pre-oxidation step. The next problem evaluated using the insight gained from investigating the temperature behaviour of fluxes, was difficult to fuse materials including rutile, zircon and chromite-bearing ores. Successful fusion recipes were compiled with much lower dilutions than used in the past.