Molybdenum Concentrates - Borate Fusion with Niobium Internal Standard

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Molybdenum concentrates are relatively high purity MoS$_2$ and MoO$_3$ prepared from Cu-Mo ore. Concentrates are used for making molybdenum metal products, ferromolybdenum, chemicals (e.g. ammonium molybdate), and lubricating products. The quality of concentrates is determined by the quality of the ore and the enrichment technology. Some mines produce very good quality concentrates with Mo content > 55% and Cu < 0.1%. Other mines produce lower grade concentrates with Mo only 50% to 54% or less and relatively high Cu of 0.5% to 1.5%. Low grade concentrates may be used only by blending them with high quality concentrates. Mining industry laboratories use XRF with borate fusion and Nb internal standard as a rapid, reliable test method for Mo content. Most use atomic absorption (AAS) for determination of Cu and other elements.

At NIST, this XRF test method has been extended to include determinations of Cu, Fe, Pb, and Re, as well as Mo. The method was validated in two ways. First, a group of industry labs carries out an annual interlaboratory study to validate their quality assurance procedures. In 2008, the study used two concentrates that will become NIST SRM.333a and SRM 423. The industry labs provided multiple sets of results for Mo from the XRF method, plus three classical test methods. They also provided AAS and ICPOES results for minor and trace elements. Second, two certified reference materials for MoS$_2$ concentrates were used in an attempt to validate the XRF method. The XRF test method will be presented and validation results will be discussed in detail.