Quantitative mineralogy for processing Ta-low grade ores: the Penouta deposit

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Modern tecniques of quantitative mineralogy, as mineral liberation analyses (MLA) result of great value to determine the mineral characteristics necessary for processing. The measurement software has to be custom-tailored. Then an exhaustive knowledge of the mineralogy and mineral chemistry of the ore is necessary. Also the geochemical distribution of Ta among the different minerals will be useful to know the recoverable quantity of tantalum.

The complement with X-ray diffraction quantitative characterization, e.g. by the Rietved method, can be important for characterize samples with large particles.

The Penouta rare-metal granite deposit has an average grade of 77 ppm Ta and 443 ppm Sn [1]. Tantalum-rich minerals are mainly disseminated in an albitized leucogranite constituted by quartz, albite, K-feldspar, muscovite, and kaolinite. Tantalum occurs mainly as columbite group minerals (CGM), but microlite and wodginite also occur. Cassiterite has up to 8.5 wt.% of Ta in substitution of Sn and also inclusions of Ta-rich minerals.

In addition, white mica can contain high Ta-contents. These micas represent nearly 10% of the total rock.

As a result of the alteration this granite was easily disaggregated and then sieved. Distribution of minerals is irregular in the different particle sizes. Quartz, is from 20 up to 67 wt.%, albite, 2-40 wt%, K-feldspar, 4-18 wt%, muscovite, about 10 wt. CGM and cassiterite concentrates in the finer sizes. The mineral liberation analysis of this, indicated that 78 % of the CGM grains are liberated and most of them are particles smaller than 200 μm, with a grade of more than 70%. In binary particles CGM are mainly associated with cassiterite, quartz and white mica. This analysis provides the distribution of CGM according to the grade of the particles and the particle size.