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LEPIDOLITE PROCESSING USING SULPHATION BAKING: A COMPARISON AGAINST CONVENTIONAL PROCESSING FLOWSHEETS

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ABSTRACT

Processing of hardrock Li-bearing minerals other than spodumene and petalite are challenging due to the reduced grades of Li and increased reagent costs associated with impurity rejection prior to production of a saleable lithium chemical concentrate. In the current climate however, Li-bearing micas such as lepidolite and zinnwaldite have attracted significant commercial attention as potential development targets.

A number of extraction processes for Li-bearing micas have been outlined in the public domain. Many of these processes have been reported for mineral concentrates, although some have examined the direct use of ore. Whether involving a mineral concentrate or ore, the unit processes employed to 'crack' the Li-bearing micas have typically involved air roasting, suphation roasting or acid leaching. A number of less common approaches such as sodium sulfide mechanochemical activation, chlorination and carbonate pressure leaching do not appear to have attracted any commercial interest.

Energy cost sensitivity is arguably the most important economic factor affecting the use of roasting and sulphation roasting process flowsheets. Moreover, despite reasonable rejection up-front of the major gangue elements, significant effort is still required to manage alkali elements (Na, K, Rb and Cs) in the downstream circuit, plus rejection of a extended suite of minor and trace impurities.
ANSTO Minerals has had significant exposure to both brine and hardrock Li projects for the last six years, providing us with a unique breadth of Li processing experience. From our perspective, aside from the energy cost sensitivity, a key risk to realising the value of Li-bearing micas via roasting and sulphation roasting process flowsheets is the need to remove alkali sulphates (Na and K) via crystallisation steps (evaporative and / or cooling) and the lack of specific impurity removal steps from the downstream hydrometallurgical processing steps.

As a possible alternative processing approach, we have examined a hybrid approach involving sulphation baking up-front and downstream processing specifically aimed at readily and cost effectively rejecting the major gangue elements, along with problematic minor and trace impurities. The development of a simple reagent-free, impurity rejection method early in the flowsheet has significantly simplified the overall process flowsheet. This presentation will outline and discuss this approach and its application to lepidolite ore.

Keywords: Lithium, Hardrock Processing, Lepidolite, Sulphation Baking, Process Development