

NEW REAGENTS FOR BENEFICIATION OF LITHIUM ORES

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ABSTRACT

Global demand for lithium has increased significantly over recent years due to a dramatic increase in the use of rechargeable lithium ion batteries in a multitude of applications, including electric vehicles, electric power storage and electronic devices. Hard rock mining of pegmatites has emerged as a major source of lithium to meet this expanding demand. The minerals include spodumene, lepidolite and petalite, and are beneficiated using techniques including gravity separation, magnetic separation, and froth flotation.

Flotation is used for processing fine particle size feed, complex ore deposits and where high grade concentrates are required. Clariant Mining Solutions has developed a range of novel collectors for the flotation of spodumene and other lithium ores, and this paper presents some of the most recent developments.

Fatty acids are the typical collectors used for lithium flotation, however the grade and recovery achieved with these collectors is often below the desired level. There are also some significant drawbacks associated with the use of fatty acid collectors, such as the formation of calcium soaps which give rise to filtration problems and the need for acid washing.

Two strategies have been developed to improve on these standard lithium collectors. The first is achieved through modification of the fatty acid composition. The second strategy is to completely replace the fatty acids with alternative chemistry.

Modified fatty acids can improve the metallurgical performance and significantly lower dosages, thereby minimising the issues associated with soap formation. Performance of the modified fatty acid collectors demonstrated lithium recoveries greater than that achieved with a standard dose of fatty acid collectors at an improved grade.

Recent innovations include products which are based on complex ester chemistry. These collectors have been found to produce superior grade and improved recovery at less than half the dosage of fatty acid collectors. These collectors have also been shown to improve the filtration efficiency of the final concentrate.

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