ALTA 2024 28th
27 - 31 May | Perth, Australia

CLARIANT NEW GENERATION COLLECTORS FOR FLOTATION OF LITHIUM ORES

By

[1]Matthew Pupazzoni, [2]Wagner Silva, [3]Suresh Raju Mudnuru

[1]Clariant Mining Solutions, Australia
[2]Clariant Mining Solutions, USA
[3]Clariant Mining Solutions, UAE

Presenter & Corresponding Author

Matthew Pupazzoni

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 growing demand. The key minerals include spodumene, lepidolite and petalite, and they are often beneficiated via complex flowsheets using multiple techniques including dense media separation, magnetic separation, and froth flotation.

In the flow sheets for processing lithium ores, flotation is often used for processing fine particle size feed, for complex ore deposits, and where high grade concentrates are required. Clariant Mining Solutions is focused on helping the mining industry deliver the minerals needed to enable the decarbonization megatrend in a sustainable way, and to this effect, Clariant has been working to develop a range of new collectors for more efficient flotation of spodumene and other challenging lithium ores. This paper presents some of the most recent developments.

Fatty acids are often used for lithium flotation; however, the grade and recovery achieved with these collectors is often below the desired level. Also, high dosages of fatty acids are often required, and residual fatty acids in the concentrates can impart a fatty odour to the lithium concentrate which is undesired during further processing into lithium carbonate or hydroxide. Fatty acid collectors can also cause formation of calcium soaps which give rise to filtration problems and the need for acid washing.

Clariant is using two strategies to develop improved lithium collectors. The first is to formulate collectors containing fatty acids but minimizing the negative effects of fatty acids, and the second is to completely replace the fatty acids with alternative chemicals.

Modified fatty acid formulations can improve the metallurgical performance and significantly lower dosages, thereby minimizing the issues associated with residual fatty odour and soap formation while achieving lithium recoveries greater than those achieved with conventional fatty acid collectors at an improved grade. Furthermore, Clariant's novel collectors that are free of fatty acids have been found to produce superior grade concentrates and improved recovery at less than half the dosage of fatty acid collectors. These collectors completely eliminate the residual fatty odour and have also shown improvements in the filtration efficiency of the final concentrate.

Keywords: Lithium, flotation, beneficiation, reagents