Direct Lithium Extraction: Optimizing for Downstream Processing

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ABSTRACT

Direct lithium extraction (DLE) technology using various types of sorbents or ion exchange media is being widely explored for the harvest of lithium from saline brines. After DLE, the dilute lithium chloride mixed salt solution is concentrated, refined, and converted (CRC) into an upgraded lithium product, often lithium carbonate or lithium hydroxide. Data and tools are presented for economic optimization and lithium yield maximization when combining DLE and CRC.

An important, and often neglected, relationship exists between the chemistries of the DLE and CRC process steps, which should be considered in conjunction, as opposed to as wholly separate unit operations. Attendees are provided with methods to maximize total system lithium recovery while minimizing costs and energy. Attendees will learn how to prevent lithium yield loss in CRC processes and avoid the need for, or reduce the size of, costly and energy-intensive evaporative processes by optimizing the DLE system and employing recently commercialized ultra-high pressure reverse osmosis technology.

Not all DLE processes are equal, and the common singular metric of eluent lithium concentration is misleading. For example, the lithium to TDS and lithium to hardness ratios can be far more important than DLE lithium eluent concentration alone. Over-processing in DLE to increase lithium concentration can result in higher costs and lithium yield loss in downstream CRC. An optimum balance exists.

The authors will present an overview of CRC processing technology for a typical DLE eluent. They will explore the chemical levers that help or hamper CRC lithium recovery and economics. These tools will help readers understand how to best tune the process balance between DLE and CRC processing for optimal lithium recovery and economics.