Novel Process for Lithium Extraction from Salt Brine Lake

Opportunity Statement

Lithium is the one of the most commonly used metals in industry with a wide variety of applications including batteries, lubricating grease and pharmaceutical products. Demand for lithium is expected to rise with the increasing adoption of electric vehicles. Market reports have predicted that world lithium demand will increase by 2.5 times from 2010 to 2020. Therefore, there is a pressing need to develop new sources of lithium to support this anticipated increase in demand.

Lithium can be extracted from salt brine or minerals and then processed to obtain lithium carbonate, which is used to produce various lithium compounds. Salt brine is the most abundant lithium source available in world, comprising about 60% of all known lithium deposits. Producing lithium by evaporating salt brine is also less costly than directly extracting it from minerals. This makes salt brine an important source of lithium to meet future market demand.

Problem

There are diverse processes available for lithium extraction. However, each of them has some shortcomings as described below.

1. Precipitation Method
   Precipitate formed has a small size and is hard to filter, resulting in significant lithium loss.

2. Carbonization Method
   Process is not easy to control, resulting in low lithium yield.

3. Calcination and Leaching Method
   Magnesium removal rate is low and energy consumption is high.

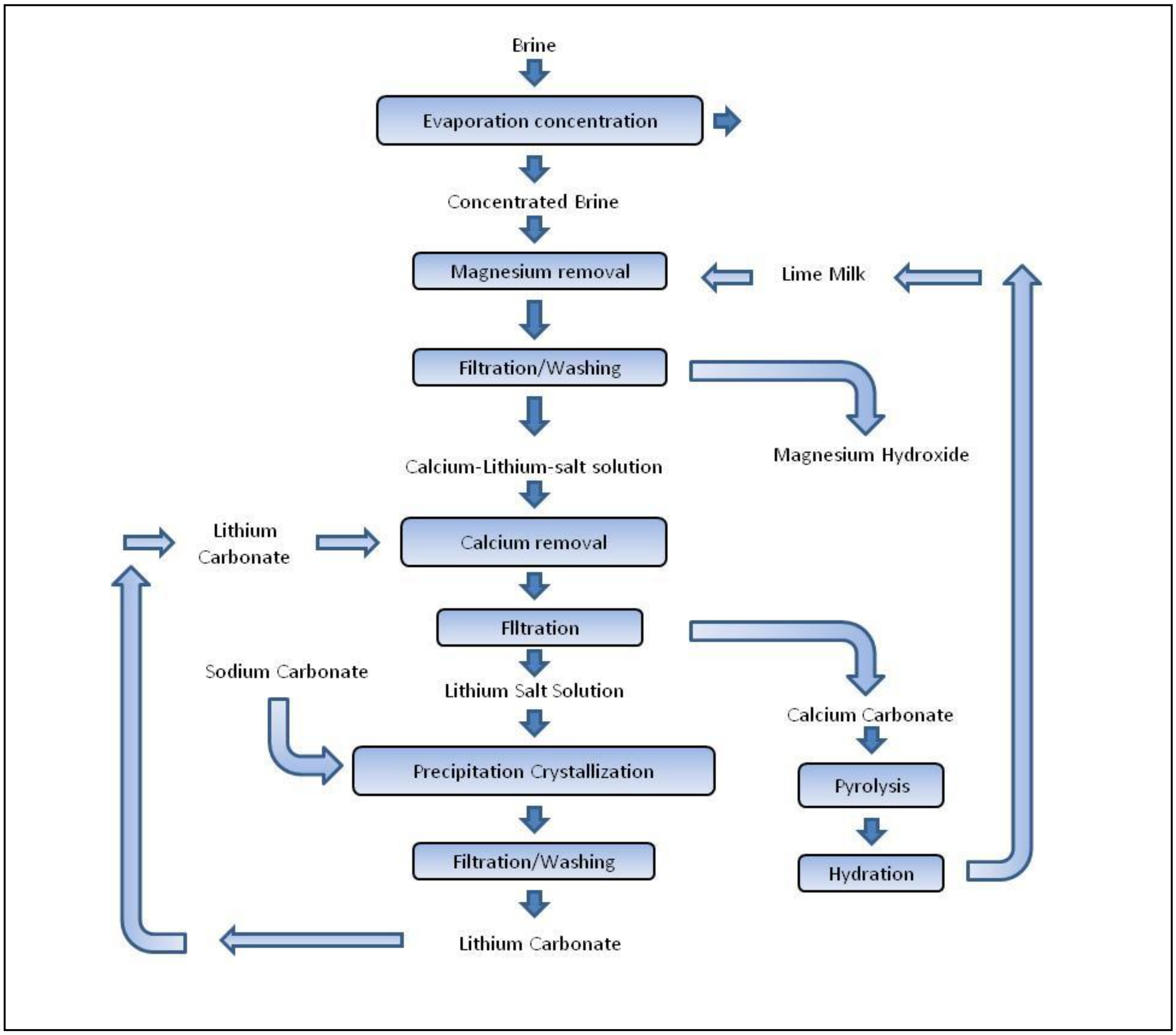
4. Adsorption Method
   Low production efficiency due to low capacity of adsorbent.

Therefore, there is a need for a technology which addresses the limitations of current processes for lithium extraction from brine lakes.

Novel Process for Lithium Extraction from Salt Brine Lake

360ip Partner's Solution

360ip's partner has developed a technology which provides an integrated approach as shown below.



The process includes the following steps:

1. **Concentration of brine water** through an evaporation process.
2. **Removal of magnesium** by the addition of lime milk. This results in a solid-phase conversion reaction which converts the calcium hydroxide into magnesium hydroxide. The magnesium hydroxide is removed from the brine solution with a filtration process at a later stage. Calcium ions from the solid phase conversion reaction are retained in the brine solution.

3. **Removal of calcium** through the addition of lithium carbonate. This produces another solid-phase conversion reaction which converts lithium carbonate into calcium carbonate. The calcium carbonate is removed with a filtration process at a later stage.
4. **Lithium carbonate production** through a precipitation process which requires the addition of sodium carbonate to the lithium salt solution.

The key advantages associated with this technology are as follows:

- The solid-phase reaction process produces crystals that are easy to filter, enabling a high lithium recovery rate.
- Low-cost process which only requires sodium carbonate as an external raw material. Input materials for the solid-phase conversion reaction (lithium carbonate and calcium carbonate) are products of the process which can be reused and recycled. This closed-loop system enables low lithium-extraction cost and reduced pollution.
- Compared to conventional technology, the number of steps involved in concentrating lithium in brine is reduced, which enables low energy consumption and cost.

360ip is seeking interested parties for the licensing, further development and commercialization of this technology-based solution.

For additional information, contact:
licensing@360ip.com