

# **Filtration – an integral part of impurity removal for battery grade $\text{Li}_2\text{CO}_3$ / $\text{LiOH}$ production**

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## **ABSTRACT**

Impurity removal is an important process step occurring in most lithium conversion processes. Removal of impurities such as Ca, Mg, Si, Cl, F, Fe, Ni, Al and other elements is relevant not only for spodumene concentrates but also lithium micas and brines. Most ore impurities are removed as leach residue by filtration with further dissolved impurities removed after precipitation also by filtration. Pressure filtration is usually the preferred method, with filter presses and FUNDABAC® candle type filters the most commonly used.

Extensive bench and pilot scale filtration testwork have been undertaken by the authors on most major processing routes and projects, including but not limited to:

- Spodumene to  $\text{LiOH}$ : Tianqi Australia's Kwinana  $\text{LiOH}$  plant
- Brine to  $\text{LiCO}_3$ : Enirgi Group's DXP Plant at Salar del Rincón
- Lepidolite to  $\text{Li}_3\text{PO}_4$ : Lithium Australia's SiLeach® project

Impurity removal filtration and polishing is challenging due to high quality requirements (high filtrate clarity for IX feed, crystallisers or simply impurity removal but also high liquor recovery with limited dilution) and mostly difficult to filter fine solids. While pre-treatment through recycling, re-seeding, HDS process and similar can improve filterability, they often can't prevent the need for filter aids. Those aids, which could be diatomaceous earth (DE), perlite, cellulose or others, can be applied as pre-coats and/or body feeds.

This paper will discuss optimisation, result extrapolation and simulation of pressure and polishing filtration based on examples of impurity removal filtration for lithium conversion, covering direct pressure filtration as well as with pre-coat and body feed with consideration of filtration parameters such as cycle time, cake thickness, filtration pressure and more. Scale-up considerations as well as full scale filter options and features will complete the discourse.

**Keywords:** Impurity Removal, Filtration, Polishing, Solid/Liquid Separation