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LANXESS Energizing Chemistry

Boron removal from battery metal concentrates with Lewatit® MK 51

Lewatit® ion exchange resins offer the fascinating possibility to selectively remove impurities from battery metal concentrates containing lithium, copper, nickel, cobalt, and manganese. Boron is a contaminant that appears in ores such as jadarite and needs to be removed from lithium concentrates to obtain battery-grade quality. Compared to competitive technologies such as solvent extraction (SX), the use of ion exchange resin technology facilitates highly efficient refining processes with a good environmental footprint, water balance, and cost.

Applications

Lithium is extracted from three sources: salar brines, hard rock, and geothermal or oil field brines. In all three applications boron can occur as a contaminant that needs to be efficiently removed. Solvent extraction was previously used for boron removal. This technology, however, requires huge contactors, resulting in a big plant footprint. Additionally, flammable solvents are needed, which requires explosion protection. Often separation efficiency is poor, which requires long contact times in the separators. As a result, the CAPEX and OPEX of SX are high and the technology is detrimental to the environment. Moreover, lithium mine sites are often located in remote areas, which makes it difficult to establish chemical plants. To overcome these limitations we introduce our boron-selective Lewatit® MK 51 ion exchange resin. This technology is based on boron extraction from aqueous salt solutions onto a solid ion exchange resin phase.

Benefits

Lewatit® MK 51 removes boron from lithium concentrates:

- Without needing organic solvents and explosion protection
- With low contact times at high separation efficiency, low plant footprint, and CAPEX
- With high mechanical stability, leading to savings on resin inventory
- With fast exchange and high capacity
- With low cost for regeneration chemicals and high-purity lithium concentrates

Lewatit®

Lewatit®

Purification of lithium containing sodium sulfate to < 1 ppm B

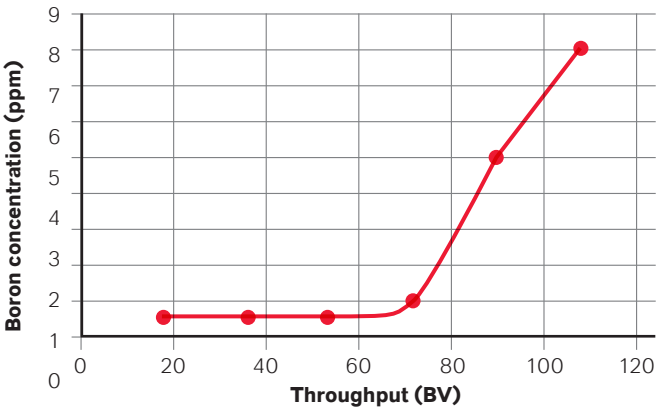
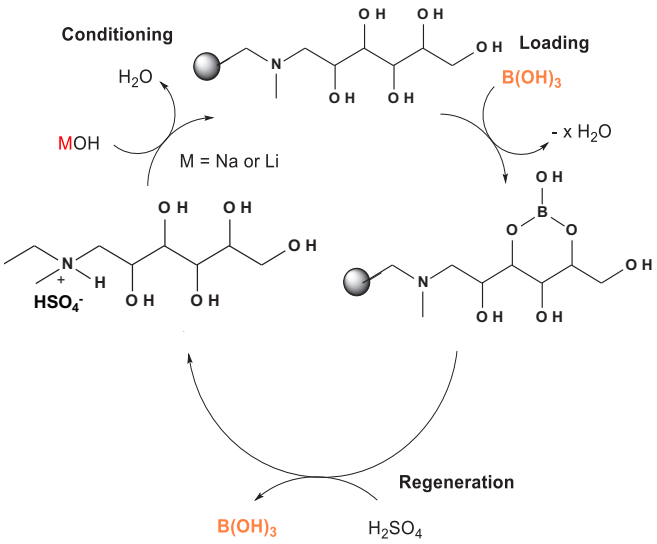


Figure 1: Free base form, 30 ppm B, 100 ppm Li, Na_2SO_4 178 g/l ph 8.5, 18 BV/h, ambient temperature, breaking trough point 5 ppm B, op. cap 2.7 g B/l Lewatit® MK 51

Loading and regeneration cycle for Lewatit® MK 51 – Boron loading, elution, and conditioning



Standard regeneration sequence

Step	Flow direction	Solution	Flow rate	Quantity [m³ per m³ of resin]	Time (min)
Service	Downflow	Brine	<10 BV/h	–	–
Displacement	Downflow	Water	4 BV/h	4	30
Backwash	–	Water	9–10 m/h	–	30
Regeneration	Downflow	H_2SO_4 5%	4 BV/h	2–2.5	40
Rinse	Downflow	Water	4 BV/h	4	60
Conditioning	Downflow	NaOH 4% LiOH 2.5%	4 BV/h	1.0	35
Rinse	Downflow	Water	4 BV/h	2	30

We will be happy to support your business. Please contact us for additional information: visit www.lpt.lanxess.com

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