

Numerical predictive calculations of operational lithium production

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Growing demand for lithium as a cathode material in rechargeable batteries, has catapulted lithium to the limelight of the mining scene. Brine deposits supply approximately 56% of current demand essentially from solar evaporation projects in Argentina, Bolivia, Nevada, USA, Tibet and Chile. In the case of lithium brines, geochemical modelling is used to predict the likely reserves, operational concentrations, grade, of lithium being produced, as well as being applied to the prediction of ground stability caused by changes in hydrogeological conditions or to the modelling of the lithium concentration within the underground brine.

Hypersaline brines are typically hard to model using thermodynamic equilibrium calculations due to the effect of ionic strength on ion thermodynamic properties [1]. Following a literature review of lithium species and lithium bearing phases to integrate them in a Pitzer formalism.

In this case study, the mining life cycle of lithium was reproduced. The lithium concentration was calculated from the pumping well, through each process operation and at each evaporative step, including impurity removal steps (boron and magnesium) until its precipitation as lithium carbonate. These concentrations were compared with the existing data from the pumping well and process chemistry to evaluate the performance of the predictions.

[1] Appelo, & Postma, *Geochemistry Groundwater and Pollution*. Balkema. 2005.