

Lithium content in deep geothermal fluids of the North German Basin and its mobility in different geological formations

**SIMONA REGENSPURG¹, ANIKA THOMAS², NINA
POGARELL³ AND JESSICA A. STAMMEIER⁴**

¹GFZ - Helmholtz Centre for Geosciences

²University Halle

³Freie Universität Berlin

⁴GFZ Helmholtz Centre for Geosciences

The co-use of geothermal fluids for heat and lithium (Li) provision becomes an increasingly attractive idea for geothermal operators and investors. This approach could be a way to fulfill both, climate goals and the implementation of the Critical Raw Material Act for Europe. The amount of Li in a brine strongly depends on the geological and geochemical conditions of a reservoir. Currently, the North German Basin (NGB) obtains some attention due to its high Li content in deep brines from Bunter and Rotliegend sandstones (up to 600 mg/L; 1). Most of these data derive from former gas wells because only few deep geothermal wells have been drilled so far in this region.

Comprehensive data and fluid samples were obtained from the about 4 km deep geothermal research well in Groß Schönebeck, where fluid analysis was carried during production tests (2011-2013). The brines produced from a Rotliegend and volcanic rocks reservoir contain up to 230 mg/L Li (2).

Lithium was measured after total digestion in 23 rock samples along the stratigraphy from the Muschelkalk to the Permo-Carboniferous volcanic rocks (well bottom). Samples that showed best results as potential reservoir rock for co-production of heat and Li were selected for leaching and sequential extraction experiments (3). The Rotliegend sandstone showed the highest Li content. Results indicate that Li is very strongly bound to all rock types, because less than 5 % can be mobilized at all. Although only little Li leaching occurred over time, data at reservoir-near conditions suggest increasing Li removal from rocks with both temperature and time.

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