

Lithium occurrences in deep brines from the Brazilian Atlantic margin

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The demand for lithium is expected to rise from 220,000 to 1.4 million tons by 2050, mainly used for batteries (87%) [1,2]. Formation water can be a rich source of lithium, and separation could be carried out directly from brines [3]. This research aims to bring preliminary knowledge about lithium concentrations in deep brines from selected sedimentary basins in Brazil. We researched (1) all brines with quantified lithium sampled in oil fields of Brazilian basins, (2) waters from intervals above and below evaporites, (3) correlations between evaporites and lithium enrichment in water, and (4) other rocks' lithium contents. The waters of Campos, Espírito Santo, Sergipe, Potiguar, and Ceara basins have contents below 100 mg/L. In Santos Basin, higher contents were first identified in waters produced together with oil and can reach up to 862 mg/L. These higher contents are peaks because subsequent samples from the same wells return to the level up to 200 mg/L. In formation waters, some maximum contents are 300 mg/L, with predominance between 60 and 200 mg/L. In the fields where water injection for enhanced oil recovery (EOR) is happening, brines are being diluted nowadays. There are some hypotheses to explain the origin of lithium: (1) hydrothermal fluids [4]; (2) residual fluids from evaporites precipitation or incongruent dissolution of salts; (3) leaching fluids from felsic rocks [5]; and (4) lithium enrichment in produced waters by the interaction of the injected water with clay levels. To understand the origin of lithium, systematic sampling of brines and analyses in all lithology types occurring in the Santos Basin pre-salt are needed. Also, it will be necessary to assess the technical and economic feasibility of lithium separation, production, and regulatory actions.

[1] IEA (2024) Global Critical Minerals Outlook, 125-135. [2] USGS (2025) Mineral Commodity Summaries, 110-111. [3] Dugamin et al. (2021) Nature Scientific Reports 11:21091. [4] Lima & De Ros (2019) Sedimentary Geology 383, 55-810. [5] Pietzsch et al. (2018) Palaeogeography, Palaeoclimatology, Palaeoecology 507, 60-80.