

Leaching Approaches for Lithium Recovery from Spodumene

Joana Almeida¹[0000-0002-1247-9341], Fátima Pedrosa¹[0000-0002-0479-822X], Maria João Plancha¹[0009-0005-3142-9779], Ana Gonçalves¹[0009-0009-4763-8750] and Carlos Nogueira¹[0000-0003-2949-5046]

¹ Laboratório Nacional de Energia e Geologia, I. P. (LNEG), Campus do Lumiar, 1649-038 Lisboa, Portugal
joana.almeida@lneg.pt

Abstract. Lithium, a critical raw material, is essential for the electrification of vehicles due to its pivotal role in battery production, thereby contributing to the decarbonisation of the transport sector. The growing environmental and supply-chain challenges associated with primary metal extraction have increased the need for alternative resources and sustainable processing methods. This study investigates the leaching behaviour of lithium from calcined spodumene, a lithium-bearing mineral, with the aim of optimising recovery under more environmentally friendly conditions. The research focuses on the assessment of the influence of key operational parameters on lithium solubilisation by water leaching, such as temperature, liquid-to-solid ratio, and reaction time. By varying these factors, the study aims to assess the conditions that maximise lithium yield while minimising resource consumption and environmental impact. The results demonstrate that almost complete lithium recovery was achieved at room temperature (24 °C), with liquid-to-solid ratios of 2–3.5 L/kg and leaching durations of 30–60 minutes, indicating that additional heating, excessive solvent, or prolonged contact time offers minimal improvement. These findings provide a route to improve resource use while lowering the carbon footprint of lithium production.

Keywords: Critical Raw Material, Lithium Leaching, Spodumene.

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