

Geochemical Characterization of K-Feldspar in Lithium-Rich Aplite-Pegmatites: Insights from the Barroso-Alvão Region, Northern Portugal

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Given the rising demand for lithium (Li) in the context of the energy transition towards electric vehicles, the identification and characterization of Li-rich aplite-pegmatites holds significant importance for sustainable resource development and the advancement of electric mobility. In the Barroso-Alvão region of northern Portugal, aplite-pegmatites enriched in Li constitute significant deposits of spodumene minerals, representing potential valuable economic resources. These igneous formations were emplaced during the Variscan Orogeny (Early Devonian to the Early Permian), and intruded Silurian metasediments. This study focused on the geochemical analysis of K-feldspar crystals collected from various aplite-pegmatites across the Barroso-Alvão aplite-pegmatite field. Using ICP-MS analysis, this research focused on the minor and trace elements of these K-feldspar crystals, offering new insights into the geological evolution of the region. The findings not only elucidate the spatial distribution of the aplite-pegmatites in relation to their Li mineralization but also provide crucial insights for differentiating between various types of aplite-pegmatites. Notably, this study establishes key chemical elements and their concentrations within K-feldspars, facilitating the characterization of the types of aplite-pegmatites in the Barroso-Alvão region: namely, Li-barren, spodumene-rich, and petalite-rich aplite-pegmatites. The implications of these results can be extended to mineral exploration, guiding future Li exploration campaigns.

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