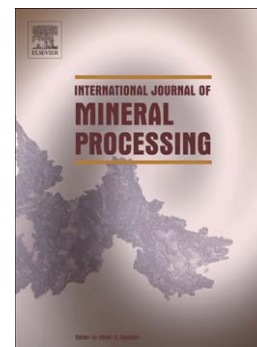


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Thermal treatment of a potassium-rich metamorphic rock in formation of soluble K forms

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ABSTRACT

Countries like Brazil, China and India are highly dependent on external reserves of soluble potassium (K) minerals for the production of K fertilizers. On the other hand, the natural occurrence of potassium-rich silicate minerals in these countries, has seldom been commercially exploited until recently. Technological strategies that can increase the reactivity of these minerals can turn them into a resource for K fertilizer production. This work aimed to investigate the changes in solubility of verdet rock (VR) after calcination with a melting agent (MA- $\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$) under varying temperatures of calcination and ratios (w/w) of MA/VR. Measurements of extractable K in water (K_{water}), X-ray diffraction (XRD) and X-ray Absorption Near Edge Structure (XANES) were performed to identify new mineral phases. The K_{water} increased up to 184-fold when the VR was calcined in the presence of MA. Optimization of calcination of VR to temperature of 850 °C and a 1.7 ratio (w w⁻¹) of MA/VR yielded K_{water} values of up to 95% of total K. Potassium K-edge XANES analysis revealed changes in the molecular environment of K due to the calcination of VR at increasing temperatures.

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