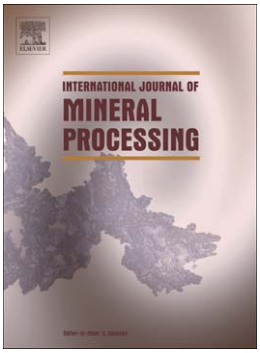

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Thermal treatment of a potassium-rich metamorphic rock in formation of soluble K forms

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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 verdete rock (VR) after calcination with a melting agent (MA- $CaCl_2.2H_2O$) 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 ^{o}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.