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Geochemical of Volcanic Rock Powder Sample from Serra Geral Formation: An Important Remineralizer

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Abstract

Geochemical and mineralogical characteristics of volcanic rock residue, from a crushing plant in the Nova Prata Mining District, State of Rio Grande do Sul (RS), Brazil, in this work named rock powder, were investigated in view to define its potential application as soil amendment in agriculture. About 52,400 m³ of mining waste are generated annually in the city of Nova Prata without a proper disposal. The nutrients potentially available to plants were evaluated through leaching laboratory tests. Nutrient leaching tests were performed in Milli-Q water; citric acid solution 1% and 2% (AC); and oxalic acid solution 1% and 5% (AO). The bulk and leachable contents of 57 elements were determined by Inductively Coupled Plasma Mass Spectrometry (ICP-MS) and Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES). Mining waste was made up by CaO, K₂O, SiO₂, Al₂O₃, Fe₂O₃, and P₂O₅. The analysis by X-ray diffraction (XRD) showed the major occurrence of quartz, Ca-plagioclase, cristobalite, sanidine, and augite. The water leachable concentrations of all elements studied were lower than 1.0 mg/kg, indicating their low solubility. Leaching tests in acidic media yield larger leachable fractions for all elements being studied are in the leachate of the AO 1%. These data demonstrates that volcanic rock powder is a potential natural fertilizer for agriculture in the Mining District of the Nova Prata, Rio Grande do Sul, Brazil.

Keywords: *mining waste, volcanic rock, particle characterization, leaching of nutrient, nutrient availability*