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PHYSICOCHEMICAL CHARACTERIZATION OF PULVERIZED PHYLLITE ROCKS TO GEOPOLYMER RESIN SYNTESIS

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Geopolymeric materials have common properties considered unique, such as: early-high compressive strength, durability, high chemical resistance to acids and sulfates attacks, ability to immobilize toxic and radioactive compounds, low porosity, low permeability, and resistance to high temperatures. Together with its environmental benefits, such as low energy consumption and low carbon dioxide emissions during production, these inorganic polymers are strategic materials for sustainable development and a good alternative to Portland cement. The main objective for introducing alternative materials is to lower the associated costs of its industrial process. Thus, the use of phyllite as the geopolymer precursor, is encouraged by its abundance, low cost, and the fact that it already is applied to the ceramic industries as kaolin substitute. This paper presents a physical characterization using TEM, SEM, XRD and XRF techniques of two pulverized phyllite rocks used as geopolymer precursors for refractory applications. It was found that both phyllite rocks studied have a high quartz content of approximately 50% that can be explored as “filler” function in the microstructure, which stabilizes residual tensions after curing. Kaolinite and muscovite minerals are present up to 40% and are responsible for the high strengths in the geopolymer resins, as determined by compressive strength tests.