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Physico-Chemical Properties of Geopolymers Based on Metakaolin with The Addition of Organic Phase PVA

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Recently, there has been a growing interest in mixing two different systems, organic and inorganic, which would contribute to some improved properties, such as adjustment time, reduced shrinkage, improved mechanical properties and durability. A new class of geopolymer composites with an organic matrix has been developed with the main goal of improving the fire resistance of organic polymers and reducing the production of smoke resulting from their combustion, as well as improving mechanical properties.

For the synthesis of hybrid geopolymer materials, metakaolin with the addition of organic phase poly (vinyl alcohol) (PVA) was used as the starting material. For the synthesis of alkaline activator, a solution of NaOH with a molarity of 12 mol / dm3 was used. The chemical composition of the samples was determined by XRF analysis. Structural and phase characterization of hybrid and reference materials were analyzed using X-ray diffraction (XRD) and Fourier-transform infrared spectroscopy (FTIR), which revealed new phases in the PVA-added samples. The results show that the content of added PVA in the reaction mixture affects the phase composition of the synthesized materials. The morphology was analyzed using a scanning electron microscope with energy dispersive spectroscopy (SEM/EDS), where efflorescence was observed and identified. After characterizing the geopolymer with the addition of PVA, we obtained a material that is far more porous than the basic sample, and we can conclude that we have synthesized a material that shows good mechanical properties.

Keywords: metakaolin, geopolymer materials, organic polymer, organic phase, PVA