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Abstract

Microstructure of cured mixes composed of kaolinitic-illitic raw clay calcined at 700°C and sodium hydroxide (4-14 M) was investigated using X-ray diffraction, Fourier-transform infrared spectroscopy, Scanning electron microscopy and Thermal analysis. The change of the properties (flexural strength, density, water absorption, open porosity and electrical conductivity) versus NaOH concentration was evaluated and the possible formation of zeolite ZK-14 within the geopolymer matrix from the amorphous clay phases (mainly metakaolinite) was examined. Sodium carbonate was detected as a carbonation product. Due to heating, geopolymers were characterized by dehydration and subsequent recrystallization into nepheline. The development of the fibrous-zeolitic phase was favored by the increase of NaOH concentration and its impact on the studied properties was somewhat advantageous. The rise of alkali concentration within 4-11.5 M enhanced the extent of geopolymerization. The water absorption kinetic obeyed a pseudo-first order equation and the constant was in the range $(18.38\text{--}51.01) \times 10^{-2} \text{ min}^{-1}$.

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