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Study of the Effect of Siliceous Species in the Formation of a Geopolymer Binder: Understanding the Reaction Mechanisms among the Binder, Wood, and Earth Brick

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Abstract

In building construction, geopolymer binder or mortar can interact with the structural materials and thus modify the binder formation mechanisms. In a geopolymer binder, the availability and amount of siliceous species is a preponderant parameter influencing the nature of networks formed after consolidation. In this study, the interactions between the binder and structural materials (wood and earth bricks) were investigated by ²⁹Si magic angle spinning nuclear magnetic resonance (MAS NMR) and Fourier transform infrared spectroscopy (FTIR) during and after the consolidation. Then, the effect of the amount and nature of the siliceous species available in the reaction medium were analyzed. According to the siliceous species available, it is possible to form different types of materials (hardening or sedimented materials). By corroborating these results with MAS NMR and FTIR analyses, a formation scheme of the binder in contact with the materials was proposed.