

Development of green building materials through alkali activation of industrial wastes and by-products.

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ABSTRACT

The scope of the present study is to propose an effective methodology for the experimental design and development of geopolymeric products that can satisfy a wide range of end-user requirements. The methodology involves the application of a multifactorial experimental design model through the Taguchi approach. This approach allows the investigation of the combining effect of selected parameters in the response of the experimental system by conducting the minimum number of experiments and, therefore, significantly reduces the time and the cost of the whole process. Results showed that the use of various raw materials and additives, as well as the controlled variance of synthesis parameters and manufacturing conditions leads to production of geopolymers with a broad range of final properties. This approach was applied for the development of geopolymers with compressive strength, density and thermal conductivity in the range 2-55 MPa, 0.6-2.0 g/cm³ and 0.09-0.40 W/mK, respectively.

Key Words: Industrial wastes, by-products; Alkali activation; Experimental design; Taguchi