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Alkali-activation of aluminosilicate materials on geopolymerization

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Alkali-activation of aluminosilicate materials on geopolymerization

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Abstract

Alkaline activation of aluminosilicate materials is a fundamental step in the geopolymer manufacturing process. Alkaline activators are used to accelerate the dissolution of the aluminosilicate source and the formation of aluminosilicate gels (initiating the geopolymerization reaction). Commonly used alkaline activators are sodium or potassium hydroxide. Depending on the nature of the raw material used, amorphous substances (gels) may be formed. Several variables influence the alkaline activation process: the type and composition of the raw materials, the nature and concentration of the activator, the temperature and the curing time. When the aluminosilicate raw material comes into contact with the alkaline solution, an amorphous to semi-crystalline matrix (geopolymer) is formed through a chemical process known as geopolymerization. The transformation of a solid aluminosilicate source into a geopolymer matrix can be summarized in three steps: dissolution of the amorphous aluminosilicate source in the alkaline solution creates a supersaturated solution of SiO2 and Al2O3. This is followed by the formation of large networks by polycondensation and the increase of the gel network. The result is a three-dimensional geopolymer matrix with good mechanical strength, high resistance to chemical attack and resistance to high temperatures.

Keywords: alkaline activation, geopolymerization, aluminosilicate materials, geopolymer.

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