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Different types of activation of supplementary cementing materials

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Abstract:

Geopolymers belong to the aluminosilicate family, essentially composed of a raw material that may be natural, a co-product or an industrial by-product such as blast-furnace slag, fly ash and metakaolin, or another material that essentially contains silica (SiO_2) and alumina (Al_2O_3) and an alkaline solution. The use of geopolymers as cementitious materials is currently growing due to their excellent properties and efficiencies, such as low CO_2 emission, high compressive strength, low permeability, enhanced durability, thermal resistance and excellent stability in acidic and alkaline environments. Geopolymers are obtained by alkaline activation, often based on sodium or potassium silicate. Many studies have shown that aluminosilicate materials are activated depending on the type of material used .Alkali-activated mortars were found to have higher compressive strength than cement mortars. Alkali-activated materials represent one of the alternatives available that could replace PC in terms of economy, ecology, mechanical performance and durability. Heat treatment has an influence on the reactivity of materials, and studies show that mortars based on uncalcined (raw) materials give lower strengths than control mortars based on 100% cement. Calcination changes the structure of the material to become amorphous, which improves the compressive strength of mortars, so thermal analysis has a positive influence on the compressive strength of mortars. The mechanical activation of materials containing a percentage of silica and/or alumina consists in increasing grain fineness (specific surface area) through advanced grinding. Heat treatment of raw materials shows significant effects on the mechanical behavior of synthesis product were this later enhance mechanical strength, But it considering more expensive then mechanical activation which more economical. However chemical activation has an interesting effect on the development of compressive strength, but is expensive and difficult to process in an aggressive environment.

keywords: Geopolymers, supplementary cementing materials ,mechanicals strength , types of activation