

Using High Temperature for Improve Compressive Strength of Ordinary Portland Cement Paste (OPC) – A New Approach

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ABSTRACT

Cement paste was replaced with kaolin-bentonite. The specimens were exposed to elevated temperature for 3 hours in a ceramic furnace and cooled down to room temperature. After cooling, the effect of kaolin-bentonite (particles sized of $< 45\mu\text{m}$) on hydration, rehydration, surface roughness and compressive strength of ordinary Portland cement (OPC) paste were investigated. Atomic Force Microscopy (AFM) was used to study surface roughness of OPC paste-additive mixture. The application of fire on OPC paste was analyzed. The results showed imposed heat (500 oC for 3 hours) accelerates the hydration process of OPC, and reduces setting time. Increased heat to 1000 oC, leads to zero compressive strength of specimens, the compressive strength of OPC continuously reduces after specimen has fully cooled down. A method for recovery of compressive strength of OPC after offing fire has been suggested. The method of offing fire has important effects on the compressive strength of concrete. The best results for specimen content are cement-kaolin-bentonite paste, exposure to 500 o C, after 90 days of curing, and cooling down in water. In this case the compressive strength has been increased around 60 % compared to not using additive and not exposing to heat.

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