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Performance of granite dust as filler in ordinary portland cement

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Granite dust, a waste from stone crushing accounts for 25% of the final product from stone quarrying in Ghana. In the absence of alternative uses, granite dust which is released directly into the environment has a high tendency of causing environmental pollution. To reduce the impact of the quarry dust on environment and humans, granite dust could be put to alternative uses such as admixture in the production of Portland cement. In this work the physical, chemical, mineralogical, mechanical and durability properties of Portland cement containing varying quantities of granite dust are evaluated. The experimental results indicate that the chemical compositions of all the cement samples are within acceptable limits according to EN 197-1. The raw granite dust also passed the standard chemical composition requirements for pozzolans prescribed by ASTM C 618. Water demand, setting times and soundness of the blended cements containing 5-25% of granite dust were all within acceptable limits per EN 197-1. Compressive strength results indicate that granite dust could be used to replace ordinary Portland cement up to an optimum of 15% for class 32.5 cement. Durability studies after 90 days proved that even though strength decreased as granite dust content increased, the cement samples containing granite dust are stable and can withstand aggressive environments (in terms of percentage strength reduction) comparable to Class 42.5N cement.

Key words: Granite dust, Ordinary Portland cement, Pozzolans, Soundness, setting times, Mineralogical, Durability.

Biography

Dr. Eugene Atiemo is a Chief Research Scientist and Director of CSIR-Building and Road Research Institute, Ghana. He holds a Ph.D in Civil Engineering and M.Phil in chemical Engineering from Kwame Nkrumah University of Science and Technology, Ghana. He is a member of Ghana Institution of Engineers.

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