

Influence of Pulverized Granite on the Mechanical and Durability Properties of Concrete

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Abstract : The use of mineral admixtures such as metakaolin, GGBS, fly ash, etc., in concrete is a common practice in the world. However, the only admixture available for use in the Ghanaian construction industry is calcined clay pozzolan. This research, therefore, studies the alternate use of granite dust, a by-product from stone quarrying, as a mineral admixture in concrete. Granite dust, which is usually damped as waste or as an erosion control material, was collected and pulverized to about 75µm. Some physical, chemical, and mineralogical tests were conducted on the granite dust. 5%-25% ordinary Portland cement of Class 42.5N was replaced with granite dust which was used as the main binder in the preparation of 150mm×150mm×150mm concrete cubes according to methods prescribed by BS EN 12390-2:2000. Properties such as workability, compressive strength, flexural strength, water absorption, and durability were determined. Compressive and flexural strength results indicate that granite dust could be used to replace ordinary Portland cement up to an optimum of 15% to achieve C25. Water permeability increased as the granite dust admixture content increased from 5% - 25%. Durability studies after 90 days proved that even though strength decreased as granite dust content increased, the concrete containing granite dust had better resistance to sulphate attack comparable to the reference cement. Pulverized granite can be used to partially replace ordinary Portland cement in concrete.

Keywords : admixture, granite dust, permeability, pozzolans

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