

An Experimental Study on Properties of High-Volume Slag and Fly Ash Cements Incorporating Calcined Oyster Shells Waste

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Abstract: Concrete construction industry is facing a sustainability issue for a variety of reasons. First, it consumes enormous amounts of natural resources. Second, the primary content in the binder of concrete is Portland cement, which production is one of the major sources of greenhouse gas emissions leading to global warming. Third, durability concerns of concrete structures. To overcome these issues cement is substituted with high volumes of more sustainable cementitious materials such as slag and fly ash. Slag is a by-product of an iron blast furnace while fly ash is a by-product of coal-fired power plants. Both these supplementary cementitious materials have gain popularity as partial replacement of cement as they positively affect some engineering properties of concrete as well as reduce the environmental burden of concrete. However, strength development of high volume fly ash concrete is slower than the conventional concrete without fly ash. Oyster shell, on the other hand, a by-product of shellfish farms contains a high amount of calcium carbonate. The disposal of waste oyster shell is of huge environmental concern as waste dumping in coastal areas has destroyed the surrounding environment. Therefore, the necessity to develop durable concrete and recycle the waste oyster shell, an experimental study is conducted to determine the feasibility of these additions on strength properties of concrete that combine both supplementary cementitious materials and calcined oyster shells waste based on their chemical and mechanical properties.

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