

Development of Novel Bricks Using Ceramic Waste

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The major ceramic waste found in the ceramic industry is called filter cake. This is a semi-solid material and mainly generated during the processes of tile glazing and shaping. It is estimated that 15 to 30% waste is produced from the total raw materials used. However, there are no popular methods to reuse this waste. Therefore we study and develop novel bricks using above ceramic waste. Different types of proto type brick samples were fabricated using pure filter cake and also mixing shaping waste, kiln roller waste, rice husk, red clay and cement into the filter cake. The mechanical properties of the samples were carried out using Universal Tensile Machine (UTM). The density, water absorption and pH of different samples were also obtained during this study. The results showed that red clay incorporated samples have high mechanical properties and very low water absorption compared to pure filter cake, pure red clay, and other investigated mixtures. However, the density of red clay incorporated filter cake mixture is higher compared to pure filter cake. The chemical composition of the filter cake and red clay was obtained using XRF analysis in order to determine the major elements present in these two materials. Our analysis showed that filter cake consists of SiO₂ (55.83%), Al₂O₃ (17.41%), and CaO (7.72%) whereas red clay consists of SiO₂ (60.67%), Al₂O₃ (15.18%), and Fe₂O₃ (7.61%) as major compounds. These values clearly indicate both filter cake and red clay have quit similar chemical compositions and can be obtained as homogenous mixtures. Therefore, addition of red clay into ceramic waste and develop novel bricks would be a very good solution compared to using ceramic waste alone, to reuse the ceramic waste in Sri Lankan ceramic industry. Also, high abundance of red clay in Sri Lanka will lower the production cost.

Keywords: Ceramic waste, Filter cake, Red clay, Mechanical properties, XRF analysis