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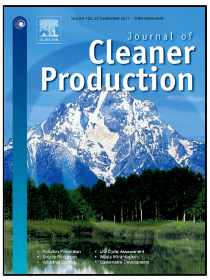

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ABSTRACT

The use of recycled concrete aggregates from rubble and demolition waste in combination with cementitious additions in concrete has several practical, ecological and economic advantages by reducing carbon dioxide emissions, reducing the excessive consumption of natural resources and contributes to a cleaner production of concrete. In this paper, rheological, mechanical and durability properties of self-compacting concrete (SCC) using recycled concrete aggregates and natural pozzolan (PZ) are evaluated. Four concrete mixes were manufactured, by varying the level of substitution by weight of both coarse and fine natural aggregates by fine and coarse recycled aggregates. The substitution levels were fixed at 0%, 50%, 75% and 100%. The cement was also partially replaced by weight from 5% to 25% by natural pozzolan. The performance at the fresh state of SCC was discussed using the following tests (slump test, J-Ring, flow time test V-funnel, L-Box and sieve stability tests). Compressive strength was measured at the ages of 7, 28, 56, 90 and 120 days. Considering the importance of studying the durability of SCC in aggressive environments, the behavior of chloride ions diffusion was analyzed using the Fick's second law and the loss in mass after immersion in sulfuric acid(H2SO4 was also investigated). The results indicate the possibility of using 50% recycled coarse and fine aggregates for performing self-compacting concrete. The NSCC and RSCC mixtures containing PZ develop a comparable compressive strength to mixtures without PZ at 120 days. The incorporation of 15% and 20% PZ in NSCC and RSCC decreased the penetration depth of chloride ions to 50% and also decreased the mass loss under sulfuric acid attack.

Keywords: *Self compacting concrete (SCC), Recycled concrete aggregates, Natural pozzolan, Rheology, Mechanical properties, Durability.*

1. INTRODUCTION

A large quantity of waste materials from construction and buildings demolition sites is generated all around the world [1]. The removal and disposal of these wastes cause significant environmental problems as disposal sites are lacking especially around big cities. The recycling and reuse of concrete wastes as aggregates are of great importance to the environment protection because, it can minimize the environmental pollution and protect the nature by reducing the use of natural aggregates resources.