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Research Article

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Rice Husk Ash for Enhancing Salts Attack Resistance of Blended Cement Containing Metakoalin

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Abstract: The effects of addition rice husk ash on the mechanical properties of blended cement containing metakaolin have been investigated experimentally as well as sulphate and chloride resistance of these blends. The influence of aggressive media such as 5% $MgSO_4$ and 5% $MgCl_2$ on the mechanical properties of the prepared pozzolanic cement pastes was studied. The pastes were made from ordinary Portland cement containing 25 wt % metakaolin with partial replacement of metakaolin by different ratios (0, 5, 10, 15 and 20 wt %) of rice husk ash. All cement pastes immersed in tap water for 28 days (zero time) then immersed in aggressive media for 1, 3, 6, 9 and 12 months. The mechanical properties were measured by determination of the compressive strength. Total sulphate and chloride contents at each curing time in the aggressive mediums up to one year as well as their physico-chemical properties were monitored periodically and analyzed by XRD, DTA and visual inspection. The results showed that, the partial replacement of metakaolin by 10 wt % rice husk ash improves the resistance of hardened cement pastes against 5% $MgSO_4$ attack. Whereas 15 wt % rice husk ash improves the resistance against 5% $MgCl_2$ attack.

Keywords: Rice Husk Ash; Metakaolin; Blended Cement; Salt Attack

1. INTRODUCTION

Recently, there has been a high interest in using metakaolin (MK) as a supplementary cementitious material [1-3]. MK is an ultra fine pozzolana, which consists predominantly of silica and alumina can produced by calcining kaolin at temperatures between 700 and 900 °C. MK has high ability to increase the concrete strength especially during the early ages of hydration [4, 5]. This is due to filling the space between cement particles, acceleration of cement hydration and pozzolanic reaction of MK. This is similar to silica fume effect. Although the pore volume slightly increases in pastes containing MK, the pore structure of paste, is found to be refined [6]. As a result of the reaction between protland cement (PC) hydration product and MK, the portlandite content in MK paste and mortar is reduced. Therefore,