

Abstract

Reuse of Rice Husk Ash as an Alkaline Activator in the Manufacture of Alkaline Cements [†]

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The cement industry is a highly polluting industry, where natural resources (quarries) are exploited and a large amount of polluting gases are emitted into the atmosphere. Alternative materials for Portland Cement include those derived from the alkaline activation of aluminosilicates, either as natural products (clays) or as industrial by-products, where after activation of these materials with alkaline solutions, different conglomerates are obtained. The alkaline activators used are strongly alkaline solutions (NaOH and alkaline silicate hydrates). Alkaline hydrated silicate, also known as waterglass, is the one that provides the best mechanical and durable best mechanical performance and durability in these alkaline systems. However, there is a major problem in the production of this activator, since it is a synthetic material obtained through very costly and highly polluting processes, as it requires temperatures of over 1300 °C, emitting large quantities of CO₂ into the atmosphere. The purpose of this work was to investigate the possibility of synthesizing sodium waterglass from rice husk ash (RHA) and used as an activator to produce electric arc furnaces (EAF) based alkali activated cements. Commercial sodium silicate/NaOH solution was used as alkaline activator as control specimens. The effects of the ratio RHA/NaOH solution used for the synthesis of sodium waterglass on the formation of alkali activated cements have been studied using infrared spectroscopy, X-ray diffraction (XRD), scanning electron microscope (SEM) coupled with energy dispersive X-ray spectroscopy (EDS), physical, mechanical and thermal properties. The results showed that materials activated with RHA reached higher compressive strengths than those activated with commercial sodium silicate. The study confirms the possibility of using rice husk ash as an alternative activator in the production of alkali activated cements.

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