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Analysis by means of surface response to chemical composition and pozzolanic reactivity of ultrafine treated rice husk ash (UFTRHA) as cementing additive material (Article)

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Abstract

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Pozzolanic reactive material is considered as one of the most essential characteristic of cementing additive material in concrete technology application. Normally, the reactive material contains abundant silica that enhances concrete strength activity. Undeniably, it is proven that rice husk ash (RHA) possesses large quantity of silica that induces the pozzolanic reaction in concrete. Nevertheless, usage of conventional RHA is still widely accepted in concrete industry nowadays. One of the setback of conventional RHA incorporation is simply because of its properties inconsistency. Therefore, enhancement on the RHA properties by introduction of a specific pretreatment prior to incineration process is expected to provide an alternative way in order to produce highly reactive cementing additive material from locally available agricultural by-product, the rice husk. In this paper, a total number of 30 experimental set points was conducted. Statistical analysis was conducted for four independent variables and two responses using Response Surface Method (RSM). The analysis was completed using a commercial software set (Design-Expert) for experimental design and analysis. The independent variables were HCl concentration, soaking time, burning temperature and soaking temperature. Meanwhile, the responses investigated in this study were including cumulative pozzolan percentage and electric conductivity decrement from 0 to 2 minutes. As for the statistical analysis of the data for response 1, the cumulative pozzolan percentage calculated from the model was in-line with the experimental data, with R-squared value of 0.9565. Hence, the result validates the precision of the model. On the other hand, the R-squared value for response 2 which is the EC decrement from 0 - 2 Minutes, it shows that the model was in agreement to the experimental values at 0.9342. Thus, it is again justifies the model accuracy. © 2018 Authors.

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