

Kinetic study of the hydrothermal reaction between lime and rice-husk-ash silica

Abstract

The paper describes a study of the reaction between lime and amorphous silica obtained from rice-husk (93-94% SiO₂) under hydrothermal conditions, in the range 80-140°C. The progress of the reaction, conducted in stainless steel bombs was followed by analysing unreacted lime. It was observed that the reaction follows two-stage progress pattern similar to the one reported earlier for lime-quartz hydrothermal reactions. X-ray diffractometry and DTA on the reaction products of both stage 1 and stage 2 indicated the formation of CSH (1), calcium-silicate-mono-hydrate in both the stages. An earlier model by Bezjak and coworkers developed for two-stage transformation observed in lime-quartz hydrothermal reaction was examined for a possible application to the data from the present work. Calculations were made following the general assumptions of the model, which could be applied satisfactorily to the first stage, but not the second stage, possibly because of the relatively more rapid reaction between lime and amorphous silica in the first-stage, creating sluggishness in the second stage.

Keywords — Rice husk ash, hydrothermal reactions, lime--reaction kinetics, concrete aggregates.