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Effect of curing time on granulated blast-furnace slag cement mortars carbonation

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Currently, ground granulated blast-furnace slag cements use in cement-based materials is being increasing because perform well in marine and other aggressive environments. However, mortars and concretes made of this type of cement exhibit high carbonation rates, particularly in badly cured cement-based materials and when high blast-furnace slag contents are used. Concrete reinforcement remains passive but can be corroded if the pore solution pH drops as a result of the carbonation process promoting the reinforced concrete structure failure during its service life. Results show the very sensitive response to wet-curing time of slag mortars with regard to the natural carbonation resistance. Then, a minimum period of 3-7 days of wet curing is required in order to guarantee the usual projected service life in reinforced concrete structures. In this work, estimation models of carbonation depth and carbon dioxide diffusion coefficient in ground granulated blast-furnace slag mortars as a function of the curing period and the amount of ground granulated blast-furnace slag are proposed. This information will be useful to material and civil engineers in designing cement-based materials and planning the required curing time depending on their ground granulated blast-furnace slag content.

Keywords: Ground granulated blast-furnace slag; Cement; Durability; Carbonation testing; Carbon dioxide.

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