

Synthesis of Hydrogarnet from Blast Furnace Slag Using Alkali Fusion for HCl Gas Removal

Takaaki WAJIMA*

* Department of Urban Environment Systems, Graduate School of Engineering,
Chiba University, 1-33, Yayoi-cho, Inage-ku, Chiba 263-8522, Japan
E-mail : wajima@tu.chiba-u.ac.jp

Blast furnace (BF) slag, one of the by-products of iron- and steel-making plants, was converted into the product including hydrogarnet using the alkali fusion method for HCl gas removal. The slag with diameters of less than 2 mm was transformed into the alkali-fused slag with reactive phases via alkali fusion using sodium hydroxide at 600°C for 6 h, after which the fused slag was added to distilled water and stirred at room temperature to prepare the precursor to synthesize the product including a hydrogarnet by heating at 80-160°C. The product could remove HCl gas at high temperature (800°C), and Cl fixation in the product follows the pseudo-first-order kinetics model rather than the pseudo-second-order kinetics model. These results suggest that a novel product able to remove HCl gas at high temperature can be synthesized from BF slag via alkali fusion.

Keywords : Blast furnace slag; Alkali fusion; Hydrogarnet; HCl gas removal