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Calcification–carbonation method for red mud processing

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ABSTRACT

Red mud, the Bayer process residue, is generated from alumina industry and causes environmental problem. In this paper, a novel calcification–carbonation method that utilized a large amount of the Bayer process residue is proposed. Using this method, the red mud was calcified with lime to transform the silicon phase into hydrogarnet, and the alkali in red mud was recovered. Then, the resulting hydrogarnet was decomposed by CO_2 carbonation, affording calcium silicate, calcium carbonate, and aluminum hydroxide. Alumina was recovered using an alkaline solution at a low temperature. The effects of the new process were analyzed by thermodynamics analysis and experiments. The extraction efficiency of the alumina and soda obtained from the red mud reached 49.4% and 96.8%, respectively. The new red mud with