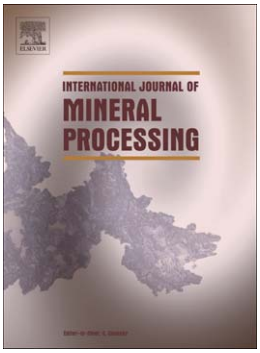

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Iron recovery from the leached solution of red mud through the application of oxalic acid

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Abstract

The recovery of iron from the leached solution of red mud with oxalic acid was studied. It was found that the iron in the $Fe(C_2O_4)_3^{3-}$ formed in the leached solution of red mud with oxalic acid can be effectively separated and recovered by co-precipitation, selective dissolution and re-precipitation. The iron in the leached solution was first precipitated with oxalic acid to form the precipitate containing $CaC_2O_4 \cdot 2H_2O$ and $Fe(OH)_3$ by adjusting the pH to about 3.5 with $CaCO_3$. Then the $Fe(OH)_3$ was selectively dissolved from the precipitate in the solution containing 1 mol/L HCl and 200g/L $CaCl_2$ with L/S ratio 4:1 ml/g at room temperature. After filtration, the iron was re-precipitated from the dissolved solution by adjusting the pH to 3.0-4.0 with $CaCO_3$ at 80°C under stirring. The product of Fe_2O_3 with the purity 98.44% was obtained by adjusting the dissolved solution pH to 3.52 and filtering the precipitate from it, and then calcining the cake at 750°C for 3 h. By adding concentrated hydrochloric acid into the filtrate to adjust its acidity to 1 mol/L HCl, a part of $CaCl_2$ was crystallized from it, and the saturated solution of HCl-$CaCl_2$ was obtained, which was reused in the selective dissolution. The $CaC_2O_4 \cdot 2H_2O$ remained in the dissolved residue was completely changed into $CaSO_4 \cdot 2H_2O$ and $H_2C_2O_4$ in 3 mol/L H_2SO_4 with L/S ratio 5:1 ml/g at 60°C stirring for 20 min. By filtering the supernatant immediately, the product of $CaSO_4 \cdot 2H_2O$ with the purity 99.31% was obtained after washing the cake with dilute sulfuric acid and distilled water, and then the crystal of $H_2C_2O_4 \cdot 2H_2O$ was formed by cooling the filtrate at room temperature.

Key words: Red mud; Iron; Oxalic acid; Leaching; Co-precipitation; Selective dissolution

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