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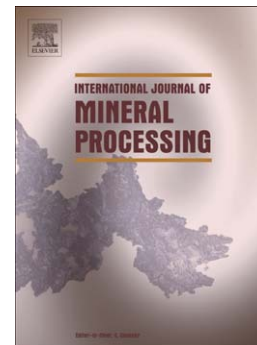
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## Iron recovery from the leached solution of red mud through the application of oxalic acid

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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  $\text{Fe}(\text{C}_2\text{O}_4)_3^{3-}$  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  $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  and  $\text{Fe}(\text{OH})_3$  by adjusting the pH to about 3.5 with  $\text{CaCO}_3$ . Then the  $\text{Fe}(\text{OH})_3$  was selectively dissolved from the precipitate in the solution containing 1 mol/L HCl and 200g/L  $\text{CaCl}_2$  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  $\text{CaCO}_3$  at 80°C under stirring. The product of  $\text{Fe}_2\text{O}_3$  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  $\text{CaCl}_2$  was crystallized from it, and the saturated solution of HCl- $\text{CaCl}_2$  was obtained, which was reused in the selective dissolution. The  $\text{CaC}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  remained in the dissolved residue was completely changed into  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  and  $\text{H}_2\text{C}_2\text{O}_4$  in 3 mol/L  $\text{H}_2\text{SO}_4$  with L/S ratio 5:1 ml/g at 60°C stirring for 20 min. By filtering the supernatant immediately, the product of  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$  with the purity 99.31% was obtained after washing the cake with dilute sulfuric acid and distilled water, and then the crystal of  $\text{H}_2\text{C}_2\text{O}_4 \cdot 2\text{H}_2\text{O}$  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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