Phosphate removal of acid wastewater from high-phosphate hematite pickling process by in-situ self-formed dynamic membrane technology

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ABSTRACT

Phosphate removal from pickling milling wastewater of high-phosphate hematite mineral by in-situ self-formed dynamic membrane reactor (DMR) developed with raw and activated red mud (RM-raw and RM-a) was studied in this paper. The results indicated that RM dosage, velocity gradient of the mixer (G value), reaction time (t), and pH were main effects on phosphate removal. The pH of the actual mineral processing wastewater is 2.50~2.53 while the phosphate concentration is 98.85 mg/l. After the treatment, the removal rate of phosphorus with RM-raw and RM-a can reach 94.33% and 99.72%, respectively, with the dosage of 23.00 g/l and 20.00 g/l, respectively. Correspondly, effluent pH was respectively 8.12 and 3.06, and both turbidity could reach the effluent requirement. Brush cleaning was a very effective cleaning method, and the membrane flux of DMR could be restored. Also, it demonstrated that acid reuse from the phosphate-contained acidic wastewater from wastewater produced in high-phosphate hematite pickling process could be achieved by in-situ self-formed dynamic membrane technology.

Keywords: Acidic regeneration; Activation; Dynamic membrane reactor; Mineral processing wastewater; Phosphate removal; Red mud

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