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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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