

Electrochemical synthesis of ferrate(VI): optimization of parameters and evaluation of their impact in production cost

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Received 5 April 2017; Accepted 26 March 2018

ABSTRACT

Ferrates have attracted considerable research in the last few decades because their activity is not associated with toxic byproducts. This research investigated the effect of three factors on ferrate (VI) synthesis using an electrochemical reactor: electrolyte concentration, current density, electrode effective surface: electrolyte volume ratio (S/V ratio). The results of ferrate(VI) production using two different membranes were compared. Electrolyte concentration had the greatest effect on ferrate(VI) production. Ferrate(VI) concentration of 250 mmol dm⁻³ was achieved using 20 mol dm⁻³ of NaOH electrolyte, current density of 80 Am⁻², and 2.21 S/V_{An} during five hours of electrolysis. A cost analysis of the consumable components such as the electrolyte, electric energy, and dissolved iron demonstrated that the electrolyte concentration had the greatest influence.

Keywords: Ferrate(VI); Electrochemical reactor; Membrane; Production cost; S/V ratio

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