Wastewater recovery by ultrafiltration and electrodialysis in the integrated citric acid-methane production process

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The integrated citric acid-methane production process was developed in previous study to recycle wastewater in citric acid industry. This paper investigated the technical feasibility of wastewater recovery by ultrafiltration and electrodialysis in the integrated process. Treated with coagulation, flocculation and ultrafiltration (200 kD), the turbidity of anaerobic digestion effluent was below 1 NTU. The optimized conditions of electrodialysis operations were applied voltage of 10 V, flow velocity of 2.16 cm/s and concentrate to diluate stream of volume ratio of 1:4. The concentration of Na\(^+\) and ammonium in diluate of electrodialysis were 46 mg/L and 36 mg/L, respectively. The pH of concentration in electrodialysis was adjusted to 6.5 by HCl and the scale of CaCO\(_3\) was eliminated. Citric acid production with treated anaerobic digestion effluent was comparable to production with deionized water. The experiment further improved the technical feasibility of cleaner production with integrated citric acid-methane production process.

Keywords: Citric acid; Anaerobic digestion; Ultrafiltration; Electrodialysis

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