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Electrodialytic separation of bio-based volatile fatty acids (C2-C6)

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Volatile fatty acids (VFAs) produced during the bioconversion of organic substrates (such as biowaste) have attracted increasing attention due to their broad applicability as platform chemicals, precursors for bio-based products, and intermediates in circular biorefinery concepts. However, their efficient recovery from complex fermentation broths are still challenging and limited. Electrodialysis (ED) represents a promising separation technology for this purpose, as it enables the selective transport and concentration of ionizable components under an applied electric field. In this study, real fermentation effluents were treated using an electrodialysis system to investigate the separation kinetic and recovery of organic acids. The energy consumptions were between 0.26-0.32 kwh/kg VFA, and the product recovery values regarding the short-chain acids (C2-C4) were between 80-95%. These findings support the potential application of electrodialysis as a downstream processing step in VFA-based bioconversion and waste valorisation systems.