Scale-Up of Volatile Fatty Acids Recovery via Stripping

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This study explores the sustainable valorization of digestate by recovering volatile fatty acids (VFAs)—specifically acetic, propionic, butyric, and valeric acids—via gas stripping from anaerobic digestion effluents. Laboratory experiments, combined with Aspen Plus® simulations, showed that reaching recovery efficiencies of up to 99% and reducing the volume of effluent requiring treatment is possible. Given the growing industrial demand for VFAs, the process shows strong application potential.

A preliminary safety assessment was also conducted using an inherent safety approach for the conceptual design phase, applying the Graphical Inherent Safety Assessment Technique to evaluate flammability, explosiveness, and toxicity. The analysis of the scaled-up process showed low intrinsic risk in the gas stripping and absorption section and a higher level of risk for the downstream operations that include reverse osmosis and distillation units. These findings represent a key step toward industrial implementation, combining environmental and economic advantages.

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