Anaerobic Digestion of Food-Processing Industrial Wastes: A Scale-up Evaluation

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Abstract

Anaerobic digestion (AD) presents a promising solution for the management of food-processing industrial wastes, ofering both environmental and economic benefts through the production of renewable energy and organic fertilizers. However, the successful scale-up of AD systems from laboratory to industrial scales remains a signifcant challenge, requiring careful evaluation of process parameters, reactor design, and operational strategies. This article reviews the scale-up considerations and challenges associated with the AD of food-processing wastes, focusing on substrate characteristics, reactor confgurations, mixing mechanisms, and biogas production kinetics. Case studies and experimental data from pilot-scale and full-scale AD facilities are analyzed to assess the scalability and performance of AD systems under real-world conditions. Furthermore, techno-economic analysis and environmental impact assessments are discussed to evaluate the feasibility and sustainability of large-scale AD implementations. The integration of pre-treatment technologies, process optimization strategies, and co-digestion opportunities is explored to enhance biogas yields, substrate utilization efciency, and overall process robustness. By synthesizing insights from research studies and industrial experiences, this article aims to provide valuable guidance for stakeholders involved in the

Characterization of food-processing wastes:

[illegible]

Pre-treatment of substrates:

[illegible]

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Conclusion

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Con ict of Interest

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