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Sustainable downstream routes for bio-manufacturing processes

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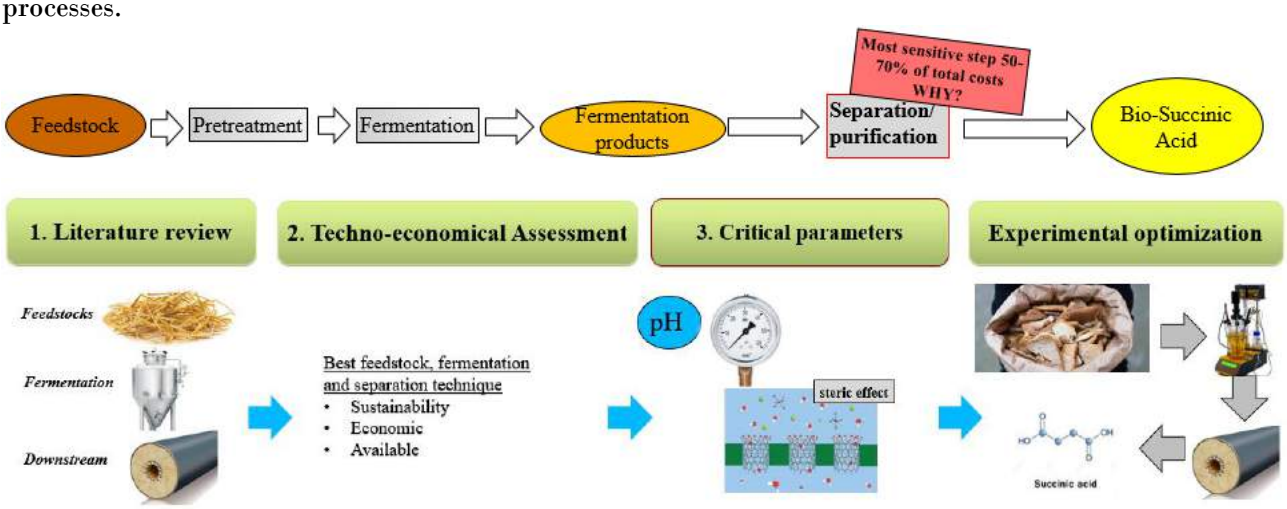
Biorefinery is a promising concept that can contribute overcoming the petrol-era, especially with respect to sustainable fine chemical production, addressing at the same time several problems: the depletion of petroleum resources (with the associated consequences), human sustainability, waste management and political concerns [1,2]. Production and separation of valuable products from biomass have indeed been successfully achieved and implemented at full scale[3]. However, the lack of cost-effective downstream processes is largely preventing biorefinery products to become economically competitive, and membranes are one of the fundamental technologies for separation of fermentation products such as succinic acid[4] (SA). Therefore, key factors such as pH, pressure, steric effect etc. in downstream processes must be identified for a technological breakthrough. Data collection about different feedstocks, fermentation and downstream techniques for bio-SA production will highlight the most relevant for large-scale application. These, will be then study trough a techno-economical analysis, which will be focused on membrane separation techniques. Thus, a computer-aided framework will be used to assess and rank the critical parameters in downstream technologies, which will be subsequently tested trough an experimental validation of bio-SA production. The interest for bio-SA production have been constantly increasing[3,5], since more than 30 commercially valuable products can be currently synthetized from it, including solvents and lubricants, synthetic resins and biodegradable polymers such as PBS and polyamides, cosmetics, food and pharmaceuticals [3,5]. Finally, a defined and interactive operation range for each studied variable is intended to be provided, which can be virtually extrapolated to other similar separation processes. The feasibility of potential alternatives will be evaluated experimentally on other similar processes.



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