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Optimized Process of Lactic Acid Production from Food Waste

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Abstract

The society is facing tremendous challenges due to the extensive use of petrol based plastics. At the same time, a huge amount of environmentally harmful waste is produced (Jambeck et al., 2015) and, special treatment is required to eliminate their negative effect. Food waste in particular, adds to 1.4 billion tons per year. Apart from prevention and reduction through education and policy, advanced technology plays a crucial role in facilitating food waste management and recycling. In the past decades, many research groups have described the conversion of different kinds of food waste -including molasses, bakery waste and sugar cane- into value-added products, such as lactic acid. Lactic acid (2-hydroxypropanoic acid), is an organic compound widely used in food, pharmaceutical and chemical industry, which can be polymerized to form the biodegradable and compostable polymer polylactic acid (PLA), a potential substitute for petroleum-derived plastics. The present study focuses on the optimization of lactic acid production from food-waste collected from the Municipality of Heraklion according to the method proposed by Sakai and collaborators (Sakai et al., 2003) and, on the development of a scalable synthetic process. More specifically, a sequence of fermentations was initially performed to produce optically pure L-lactic acid from food waste, followed by purification of the produced L-lactic acid via esterification to the corresponding ammonium lactate and a final hydrolysis of the isolated ester. The process was optimised on terms of energy consumption and enrichment, for lactic acid production in a bench unit. The yields and limitations of this process will be discussed.

Keywords: waste management, L-lactic acid, fermentation, bioplastic

References

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