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# CAPRYLATE PRODUCTION WITH LACTATE AS ELECTRON DONOR USING *MEGASPHAERA HEXANOICA*

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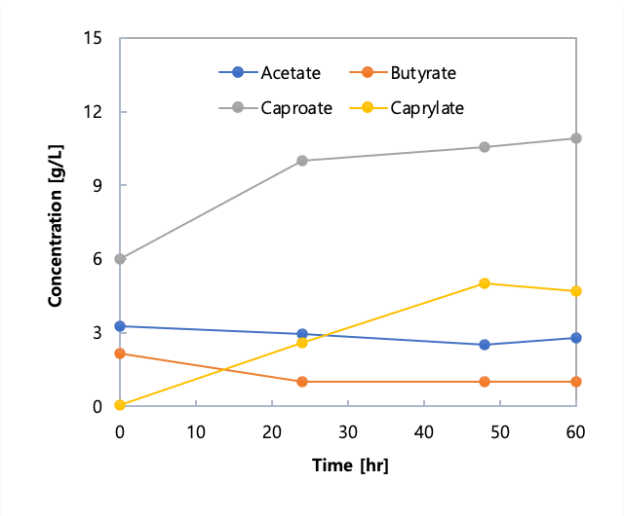
Waste-based biorefinery has advantages for waste management as well as renewable energy and chemical production. Several studies have been conducted to utilize various wastes through biorefinery, and medium chain carboxylic acids (MCCAs) production using chain elongation pathway in microorganisms is also one of the promising wastes biorefinery. Not only MCCAs itself can be utilized in food additives, animal feeds, antimicrobial agents, electrocatalytic conversion of MCCAs can readily and efficiently produce hydrocarbons which can be used as biofuels and platform chemicals. MCCAs can be produced from short chain carboxylic acids (SCCAs) through reverse β-oxidation (RBO) pathway which can be utilized in few bacteria. For chain elongation of SCCAs, electron donors (EDs) such as ethanol, lactate, sugars, and hydrogen are necessary. Among these EDs, lactate can be readily produced to from carbohydrate-rich wastes such as food wastes, municipal wastes, and acid whey. Because of this advantage, chain elongation using lactate as ED have economic and environmental benefits.




*Megasphaera hexnaoica* is anaerobic bacteria who has well running reverse β-oxidation pathway. In previous study, the strain showed excellent production of medium chain carboxylic acids (MCCAs) using fructose as electron donor. In this study, chain elongation process study for caprylic acid using lactate instead of fructose was conducted in *M. hexnaoica* fermentation. It was found that *M. hexanoica* can use lactate as electron donor in chain elongation process. Caprylate production of 5 g/L was achieved in fermentation using lactate as sole electron donor. Compared to fructose condition, lactate as electron donor showed more than 3 times higher specific titer and specific productivity. In addition, when fructose and lactate were used as electron donor simultaneously, further improvement of caprylate production was observed. Utilization of lactate as electron donor in *M. hexanoica* showed potential opportunity in chain elongation process for caprylate production. This study firstly reports that the strain also utilize lactate as an electron donor for caprylate production. In the lactate-supplement condition, caprylate was produced with a higher specific titer and a higher specific productivity compared to the fructose condition. Besides, the use of fructose and lactate together showed an improvement in the production of MCCAs, suggesting new possibilities for this strain.

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