

Accepted Manuscript

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PII: S1383-5866(17)34212-0
DOI: <https://doi.org/10.1016/j.seppur.2018.04.086>
Reference: SEPPUR 14582

To appear in: *Separation and Purification Technology*

Received Date: 22 December 2017
Revised Date: 29 April 2018
Accepted Date: 30 April 2018

Please cite this article as: S. Xu, K. Lan, J. Li, T. He, C. Hu, Separation of lactic acid from synthetic solutions and the mixture directly derived from corn stover by aqueous two phase extraction, *Separation and Purification Technology* (2018), doi: <https://doi.org/10.1016/j.seppur.2018.04.086>

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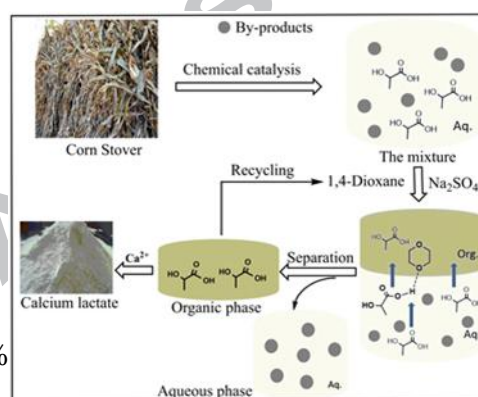
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ABSTRACT:

In present work, 1,4-dioxane/ Na_2SO_4 two-phase extraction system was developed for the separation of lactic acid from the synthetic solutions and the mixture directly derived from corn stover. The mass fraction of 1,4-dioxane, Na_2SO_4 amount, and pH of the system were found to be main factors influencing the extraction efficiency. Under the conditions (13.5 wt% of Na_2SO_4 , 28.0 wt% of 1,4-dioxane, pH at 1.68) optimized by Response Surface Methodology (RSM), the highest extraction efficiency of lactic acid in simulation solution was up to ~91%. ATR-IR characterization of extraction system indicated that the formation of hydrogen bonding between O atom of 1,4-dioxane and H atom of O-H in lactic acid predominantly contributed to the excellent extraction efficiency. Furthermore, 1,4-dioxane/ Na_2SO_4 two-phase system also showed excellent extraction efficiency (90%) for lactic acid from the mixture directly derived from the chemical catalytic conversion of corn stover. The extracted lactic acid could be further transformed to calcium lactate by salification, and the remaining 1,4-dioxane was recycled and directly used for the next run.



Keywords: Lactic acid; Salting out; Extraction; RSM.

1. INTRODUCTION

Lactic acid, as an important platform chemical, is widely used in food^[1] (e.g. beverages, candy, meat, bakery), pharmaceutical^[2] (e.g. disinfection and dialysis (Na-lactate)), cosmetics^[3] (e.g. anti-acne, moisturizers), as well as an intermediate for the synthesis of commodity chemicals.^[1,4] Recently, the demand of lactic acid for the production of biopolymer polylactic acid (PLA, a biodegradable polymer with a wide range of applications) has increased considerably with an annual growth of 5–8%, and it is estimated that the demand of lactic acid is over 600000 tons in 2020.^[5] The conventional method for the production of lactic acid is based on the fermentation of carbohydrates.^[6] Nowadays, increasing attention has been focused on the production

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