

Title : Pectin isolation by citric acid from waste lime peel

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Type of presentation* (choose 1) : Oral Presentation (เฉพาะ ตัวแทนศ.ที่สาขาเลือกให้นำเสนอแบบบรรยาย)
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 Cooperative Education (กรณี นำเสนอผลงานสหกิจศึกษา)

ABSTRACT

This special project aims to study the extraction conditions of pectin from waste lime peel powder. The study focused on the suitable extraction conditions and using the obtained parameters to simulate the process at an industrial scale. In the preliminary study, pectin was extracted from waste lime peel powder by citric acid solution. The experimental variables were pH, temperature, and extraction time. The results showed that 90 min extraction time gave the highest yield of 24.14% at pH 2. The chemical properties of the extracted pectin were analyzed by % methoxyl content, equivalent weight, % AUA (anhydrouronic acid), and %DE (degree of esterification). The methoxyl content was 21.57%, indicating as low methoxyl pectin (LMP). This type of pectin has excellent gelling properties for the food and pharmaceutical industries. At the industrial level, a major problem involves high cost of pure ethanol in the precipitation and washing steps.

Therefore, the laboratory results became a guideline to simulate an extractive distillation by Aspen Plus v.14 software to recover ethanol. The simulation started with a lime peel flow rate of 100 kmol/hr and a yield of 90%. After the simulation, the pectin production was 23,630 lb/hr. When compared with the laboratory yield of about 20%, the industrial simulation produced about 4.5 times more pectin than the laboratory scale did. In addition, ethanol can be recovered and reused. The simulation encourages the cost feasibility and payback period of the system. The simulation results showed a profit of 235 USD per hour. In conclusion, the laboratory extraction gave a good yield of 24.14% and provided useful data for process simulation in Aspen Plus v.14. The simulation also helped to determine the cost feasibility and payback period of this system.

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