EXTRACTION OF LIGNOSULFONATE USING SUPPORTED LIQUID MEMBRANE PROCESS

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A thesis submitted in fulfillment of the requirements for the award of the degree of Bachelor of Engineering (Chemical)

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JANUARY 2013
Lignosulfonate is a byproduct from sulfite pulping process. An efficient recovery technique of lignosulfonate from the wastewater is of necessity in order to meet the wastewater treatment requirement and as a source of valuable material that has wide range of industrial applications. Several technologies that have been used to separate lignosulfonate from the waste water are precipitation, ion-exchange process and electrolysis, which offer some advantages as well as drawbacks over others. Supported liquid membrane (SLM) is gaining worldwide importance for its use in the separation and recovery of various components as it offers advantages such as simultaneous extraction and stripping steps, low consumption of extractant and high selectivity. In this study, an attempt was made to extract lignosulfonate from its aqueous solution through a flat sheet supported liquid membrane using trioctylamine (TOA) as carrier. The important parameters governing the extraction process of lignosulfonate, which are types of support material, types of solvents, types of stripping agents, feed flow rate and feed phase pH were investigated. The process was conducted in a liquid membrane cell with continuous flow system. The results show that SLM system is selectively extracting lignosulfonate from the aqueous solution. The optimum lignosulfonate extraction was achieved at 37.5% by using TOA-Kerosene-PVDF membrane system, NaOH as stripping agent, 100 mL/min of feed flow rate and feed at pH 2. The experimental results also show that the SLM system is stable for more than 9 hours.
ABSTRAK

Lignosulfonat adalah salah satu produk sampingan hasil dari proses pemulpaan sulfit. Satu teknik pemisahan dan penghasilan semula lignosulfonat yang cekap adalah diperlukan untuk memenuhi piawai pelupusan air sisa, sementara lignosulfonat adalah sumber bahan mentah berharga yang mempunyai pelbagai kegunaan industri. Teknik-teknik pemisahan lignosulfonat dari air sisa yang sedia ada termasuk proses pemendakan, proses pertukaran ion dan elektrodialisis. Setiap teknik ini mempunyai beberapa kelebihan dan kelemahan yang tersendiri. Salah satu teknik pemisahan yang baru, iaitu membran cecair bersokong mempunyai kepentingan yang meningkat dalam teknologi pemisahan bagi pelbagai jenis bahan. Kaedah ini memberi beberapa kelebihan berbanding dengan kaedah lazim, seperti proses pengekstrakan dan pelucutan yang berlaku dengan serentak, penggunaan bahan ekstrak yang kurang dan kepemilikan yang tinggi. Dalam kajian ini, penggunaan kaedah membran cecair bersokong kepingan rata dengan trioctlamine (TOA) sebagai pembawa telah dijalankan bagi tujuan pengekstrakan lignosulfonat. Parameter penting yang menentukan kecekapan proses pengekstrakan lignosulfonate, seperti jenis membran sokongan, jenis pelarut organik, jenis larutan pelucut, kadar aliran fasa suapan dan pH fasa suapan telah dikaji. Proses ini telah dijalankan dengan menggunakan sel membran cecair dalam sistem aliran berterusan. Keputusan menunjukkan sistem membran cecair bersokong yang dikaji mengekstrak lignosulfonat secara terpilih dari larutan akueus. Pengekstrakan optima lignosulfonat yang diperolehi adalah 37.5% dengan menggunakan sistem membran TOA-Kerosen-PVDF, NaOH sebagai larutan pelucut, kadar aliran fasa suapan pada 100 mL/min dan pH fasa suapan pada 2. Di samping itu, keputusan ujikaji juga menunjukkan sistem membran cecair bersokong tersebut stabil dalam masa lebih daripada 9 jam.
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# 2.3 Supported Liquid Membrane Technology

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