Carrier Selection in Liquid Membrane for Extraction of Levulinic Acid using Hybrid Graphene-Polyethersulfone Supported Liquid Membrane

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ABSTRACT

Levulinic acid (LA) and its valuable derivatives are growing demand in various applications such as in pharmaceuticals, food additives, agriculture, cosmetics, plasticizers and other industries. LA can be prepared through degradation of hexose from lignocellulosic biomass by using acids. However, the cost for LA recovery was higher than the production cost and some separation technique raise some environmental problem. Thus, it is essential to develop an economical separation process which can resulted in high yield of LA recovery with low cost and had less impacted to the environment. In this study, five different type of carriers were investigated during organic liquid membrane formulation which are tri-n-octyl phosphine oxide (TOPO), Aliquat 336, trioctylamine (TOA), tridodecylamin (TDA) and mixture of 50% TOA and 50% TDA. Hybrid graphene- polyethersulfone flat sheet membrane was prepared through vapour-induced phase separation and used as membrane support in the SLM process. The extraction was conducted using 10 g/L aqueous LA solution for 8 hours in the SLM system. The best carrier for extraction of LA was achieved using TOA which showed 74% of LA recovery. The LA extraction using TOPO, TDA, Aliquat 336, and mixture of TOA/TDA were 22%, 47%, 62%, and 67%, respectively. The selection of the carrier in liquid membrane formulation is important for achieving high recovery of LA using SLM process.

Keywords: Supported Liquid Membrane, Levulinic Acid, Polyethersulfone Membrane

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