

## Response Surface Modeling of Lactic Acid Extraction by Emulsion Liquid Membrane: Box-Behnken Experimental Design

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**Abstract :** Extraction of lactic acid by emulsion liquid membrane technology (ELM) using n-trioctyl amine (TOA) in n-heptane as carrier within the organic membrane along with sodium carbonate as acceptor phase was optimized by using response surface methodology (RSM). A three level Box-Behnken design was employed for experimental design, analysis of the results and to depict the combined effect of five independent variables, viz lactic acid concentration in aqueous phase (cl), sodium carbonate concentration in stripping phase (cs), carrier concentration in membrane phase ( $\psi$ ), treat ratio ( $\phi$ ), and batch extraction time ( $\tau$ ) with equal volume of organic and external aqueous phase on lactic acid extraction efficiency. The maximum lactic acid extraction efficiency ( $\eta_{ext}$ ) of 98.21% from aqueous phase in a batch reactor using ELM was found at the optimized values for test variables, cl, cs,,  $\psi$ ,  $\phi$  and  $\tau$  as 0.06 [M], 0.18 [M], 4.72 (%v/v), 1.98 (v/v) and 13.36 min respectively.

**Keywords :** emulsion liquid membrane, extraction, lactic acid, n-trioctylamine, response surface methodology

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