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Statistical Optimization of Lactic Acid Extraction using Green Emulsion Ionic Liquid Membrane (GEILM)

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Abstract: Recently new development in the existing emulsion liquid membrane (ELM) technique is the use of green solvents and ionic liquids to form a stable green emulsion ionic liquid membrane (GEILM) which will help in curbing the environmental problems caused by petroleum-based solvents. In the present investigation, lactic acid (LA) extraction has been carried out by using GEILM. The w/o emulsion was prepared by using diluents solution (rice bran oil (70%, v/v) as a natural green solvent, hexane (30%, v/v) as an organic solvent), span 80 (2.66%, v/v of diluents solution) as a surfactant, aliquat336 (0.2%, v/v of diluents solution) as an ionic liquid, and sodium hydroxide (NaOH) as an internal phase reagent. The obtained GEILM was stable for 90 min which is ideal time for ELM operations. Therefore, rice bran oil (RBO) as a green solvent has shown a great potential for its applications in the various existing ELM processes. Initially, a 2- level fractional factorial design (FFD) was applied for the selection of important process parameters influencing the LA extraction significantly and then Box-Behnken design (BBD) was used to optimize the process conditions. 95±3.5% LA extraction efficiency has been obtained under the optimized process conditions.