

## Optimization of Process Parameters using Response Surface Methodology for the Removal of Zinc(II) by Solvent Extraction

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**Abstract :** A factorial design of experiments and a response surface methodology were implemented to investigate the liquid-liquid extraction process of zinc (II) from acetate medium using the 1-Butyl-imidazolium di(2-ethylhexyl) phosphate [BIm<sup>+</sup>][D2EHP<sup>-</sup>]. The optimization process of extraction parameters such as the initial pH effect (2.5, 4.5, and 6.6), ionic liquid concentration (1, 5.5, and 10 mM) and salt effect (0.01, 5, and 10 mM) was carried out using a three-level full factorial design (3<sup>3</sup>). The results of the factorial design demonstrate that all these factors are statistically significant, including the square effects of pH and ionic liquid concentration. The results showed that the order of significance: IL concentration > salt effect > initial pH. Analysis of variance (ANOVA) showing high coefficient of determination (R<sup>2</sup> = 0.91) and low probability values (P < 0.05) signifies the validity of the predicted second-order quadratic model for Zn (II) extraction. The optimum conditions for the extraction of zinc (II) at the constant temperature (20 °C), initial Zn (II) concentration (1mM) and A/O ratio of unity were: initial pH (4.8), extractant concentration (9.9 mM), and NaCl concentration (8.2 mM). At the optimized condition, the metal ion could be quantitatively extracted.

**Keywords :** ionic liquid, response surface methodology, solvent extraction, zinc acetate

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