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Mathematical Modelling of Ni^{2+} biosorption by *Schizosaccharomyces pombe* using universal sigmoid approach

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The utilization of microorganisms as biosorbents for the removal and recovery of heavy metals from industrial wastewaters has become a major alternative to conventional methods. Microorganisms, active or inactive, can adsorb dissolved metals by the courtesy of their special membrane characteristics. The design of the appropriate equipment and the estimation of optimum process input values have a great importance concerning the analysis and synthesis of the process under investigation. In order to obtain a dependable optimization scheme, the evaluation of a wide collection of biosorption data was required. Instead of using a time consuming and expensive database matrix, the development of a suitable mathematical model depending on process principles and a truncated experimental data may be more efficient approach to establish an optimization result. A satisfactorily accurate model of a system can be used to predict outcomes under varying conditions without the need for actual experimentation and observation. The aim of this study is to obtain additional data for Ni^{2+} biosorption by *Schizosaccharomyces pombe* especially at pH=4.0 or 6.0 and the development of a sigmoidal mathematical model for the biosorption process under investigation. This mathematical model would be a simulation tool for the future process optimization work. In this study, *Schizosaccharomyces pombe*, a species of unicellular yeasts, was used as biomass for the bioremoval of Ni^{2+}. Chemicals such as agar, yeast extract, glucose, etc. for culture media preparation specific to yeast species and pure grade acids for pH adjustment were needed. Pure grade of $NiCl_2$ compound was used to prepare the stock solutions of nickel (II). Equilibrium between the adsorbed phase and solution phase was attained within 3 hours. The equilibrium uptake decreased with increasing temperature denoting an exothermic behavior. Several isotherm models including Langmuir and Freundlich isotherms were used to evaluate the equilibrium data. Reaction rate and thermodynamic properties of Ni(II) biosorption at 20, 25, 30, 35 and 50°C were also determined. Funding by M.U. Nihad Sayar Egitim Vakfi and M.U. Research Fund Project FEN-C-YLP-040712-0280 are gratefully acknowledged.

Biography

Rumeysa Bukcu has studied Chemistry and graduated at the age of 21 years from Middle East Technical University. Her research interests include biosorption and new technologies related to it, and she is currently completing her thesis and study of mathematical modelling of Ni^{2+} biosorption by using *Universal Sigmoid Approach*. She is graduate student of bioengineering department in Marmara University. By attending to the intellectual and creative knowledge-sharing climate during the conference, she is planning to enrich her thesis work.

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