J Chem Eng Process Technol 2017, 8:5 (Suppl)
DOI: 10.4172/2157-7048-C1-009

Modeling of nitrate biosorption on chitosan based organic-inorganic hybrid biocomposite using various mathematical models

Wondalem Misganaw Golie and **Sreedevi Upadhyayula**
Indian Institute of Technology Delhi, India

In this study, equilibrium isotherms, kinetic parameters, mass transfer and thermodynamic parameters were evaluated using batch biosorption data obtained for removal of nitrate by chitosan based organic-inorganic hybrid biocomposites. Among the two-parameter models, Freundlich isotherm model was found reasonably best fitted to the data with the highest correlation coefficient (R2) and least chi-square ($\chi 2$) values at different temperatures for all biosorbents followed by Langmuir and Temkin isotherms and then the least fit was obtain with the Dubinin-Radushkevich and isotherm. On the other hand, both the three-parameter models (Sips and Redlich-Peterson isotherms) were found to be better fitted with the experimental data than two-parameter models. The biosorption process was better described by a pseudo-second-order equation. The Biot number values were less than 100, which suggest that the external film coefficients control the biosorption process. Thermodynamic parameters were calculated from the dimensionless equilibrium constants (KC) derived from the adsorption isotherm constants (i.e., Langmuir and Freundlich) and distribution and partition coefficient. Thermodynamic parameters indicate that biosorption process was spontaneous and endothermic. Heat of adsorption obtained from Temkin and D-R isotherm models and the magnitude of biosorption enthalpy revealed that mechanism of nitrate biosorption by chitosan based organic-inorganic hybrid biocomposites was physisorption.

wondalem2004@gmail.com