

Isothermal modelling of the adsorption of lead(II) onto an antarctic sea-ice bacterial exopolysaccharide

ABSTRACT

The biosorption of the biosorption of lead(II) onto an Antarctic sea-ice bacterial exopolysaccharide is remodeled using nonlinear regression and the optimal mode was determined by a series of error function assessments. The Sips model performed best in statistical tests including root-mean-square error (RMSE), adjusted coefficient of determination ($\text{adj}R^2$), bias factor (BF), accuracy factor (AF), and corrected Akaike Information Criterion (AICc) which is not the same to the originally published work using a linearized form where the Langmuir and Freundlich models best represent the biosorption and the maximum biosorption capacity. The calculated Sips parameters k_S (l/g) value of 0.10 (95% confidence interval from 0.08 to 0.13), a maximum monolayer adsorption capacity q_{mS} (mg/g) value of 252.88 (95% C.I. from 222.13 to 283.64) and n_S (Sips model exponent) value of 1.16 (95% C.I. from 1.34 to 1.98). This study indicates that a different isotherm model can be obtained using nonlinear regression compared to the popular linearized form that may give relatively inaccurate outcome.