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BOOK OF ABSTRACTS



JAHORINA
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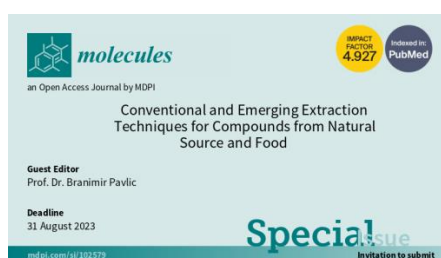
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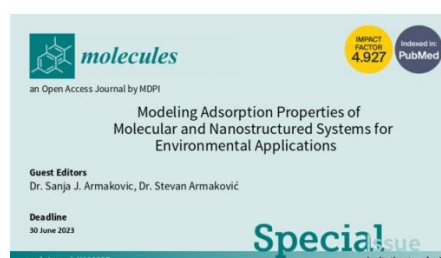
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KINETICS AND ISOTHERMS MODELING OF SILVER REMOVAL ONTO MACROPOROUS AMINO SORBENT

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Abstract

Silver as one of the most known precious metal is used on a large scale in various industrial branches and the release of silver ions from such industrial activities potentially can cause serious environmental problems. Therefore, the removal of this metal from wastewater is a great challenge, and it is crucial for the quality improvement of the environment. Porous polymer materials with high specific surface areas and other specific physical and chemical characteristics have gained much attention as sorbents in the field of environmental protection. In this paper, macroporous poly(glycidyl methacrylate-co-ethylene glycol dimethacrylate) copolymer synthesized by suspension copolymerization and functionalized with diethylenetriamine was employed for silver ions sorption from aqueous solution at unadjusted pH and room temperature. The sorption kinetics and isotherms were studied to establish the mechanisms of sorption process. The kinetic data were modeled with pseudo-first-order (PFO), pseudo-second-order (PSO), Elovich and fractional power (FP) models as well as intraparticle diffusion (IPD) and liquid diffusion model (LFD), while the equilibrium data were analyzed using Langmuir, Freundlich, Sips and Redlich-Peterson isotherm models. Eight error functions such as coefficient of determination (R^2), Marquardt's percent standard deviation (MPSD), Chi-square statistic test (χ^2), hybrid fractional error function (HYBRID), the root mean square error (RMSE), the sum of the errors squared (SSE), sum of the absolute errors (SAE), and average relative error (ARE) were used to estimate the error deviations between theoretically predicted and experimental values of sorption capacities. The best kinetic and isotherm models were determined by normalizing eight error functions and finding the sum of normalized error value (SNE). The sorption kinetic studies revealed that the sorption of silver by macroporous amino-functionalized sorbent obeys the PSO kinetic model. In addition, the results indicate that sorption was governed by intraparticle diffusion with the evident influence of liquid film diffusion. The obtained results showed that the sorption isotherm data were satisfactorily fitted to the Redlich-Peterson isotherm model.

Key words: silver, macroporous sorbent, error functions, glycidyl methacrylate, sorption