

Modified Fly Ash for Adsorption of Pharmaceuticals from Water: Chemometric Approach to the Optimization of Adsorption Method

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The immense quantity of industrial waste is a global problem that requires new solutions in accordance with the principles of circular economy and sustainable development. Therefore, in this work, fly ash obtained as waste from thermal power plants was used as an adsorbent for the removal of pharmaceutical residues from water. To improve the adsorption efficiency of fly ash, different modification methods were applied. Obtained adsorbents were characterized by SEM and FTIR. In order to improve the adsorption characteristics, the adsorption parameters were optimized (volume, initial concentration, and pH value of adsorbate solution, adsorbent mass, and contact time between adsorbent and adsorbate). Artificial neural networks were applied to establish the correlation between the examined adsorption parameters and to define the parameters having the greatest influence on the adsorption efficiency. The chemometric approach enabled the reduction of variables, i.e., the number of experiments necessary for the optimization of pharmaceutical residue adsorption onto modified fly ash, giving a good basis for the commercial application of fly ash in the field of wastewater treatment.

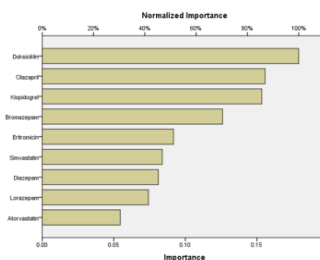


Figure 1. Prediction of drug adsorption efficiency using artificial neural network

Keywords: fly ash, pharmaceuticals, adsorption, optimization, chemometric tools, ANN

Acknowledgment: This work was supported by the Science Fund of the Republic of Serbia within the project SIW4SE (Contracts No. 7743343)