

Abstract

In this study, hybrid of artificial neural network-imperialist competitive algorithm (ANN-ICA) has been used for prediction and optimization of molecularly imprinted solid phase extraction method. This method has been used for the pre-concentration of methylene blue (MB) from environmental water samples prior to UV-Vis spectrophotometry. Molecular imprinted polymer sorbents were synthesized using radical polymerization by MB, 4-vinylpyridine, ethylene-glycol-dimethacrylate, 2,2'-azobisisobutyronitrile and methanol as template, functional monomer, cross-linker, initiator, and porogen, respectively. Characterization of the imprinted polymer was done by Fourier transform infrared spectroscopy and scanning electron microscopy. The pH, adsorbent mass, adsorption time, eluent volume, and extraction time have been used as input parameters and the recovery of MB was applied as output variable of ANN model. The results were compared according to the performance function and determination coefficient. The Freundlich and Langmuir adsorption models were used to explain the isotherm constant. The maximum adsorption capacity was obtained 417 mg g^{-1} . At the optimized conditions, the limit of detection and relative standard deviation was found to be $0.31 \text{ } \mu\text{g L}^{-1}$ and $<1.7\%$, respectively. This method was used to analysis the MB in various water samples.

Keywords: Methylene blue; Molecularly imprinted polymer; Artificial neural network; Imperialist competitive algorithm; Water samples.



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**Extraction and determination of
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