Abstract

The aim of this research was to develop a low price adsorbent with the abundant of source to remove manganese and also cobalt from water samples. Tea waste solid-phase extraction coupled with flame atomic absorption spectrometry was used for the extraction and determination of Manganese and Cobalt ions. Response surface methodology and Hybrid of artificial neural network- particle swarm optimization has been used to develop predictive model for simulation and optimization of tea waste extraction process. The pH, amount of tea waste, concentration of complexing agent, eluent volume, concentration of eluent, and sample and eluent flow rates were the input variables, while the extraction percent of Mn and Co were the output. Two approaches for their modeling and optimization capabilities were compared. The generalization and predictive capability of both RSM and ANN were compared by unseen data. The results have shown the superiority of ANN compared to RSM. Under the optimum conditions, the detection limits of Mn and Co were 0.5 and 0.67 μg L^{-1}, respectively, and relative standard deviation of the ten replicate determination was <1.9% for both analytes. This method was applied to the preconcentration and determination of manganese and cobalt from different real samples.

Keywords: Solid-phase extraction, Manganese, Cobalt, Tea waste, Artificial neural network, Particle swarm optimization, Response surface methodology.

University of Zabol
Graduate School
Faculty of Science
Department of Chemistry

The Thesis Submitted for the Degree of Master of Science
(In The Field Of Analytical Chemistry)

Using tea waste as a low cost adsorbent for extraction of manganese from water samples

Supervisor:
Dr. Mostafa Khajeh

Advisor:
Dr. Ali Sarafraz Yazdi

By:
Afsaneh Fakhrai Moghadam Yazdan Abad

October 2013