



## Selective removal of cadmium ions from water samples by using Br-PADAP functionalized SBA-15 particles

Zahra Khanjari<sup>a</sup>, Ali Mirabi<sup>a,\*</sup>, Ali Shokuhi Rad<sup>b,\*</sup>, Majid Moradian<sup>a</sup>

<sup>a</sup>Department of Chemistry, Qaemshahr Branch, Islamic Azad University, Qaemshahr, Iran, email: a.mirabi@qaemiau.ac.ir (A. Mirabi)

<sup>b</sup>Department of Chemical Engineering, Qaemshahr Branch, Islamic Azad University, Qaemshahr, Iran  
a.shokuhi@gmail.com, a.shokuhi@qaemiau.ac.ir (A.S. Rad)

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### ABSTRACT

The focus of the study is on the optimization of variables influencing the removal of Cd(II) ions using colloidal particles based on 2-(5-bromo-2-pyridylazo)-5-diethylamino phenol (Br-PADAP) functionalized on Mesoporous Santa Barbara Amorphous-15 (SBA-15). The Br-PADAP-functionalized SBA-15 mesoporous silica was synthesized and utilized as an adsorbent for removal of cadmium ions. By means of thermogravimetric analysis, transmission electron microscope, Brunauer, Emmett, and Teller, and CHNS analysis, the structural and physicochemical properties of the SBA-15 and its complex with Br-PADAP were characterized. The effects of different variables such as pH, amount of sorbent, temperature, and contact time on the adsorption of Cd(II) ions were examined. The highest adsorption capacity of the adsorbent was found to be considerable (5,000.0 mg g<sup>-1</sup>) by using the functionalized material. The reusability of the resulted composite is found for more than six cycles. The negative value of  $\Delta G$  along with the positive value of  $\Delta H$  shows that the cadmium adsorption on Br-PADAP/SBA-15 is a spontaneous and endothermic process.

*Keywords:* Aqueous solutions; Removal of cadmium; SBA-15; Surface modification

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\* Corresponding author.