N. Sivarajasekar[1]*, K. Balasubramani[2], R. Baskar[2], S. Sivamani[3], I. Ganesh Moorthy[4]

ECO-FRIENDLY ACETAMINOPHEN SEQUESTRATION USING WASTE COTTON SEEDS: EQUILIBRIUM, OPTIMIZATION AND VALIDATION STUDIES

[1]Department of Biotechnology, Kumaraguru College of Technology, Coimbatore, India;
[2]Department of Chemical Engineering, Kongu Engineering College, Perundurai, India;
[3]Chemical and Petrochemical Engineering Section, Salalah College of Technology, Salalah, Oman;
[4]Department of Biotechnology, Kamaraj College of Engineering and Technology, Virudhunagar, India
*sivarajasekar@gmail.com

Adsorbent was prepared from waste cotton seeds and utilized to remove acetaminophen from aqueous solutions. The main and interactive effects of five process variables such as, adsorbent dose, initial acetaminophen concentration, contact time, pH and temperature were investigated via response surface methodology based on Box-Behnken statistical design. The optimum values of the selected variables were estimated using Derringer's desired function. The batch adsorption data obeyed smith isotherm. Kinetic investigation showed that the acetaminophen was chemisorbed on waste cotton seed activated biomass surface following pseudo second order model. The fixed-bed adsorption breakthrough curves at different bed heights were well correlated by BDST model. Exhausted adsorbent could be regenerated eight times efficiently using microwave irradiation.

Keywords: adsorption, acetaminophen, Box-Behnken, cotton seed, derringer's desirability, regeneration.

Introduction

Acetaminophen (N-acetyl-4-aminophenol) is a common analgesic and anti-inflammatory drug. It is an emerging micropollutant which has been found in the effluent streams of pharmaceutical industries [1, 2]. This drug is designed to retain its chemical structure long enough to do its therapeutic work, which allow them to remain in the aqueous environment for prolonged

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