



## Removal of Reactive Black 5 from water using carboxylic acid-grafted SBA-15 nanorods

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### ABSTRACT

SBA-15 mesoporous silica was grafted with carboxylic acid groups and evaluated as a novel solid phase adsorbent for removing Reactive Black 5 (RB5) from aqueous media. The adsorbent was prepared based on a procedure described in the literature, and characterized using Fourier transform infrared spectroscopy, Raman, thermogravimetric analysis and X-ray diffraction, and nitrogen physisorption techniques. The different adsorbents were evaluated for removing RB5 and were found to possess adsorption capacities in the order of: SBA-15/tricarboxylic acid groups > SBA-15/dicarboxylic acid groups > SBA-15/tetracarboxylic acid groups. The adsorption of RB5 on the adsorbent based on electrostatic attraction and hydrogen bonding has been described; the results of batch studies conducted to evaluate the optimal adsorption conditions and operating parameters, for example, pH, amount of adsorbent, contact time and analyte concentration, have been reported. The data were evaluated using the Langmuir adsorption model. Further, the thermodynamic parameters and the desorption process were monitored and evaluated.

*Keywords:* Dye removal; Reactive Black 5; Carboxylic acid-functionalized SBA-15 nanorods

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