

# Numerical Simulation of Dye Removal by Scallop Shell in Fixed Bed Column

K. O. Pham Le<sup>1</sup>, T. A. Nguyen<sup>2</sup>, T. A. N. Nguyen<sup>3</sup>, and B. T. Tran<sup>4</sup>

**Abstract:** In Vietnam, color removal from textile effluents has been the subject of great attention in the last few years, not only because of its toxicity but mainly due to its visibility. Adsorption processes which produce good quality effluents that are low in concentration of dissolved organic compounds are rapidly gaining importance as treatment processes. Scallop is a marine bivalve mollusk, which was discharged as wastes by many marine product manufacturers and restaurants. Scallop can be economically used as adsorbent for the wastewater treatment. The adsorbents are usually used in the fixed bed process because of the ease of operation. To design and operate a fixed bed adsorption process successfully, the column dynamics must be understood; that is the breakthrough curves under specific operating conditions must be predictable. A mathematical model of fixed bed column is very useful for the proper design and the determination of the optimal operating conditions for this equipment. Different models for the adsorption process of gaseous or liquid components have been proposed in the literature. In this study, the adsorption of basic dyes from aqueous solutions onto scallop shell powder was studied using a fixed bed column. The adsorption process was modeled by a system of partial differential equations. A Matlab program has been developed based on the finite difference method for solving the model. The calculation results were compared with experimental data. The comparison showed that the fixed bed column adsorption can be satisfactorily modeled and the numerical method was applicable.

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<sup>1,2</sup> Faculty of Chemical Engineering  
Ho Chi Minh City University of Technology  
Ho Chi Minh City, Vietnam  
*anhnt0703@gmail.com*

<sup>3</sup> Faculty of Applied Sciences  
Ho Chi Minh City University of Technology  
Ho Chi Minh City, Vietnam

<sup>4</sup> Faculty of Applied Sciences  
Ton Duc Thang University  
Ho Chi Minh City, Vietnam