Study of bimacid dye removal from aqueous solution: a comparative study between adsorption on pozzolana, bentonite, and biosorption on immobilized anaerobic sulfate-reducer cells

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ABSTRACT

The effluents emanating from industries such as paper, plastics, textile, and leather contain many dyes which are toxic and carcinogenic. The treatment of these effluents has become very important to reduce the potential toxicity of their pollutants and minimize their concentration prior to their discharge. This paper presents a comparative study between adsorption and biosorption processes for the red dye bimacid removal from aqueous solution. The experimental results show that the removal efficiency of the red bimacid using biosorption process which uses immobilized anaerobic sulfate-reducer cells onto a physical adsorbent is more significant (up to 91%) as compared to the adsorption process using bentonite and pozzolana powders. The kinetics of biosorption and the adsorption isotherms of the red dye bimacid on these materials showed great affinities to adsorbent-adsorbate. The pH of the aqueous solution influences positively the rate of the dye removal in the case of adsorption; however, it is a limiting factor in the case of biosorption.

Keywords: Dye; Biosorption; Adsorption; Pozzolana; Bentonite; Equilibrium modeling

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