Factors affecting the immobilization of fungal biomass on CNT as a biosorbent for textile dyes

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Abstract

Effluents from dye and textile industries are highly contaminated and toxic to the environment. High concentration of non-biodegradable compounds contribute to increased biochemical oxygen demand (BOD) and chemical oxygen demand (COD) of the wastewater. Dyes found in wastewater from textile industries are aromatic, mutagens, and toxicants. Biological processes involving certain bacteria, fungi, and actinomycete carbon have been employed in treating wastewater. These methods are either inefficient or ineffective. These complex effluents require search for new approaches that will offset all the shortcomings of the present solutions to the challenge posed with textile wastewater management. This study produced a novel biosorbent by the immobilization of fungal biomass on carbon nanotubes. The raw biomass is called ‘sorption’ immobilized biomass (CNB) which was produced by immobilization technique. A potential fungal strain, Aspergillus niger was selected on the level of biomass production. It was found in this study that fungal biomass was better produced in acidic medium. Aspergillus niger was immobilized on carbon nanotubes. One-step at a time (OST) was employed to determine the effect of different factors on the immobilization of fungal biomass on carbon nanotubes and optimum levels at which the three selected parameters (pH, culture time, and agitation rate) would perform. Findings from OST showed that the optimum conditions for immobilization were a pH of 7, agitation rate of 150 rpm and a culture time of 5 days. © Published under license by IOP Publishing Ltd.