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Direct-dyes bioremoval using *Aspergillus niger* in pilot scale bioreactor

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ABSTRACT

Treatment of effluents from dye-based industries represents one of the most important approaches to protect the surrounding agricultural environment from heavy pollutions particularly in developing countries. In this work, decolorization of two structurally different direct textile dyes; Direct Violet and Direct Green, were studied to determine the optimum conditions for dye removal, particularly in relation to agitation rate and temperature. Experiments on the decolorization of the dyes were carried out in a batch mode bioreactor using *Aspergillus niger* strain 20. The effect of various temperatures (30°C, 35°C, 40°C, 45°C, 50°C) and agitation rates (0, 100, 200, 300 and 400 rpm) on the dye removal were investigated. The maximum removal of Direct Green dye was recorded at temperature 40°C, where 75.75% of this dye was removed in 2 h. The data revealed that the agitation has a significant effect on the percentage of the dye decolorization by fungal biomass. The removal ranged from 72.3 to 96.6 after 24 h. The static treatment without agitation gave higher percentage of Direct Violet dye removal reaching 92.3% after 4 h of incubation. The kinetics of the dye bioremoval process in relation to temperature and agitation changes was studied. The equations generated from kinetics studies can be applied to predict the dye removal at temperature in ranges of 30–40°C and agitation between 0–200 rpm.

Keywords: Kinetics; Direct-dye bioremoval; Fungal strain; Pilot scale bioreactor

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