

Immobilization of Metanil Yellow decolorizing mixed culture FN3 using gelling gum as matrix for bioremediation application

ABSTRACT

In this study, the Metanil Yellow (MY) decolorizing mixed culture, namely FN3, has been isolated from agriculture soil. The mixed culture was immobilized using gellan gum. In order to optimize the immobilization process for maximal dye decolorization, Response Surface Methodology (RSM) was performed. The optimal conditions for immobilization predicted by desirability function are 130 mg/L of MY dye concentration, 1.478% of gellan gum concentration, 50 beads and 0.6 cm of beads size with the percentage of decolorization of 90.378%. The correlation coefficients of the model (R^2 and R^2 adj) are 0.9767 and 0.9533, respectively. This indicates that the established model is suitable to predict the effectiveness of dye decolorization under the investigated condition. The immobilized beads of mixed culture FN3 were able to be reused up to 15 batches of decolorization. The immobilized cells also have high tolerance towards heavy metals. This was proven by higher dye decolorization rate by the immobilized cells even with the addition of heavy metals in the media. The decolorization potential of the mixed culture indicates that it could be useful for future bioremediation of soil contaminated sites and treatment solutions of water bodies polluted with MY dye.

Keyword: Immobilization; Mixed culture; Metanil Yellow; Response Surface Methodology