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EFFECT OF THE LIGNOCELLULOLYTIC SUBSTRATES AND FERMENTATION PROCESS PARAMETERS ON MYCOCOAGULANT PRODUCTION FOR WATER TREATMENT

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Abstract

In the present research, a fungal strain was used to produce a myco-coagulant via solid-state bioconversion to reduce water turbidity. The production of myco-coagulant was achieved using several low-cost lignocellulolytic substrates, namely coco peat, sawdust, palm kernel cake, and rice bran as sources of carbon and nitrogen. This research involves the study of both the effect of lignocellulolytic substrates and the parameters involved in the fermentation process for myco-coagulant production. Coco peat was chosen as a suitable lignocellulolytic substrate to serve as a carbon source for producing myco-coagulant, potentially reducing the turbidity by 84.6% from the kaolin suspension. Sawdust, palm kernel cake, and rice bran showed 33.06%, 30.18, and 21.18 %, respectively. Furthermore, a statistical approach to the Plackett-Burman design was conducted to evaluate the significant parameters that affect the production of myco-coagulant. Eleven fermentation process parameters were selected: concentration of coco peat (2-4 %), incubation time (5-9 days), temperature (25-35 °C), pH (5-9), glucose (0-2 %), malt extract (1-2 %), yeast extract (0-2%), wheat flour (0-2 %), ammonium sulfate (0-1 %), inoculum size (1-3 %) and potassium dihydrogen phosphate (0-0.5 %). The selected variables were assessed through statistical analysis (main effects) based on their significance. Based on the main effect of each variable on flocculation activity, three variables, namely glucose, malt extract, and pH influenced high levels. On the other hand, the remaining eight variables did not significantly affect the production of myco-coagulant. Furthermore, a deeper study was conducted to further optimize the three effective variables involved in the fermentation process to evaluate these factors' influence on flocculation activity © 2023, IIUM Engineering Journal.All Rights Reserved.

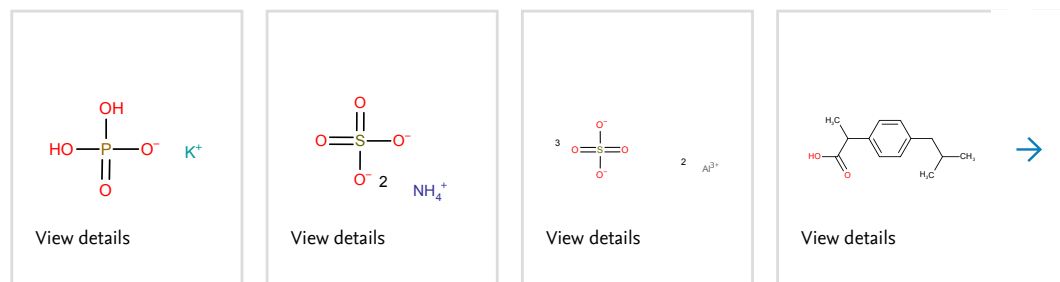
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flocculation activity; lignocellulolytic substrates; Myco-coagulant; PBD; solid-state bioconversion; turbidity removal; water treatment

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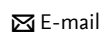
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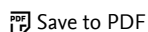
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