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Title: Optimization of chloroxylenol degradation by Aspergillus niger using Plackett-Burman design and response surface methodology

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Source: ROMANIAN BIOTECHNOLOGICAL LETTERS **Volume:** 18 **Issue:** 1 **Pages:** 7983-7994 **Published:** JAN-FEB 2013

Times Cited in Web of Science Core Collection: 7

Total Times Cited: 7

Usage Count (Last 180 days): 0

Usage Count (Since 2013): 12

Cited Reference Count: 44

Abstract: Chloroxylenol is a very toxic phenolic derivative and it represents potential hazard towards human health and to the environment. Aspergillus niger, local isolate, is an efficient fungus to degrade 99.72% of 2mg/L of chloroxylenol after 7days of fermentation. It also has a high capacity to degrade 91.83% of higher chloroxylenol concentration of 20mg/L after 6days of incubation on mineral medium amended with 2g/L of glucose. Statistical experimental designs were used to optimize the process of chloroxylenol degradation by the fungus. The most important factors influencing chloroxylenol degradation, as identified by a two-level Plackett-Burman design with 11 variables, were NaCl, (NH4)(2)SO4, and inoculums size. Response surface analysis was adopted to further investigate the mutual interactions between these variables and to identify their optimal values that would generate maximum chloroxylenol degradation. Under the optimized medium compositions and culture conditions, A. niger degraded completely (100%) chloroxylenol (20mg/L) after 134.6hr of fermentation. The predicted values of Plackett-Burman conditions and response surface methodology were further verified by validation experiments. The excellent correlation between predicted and experimental values confirmed the validity and practicability of this statistical optimum strategy. Optimal conditions obtained in this work laid to a solid foundation for further use of A. niger in treatment of high strength chloroxylenol polluted effluents. So, the optimized conditions were applied to bioremediate crude sewage containing 27.8mg/L of chloroxylenol by A. niger. The fungus efficiently degraded chloroxylenol after 8days of fermentation.

Accession Number: WOS:000315777500012

Language: English

Document Type: Article

Author Keywords: Chloroxylenol degradation; Aspergillus niger; Statistical optimization; Plackett-Burman design; Response surface methodology

KeyWords Plus: STATISTICAL OPTIMIZATION; CULTURAL CONDITIONS; PHENOL DEGRADATION; PHANEROCHAETE-CHRYSOSPORIUM; CHITINASE PRODUCTION; WASTE; PENTACHLOROPHENOL; REMOVAL; DECOLORIZATION; BIODEGRADATION

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Publisher: ARS DOCENDI

Publisher Address: SOS PANDURI 90, SECT 5, BUCHAREST, RO-050663, ROMANIA

Web of Science Categories: Biotechnology & Applied Microbiology

Research Areas: Biotechnology & Applied Microbiology

IDS Number: 101LW

ISSN: 1224-5984

29-char Source Abbrev.: ROM BIOTECH LETT

ISO Source Abbrev.: Rom. Biotech. Lett.

Source Item Page Count: 12

Open Access: No

Output Date: 2017-07-20

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