Isolation of a Dibenzothiophene Bioremoval Bacteria From Exit Water Coal Mine Hashoni of Kerman

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Background & Objectives: Because the quality of fossil fuels has a direct effect on our environment, it is necessary to decrease the sulfur content to reduce the pollution caused by the SO2 released from fossil fuel combustion. Bioremoval of organic sulfur compounds is very difficult , because the C-S bond in organic sulfur is very strong and the compositions of the fuels are complex. Most organic sulfur compounds are heterocyclic. Bioremoval operated under mild conditions, can remove sulfur from organic compounds without breaking the carbon backbone.

Methods: A dibenzothiophene (DBT) degrading bacterium, which utilizes dibenzothiophene (DBT) as the sole source of sulfur, was isolated from water coal mine Hashoni of Kerman(Iran). A convenient spectrophotometric assay (Gibbs' assay) and HPLC were used to determine the quantity of desulfurized product (2-Hydroxybiphenyl).

Results: This isolate did not grow on dibenzothiophene (DBT), dibenzothiophene sulfone (DBTO), or 2-Hydroxybiphenyl (2-HBP) as sole carbon sources. Desulfurization trait was expressed at increasing levels during the exponential phase of growth and then declined in stationary-phase cells. 2- HBP (the desulfurized product) is the end metabolite of dibenzothiophene (DBT), dibenzothiophene sulfone (DBTO2) inclusive media by these bacteria.

Conclusion: A bacterial strain with stable dibenzothiophene (DBT) desulfurization phenotype was isolated. The strain may have potential use for large-scale desulfurization of fossil fuels especially coal. This gram-positive, non-spore-forming, cocci bacterium with the ability todesulfurize dibenzothiophene (DBT) or dibenzothiophene sulfone (DBTO2) was identified as MH-2.

Keywords: Isolation; Bioremoval; Coal; Dibe Nzothiophene