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The influence of the culture media composition on the white phosphorus biodegradation by *Aspergillus niger*

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Abstract

The biodegradation of white phosphorus is undoubtedly an amazing illustration of the adaptability of living organisms to adverse environmental factors. In addition, it is a potential basis for the creation of new, breakthrough methods for detoxifying substances of the first class danger. However, establishing the fact of biological destruction is only half the battle. It is essential to optimize the growth conditions of microbial cultures and P_4 biodegradation for industrial cultivation. The presented study compared the growth of *Aspergillus niger* strain AM1 in culture media varying in composition but containing P_4 as the sole source of phosphorus. Of the ten media, two in which *Aspergillus* grew the fastest were selected. These media were concluded to be optimal for growth. Comparing the compositions of the media and the growth rate of *Aspergillus* in them, we found a key component that is a favorable factor for the growth of AM1 and the biodegradation of white phosphorus. This component was sodium nitrate ($NaNO_3$). It has also been shown that copper sulphate ($CuSO_4$) has no effect on the growth of *Aspergillus* in media with white phosphorus, regardless of the composition of these media. This result is in harmony with our previous findings. Furthermore, in the present work, attempts to increase the concentration of white phosphorus in the culture medium to values above 1% are described for the first time. For this purpose, we added the following solvents to the culture media: dimethyl sulfoxide (DMSO) and diesel, in which white phosphorus dissolves relatively well. Apparently, the presence of these substances adversely affects the growth of Aspergill. Therefore, the problem of further increasing the concentration of P_4 remains an unanswered.

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