

Effect of microbial activity on dimethyl sulfoxide degradation in air-lift
bioreactor

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Abstract

The acclimatized dimethyl sulfoxide-degrading sludge can possess the ability to convert DMSO to odourless compounds specifically by repeated batches in air-lift bioreactor. Moreover, DMSO usually causes a low microbial biomass growth, unstable operation and malodorous compounds emission in biological treatment because of its characteristic for activated sludge. A main focus of DMSO degrading performance is conducted by original sludge without long-term acclimation using airlift bioreactor in this study. The result indicates various organisms of sludge poisoned by DMSO still secrete inducible oxidoreductase to improve volatile organic sulphur compounds degradation using DMSO as a substrate in air-lift bioreactor. Using this method, the oxidoreductase in the supernatant of working medium is able to remove DMSO concentration from 50 up to 1000 mg L⁻¹ completely by fed batch mode due to LB medium cultures and enhances the microbial activity of activated sludge. An optimal alternative performance was developed; the rate of DMSO biodegradation can accomplish 34.72 mg-DMSO h⁻¹g⁻¹-dry sludge weight. The best result showed the 500 mg L⁻¹ of DMSO could be completely removed with 110 h under repeated mode. Control of microbial activity in high loading of DMSO and carbon content in wastewater were important factors for biodegradation of DMSO.

Keyword : DMSO, VOCs, activated sludge, biodegradation, airlift bioreactor