Performance of a Bioreactor Using Organic Compound and Pall Ring Media for the Treatment of BTEX Vapors

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Abstract

In this study a laboratory-scale biotrickling filter was operated to investigate the performance on treating BTEX (benzene, toluene, ethylbenzene and o-m-p xylenes) vapours in a waste gas stream. In the experiment, a column containing a mixture of compost and Pall rings, and the consortium of microorganisms presents in the compost were tested to biodegrade the vapours of BTEX. Results showed that removal efficiencies were between 86.6 and 93.4% in the phase log (exponential growing) of the consortium microorganisms in the compost after a period of 2-3 weeks for acclimatization for an inlet concentration in the range of 70 to 250 ppm. The maximum elimination capacity (EC) achieved was 29 g/m³·h for a critical loading concentration (CL) of 46 g/m³·h for an empty bed retention time (EBRT) of 2.4 min. The conclusion was that it is valid technology for the treatment of BTEX with the potential of meeting environmental requirements, and its application in Brazil is important as an alternative to more impactful and costly technologies.

Keywords: Biological air treatment, air toxic pollutants control, air emissions control in bioreactors, atmospheric emissions, air pollution.