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Treatment of gaseous volatile organic compounds using a rotating biological filter

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Abstract

Rotating biological filter (RBF), which provides higher oxygen mass transfer has been developed for treating gaseous volatile organic compounds (VOCs) such as BTEX (Benzene, toluene, ethylbenzene and xylene) at higher concentrations. The screening of enriched cultures has been done initially to enhance the performance of RBF for treating xylene, toluene and xylene, and BTEX at various loading rates. The removal efficiency of BTEX was maximum (82%), higher than toluene and xylene (79%), and xylene (72%). The presence of xylene enhanced the removal of toluene in the mixture. In the BTEX, toluene was found to be highly biodegradable followed by ethylbenzene, benzene and xylene. The RBF also removed nutrients from wastewater along with VOCs. The stability study of RBF showed that supply of nutrient media influenced the RBF performance more. Further, the predominant strain identified in the mixed culture was *Enterobacter cloacae* SP4001, responsible for biodegradation of BTEX.

Keywords: Rotating biological filter, BTEX, Mixed culture, Biodegradation, CO₂

1. Introduction

Benzene, toluene, ethylbenzene and xylene (BTEX) are the major volatile organic compounds (VOCs) found in the environment emitted mainly from paint manufacturing, chemical and petrochemical industries (Akmirza et al., 2017). BTEX represent for up to 59% of the gasoline pollutants and account 80% of the total VOCs from petrochemical emissions (El-Naas et al., 2014). The emission of BTEX compounds into the atmosphere causes different environmental problems such as

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