Biotreatment of formaldehyde-contaminated air in a trickle bed bioreactor

Amin Goli\(^a\), Amirreza Talaiekhozani\(^b\), Nicky Eshtiaghi\(^c\), Yusuf Chisti\(^d\), Reza Aramesh\(^e\), Roya Aramesh\(^f\), Ahmad Shamiri\(^{g,h,*}\)

\(^a\)Jami Institute of Technology, Mechanical Engineering Department, Isfahan, Iran, email: amin_goli54@yahoo.com
\(^b\)Jami Institute of Technology, Civil Engineering Department, Isfahan, Iran, email: atalaie@jami.ac.ir
\(^c\)Chemical and Environmental Engineering Discipline, School of Engineering, RMIT University, Victoria, Australia, email: nicky.eshtiaghi@rmit.edu.au
\(^d\)School of Engineering, Massey University, Private Bag 11 222, Palmerston North, New Zealand, email: Y.Chisti@massey.ac.nz
\(^e\)ScomiOiltools Kish Limited, Arasteh Alley, 17 Khodaverdi Street, Pourrehehaj Street, North of Neyyuran Museum, Tehran, Iran, email: reza.aramesh@scomi.ir
\(^f\)Department of Computer and Communication Systems Engineering, Faculty of Engineering, Universiti Putra Malaysia, 43400 Selangor DarulEhsan, Malaysia, email: royn.aramesh@gmail.com
\(^g\)Professional Industrial Research and Development Organization, Lucy Court, Bundoora, VIC 3083
\(^h\)Chemical and Petroleum Engineering Department, Faculty of Engineering, Technology & Built Environment, UCSI University, 56000 Kuala Lumpur, Malaysia, Tel. +603 9101 8880, Fax +6039102 3606, email: ahmadshamiri@gmail.com, shamiri@ucsuniversity.edu.my, (A.Shamiri)

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**ABSTRACT**

A biofilm developed on polyurethane packing in a trickle bed bioreactor was used to effectively remove formaldehyde from contaminated air. Formaldehyde removal depended on the retention time of the gas in the bed as well as on the gas-liquid mass transfer coefficient. Both retention time and the mass transfer coefficient depended on the gas flow rate. At 25±1°C and pH 7, a 99% removal of formaldehyde from air with an initial contamination level of 450 mg L\(^{-1}\) was achieved at a hydraulic retention time of 132 s. The degradation rate was likely limited by oxygen mass transfer. The bioreactor could be operated stably over the pH range of 5 to 7 at 25±1°C. Formaldehyde removal in the bioreactor was mathematically modeled to facilitate design and scale up. The model was shown to agree well with the experimental data. Trickle bed bioreactors offer a potentially viable option for cleaning air streams contaminated with formaldehyde.

*Keywords*: Biofilter; Formaldehyde; Biodegradation; Biofilms; Trickle bed bioreactor

*Corresponding author.*

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