



Bio-treatment of landfill leachate having low Carbon–Nitrogen ratio in a bio-film reactor packed with granular activated carbon under control of oxygen gas concentration

Trabelsi Ismail^{a,*}, Matsuto Toshihiko^b

^aLaboratoire de Traitement des Eaux Usées (LTEU), Centre des Recherches et Technologies des Eaux (CERTE)
BP 273, Soliman 8020, Tunisia

Tel. +216 79 325 044; Fax: +216 79 325 802; email: ismail.trabelsi@certe.rnrt.tn

^bGraduate School of Engineering, Hokkaido University, Kita-13, Nishi-8, Kita-ku, Sapporo 060-8628, Japan

Received 11 August 2010; Accepted 30 June 2011

ABSTRACT

Micro-organisms attached to granular activated carbon (GAC) in a fixed bed reactor were applied to treat synthetic leachate with different ratios of carbon to nitrogen. The leachate treatment reactor used in this study was run in batch operation under control of temperature, circulating flow rate, and oxygen concentration in pore space. The efficiency of a new device was estimated by treating artificial leachate having low levels of C/N ratios (0 to 5) at a temperature of 30°C, flow rate of 40 ml/min and oxygen gas concentration ranging from 1%, 5%, 10%, 15% to 21%. It was found that this device is adequate for the elimination of both dissolved organic carbon and ammoniacal-nitrogen. Even with the absence of external carbon supply, the denitrification process occurred. Partial bio-mass decay is considered the main source that supplies carbon to denitrifying bacteria. The average time needed for the elimination of dissolved organic compound (DOC) and $\text{NH}_4^+ - \text{N}$ was 1 and 2 d, respectively.

Keywords: Leachate; Nitrogen; Oxygen; Activated carbon; Bio-film; C/N ratio

*Corresponding author.