



Effects of sludge retention time (SRTs) on the removals of polycyclic aromatic hydrocarbons (PAHs), chemical oxygen demand (COD), and toxicity in a petrochemical industry wastewater

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Received 26 November 2009; Accepted 4 May 2010

ABSTRACT

In this study, it was aimed to investigate the effects of increasing sludge retention times (SRTs, 5, 10, 25, and 40 d) on dissolved chemical oxygen demand (COD_{dis}), polycyclic aromatic hydrocarbons (PAHs) and acute toxicity removals in an aerobic completely stirred tank (CSTR) reactor system treating raw petrochemical industry wastewater. The reactors were operated with and without rhamnolipid biosurfactant. In both conditions the effluent quality of the CSTR reactor improved with increasing SRT. Addition of 15 mg/l rhamnolipid increased significantly both COD_{dis} and PAH yields. For maximum COD and PAH removals (86 and 86%) the optimum sludge age was found to be 25 d. The effective PAHs concentration affecting half of the *Daphnia magna* organisms (EC_{50} value) was reduced from 65.61 to 1.86 ng/ml at the end of the aerobic treatment at a SRT of 25 d. The EC_{50} value for COD was reduced from 240 to 33 mg/l after aerobic treatment. Toxicity removals which originated from PAHs and COD were 97 and 86%, respectively.

Keywords: Aerobic; *Daphnia magna*; Petrochemical wastewater; Polycyclic aromatic hydrocarbons (PAHs); Sludge retention time; Toxicity

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Presented at the International workshop on urbanisation, land use, land degradation and environment (ULE 2009), 28 September – 1 October 2009, Denizli, Turkey