



Determination of ozone adsorption in activated sludge system and its effect on sludge properties

Sara Rezaee^a, Mohammad-Hossein Sarrafzadeh^{a,*}, Mohammad-Reza Mehrnia^a, Ahmad-Reza Mohammadi^b, Farshid Pajoum-Shariati^a

^a*School of Chemical Engineering, College of Engineering, University of Tehran, P.O. Box 11155-4563, Tehran, Iran, Tel. +98 2161112185; Fax: +98 2166954041; emails: Sararezaie@ut.ac.ir (S. Rezaee), sarrafzdh@ut.ac.ir (M.-H. Sarrafzadeh), Mmehrnian@ut.ac.ir (M.-R. Mehrnia), Pajoum@ut.ac.ir (F. Pajoum-Shariati)*

^b*Manager of Wastewater Operation in Tehran Province Water and Wastewater Co, Tehran, Iran, email: a_dehcheshmeh@yahoo.com*

Received 15 January 2014; Accepted 14 March 2014

ABSTRACT

In this study, the amount of ozone which is adsorbed by the activated sludge system and the effect of ozonation on the sludge properties were investigated. Two batch reactors, one control and one ozonated were used. During the test, the ozonation time was increased from 15 to 185 s, the ozone concentration was 0.73–4.83 mgO₃ g⁻¹ MLSS and the mixed liquid suspended solid (MLSS) was 11–14 g L⁻¹. In an ozonated reactor, with increasing the ozonation time the ozone concentration was determined in order to calculate how much ozone adsorbed in sludge system. It was found that the ozone concentration increased in the activated sludge system with time and after it reached to the maximum level in 40 s, it decreased. Based on the result, MLSS was not affected by ozonation. When ozone dose was less than 3.8 mgO₃ g⁻¹ MLSS, soluble chemical oxygen demand (SCOD) decreased or did not change but while applying dosages higher than 3.8 mgO₃ g⁻¹ MLSS, SCOD increased. In addition, protein and polysaccharide which are the main parameter in fouling in membrane bioreactors decreased when ozone dosage was less than 3.8 mgO₃ g⁻¹ MLSS while they increased when ozone dose is higher than 3.8 mgO₃ g⁻¹ MLSS which showed that ozone could disrupt the cell walls and release the soluble microbial product.

Keywords: Ozonation; Activated sludge; Oxygen uptake rate; Protein; Polysaccharide

*Corresponding author.

Presented at the 5th IWA-ASPIRE Conference, 8–12 September 2013, Daejeon, Korea

1944-3994/1944-3986 © 2014 Balaban Desalination Publications. All rights reserved.