Influence of the water height in aeration regimes with the same membrane diffuser on technical characteristics of aeration system

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ABSTRACT

Deciding on an aeration system technical characteristicssuch as energy efficiency of oxygen transport in refinery waste water and capacity of oxygen introduction is an important question. With the same membrane air distributor, in the same examined range of waste motor oil contents 5 and 10 gm\(^{-3}\) and air flows 2, 6 and 10 m\(^3\)h\(^{-1}\) energy efficiency of oxygen transport is better up to 54% and twice the real capacity of oxygen introduction, in the water column 2 m high, compared to water column 1 m high. The improvement of technical characteristics is achieved in the aeration regimes with the longer retention time between air input and output and minimal electrons density in the gas bubbles. In our paper it is proposed, electrons flux controls the oxygen transport volumetric coefficient, which determines the technical characteristics of aeration system.

Keywords: Membrane air distributor; Water column height; Active and passive oxygen transport coefficients; Electrons density state; Electrons retention molar times; Oxygen potential energy; Oxygen transport molar work; Oxygen surface molar polarization

1. Introduction

This paper examines technical characteristics of the membranes' air distributor, energy efficiency of the oxygen transport in refinery waste water at the same range of waste motor oil content 5 and 10 gm\(^{-3}\) and air flow, 2, 6 and 10 m\(^3\)h\(^{-1}\) depending on water column height 1 and 2 m. Some of the technical indicators of the aeration process installations, stated in the literature and in technical documentations of the producers, for conditions of the clean water aeration are supplied. When the aeration system is designed, it is necessary to use most efficient aeration devices. Experimental method for determination of technical membranes' characteristics is described in previous papers [1–3] based on the material balance of the aeration process [4,5].

According to the literature [4–16], the used membrane air distributor influences dominantly the technical characteristics of aeration systems.*Corresponding author.

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