



“Gheorghe Asachi” Technical University of Iasi, Romania



ASPECTS OF HYDRODYNAMICS AND MASS TRANSFER IN DIFFUSED AERATION SYSTEMS

Gabriela Oprina^{1*}, Florentina Bunea¹, Irina Pincovschi², Lucian Mândrea²

¹INC DIE ICPE-CA, 313 Splaiul Unirii, district 3, 030138 Bucharest, Romania

²UPB, 313 Splaiul Independentei, 060042 Bucharest, Romania

Abstract

The aim of this paper is the theoretic and experimental study of the hydrodynamics and mass transfer of the swarm of bubbles generated by fine bubble diffusers (FBD) made from ceramics. Thus the hydrodynamic parameters of the dispersed air-water system (pressure loss on FBD, bubble size distribution, global gas hold up) were experimentally determined. Regarding mass transfer, the volumetric mass transfer coefficient Kl_a , standard oxygen transfer rate (*SOTR*) and standard aeration efficiency (*SAE*) were also determined. The results showed that Kl_a increases with air flow rate and there is an optimum air flow rate (120÷180 l/h) that gives maximum aeration efficiency. The maximum value of *SAE* (4.25 kgO₂/kWh) was obtained for $Q = 150$ l/h, in homogeneous regime. Comparing the ceramic FBD with a sintered glass FBD issued that an increase of 35% of the mass transfer can be obtained by using glass FBD. Still, *SAE* accomplished by the two types of FBD tested is in the range given by literature or even greater.

Key words: diffused aeration, fine bubbles, mass transfer

Received: March, 2009; *Revised final:* February, 2010; *Accepted:* March 2010

* Author to whom all correspondence should be addressed: e-mail: gabrielaoprina@yahoo.com; Phone: +4021-4029486; Fax: +4021-3468299