Environmental Engineering and Management Journal *June 2015, Vol.14, No. 6, 1241-1246*
http://omicron.ch.tuiasi.ro/EEMJ/

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MODELING THE MIXING PROCESS OF INDUSTRIAL AND DOMESTIC WASTEWATER SLUDGE

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Abstract

An experimental study of mixing in autoclave vessel equipped with an anchor impeller was performed on the sludge proceeding from the treatment of mixed municipal and industrial wastewater. This unit operation is part of a process for the recovery of sludge. The mathematical modelling of the mixing was done having in view the scaling-up of this process. The mathematical model allows the calculation of the mixing power *N* as a function of the impeller diameter *d*, the vessel diameter *D*, the fluid level in the vessel *H* and the Reynolds number *Re*, in a dimensionless equation: $N_p = k \cdot \left(\frac{H}{d}\right)^p \left(\frac{d}{D}\right)^q \mathrm{Re}^r$. Finding the model parameters was the challenge of this work and for this, 384 sets of experimental data were processed. Since *r* was a constant, the parameters *k*, *p* and *q* allow the determination of the function of the dry matter fraction *f*. The good agreement between experimental and computed data in the laminar regime up to *Re* = 10 proves that the model is fit for the dimensioning of industrial mixers.

Key words: anchor impeller, mathematical modelling, mixing power, wastewater sludge

Received: December, 2014; Revised final: June, 2015; Accepted: June, 2015

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