



**“Gheorghe Asachi” Technical University of Iasi, Romania**



---

## **KINETIC MODELING OF DIESEL OIL WASTEWATER DEGRADATION USING PHOTO-FENTON PROCESS**

**Maha A. Tony<sup>1,2\*</sup>, Patrick J. Purcell<sup>2</sup>, Yaqian Zhao<sup>2</sup>,  
Aghareed M. Tayeb<sup>3</sup>, M.F. El-Sherbiny<sup>2</sup>**

<sup>1</sup>*Basic Science of Engineering Department, Faculty of Engineering, Minoufiya University, Minoufiya, Egypt*

<sup>2</sup>*Centre for Water Resources Research, School of Architecture, Landscape and Civil Engineering,  
University College Dublin, Newstead, Belfield, Dublin 4, Ireland*

<sup>3</sup>*Chemical Engineering Department, Faculty of Engineering, Minia University, Minia, Egypt*

---

### **Abstract**

The objective of this study is to develop a mathematical model which would confidently predict the rate of substrate degradation of an oil-water emulsion in a laboratory-scale completely-mixed continuous flow reactor using the photo-Fenton treatment process. Two models are developed from first principles and the predicted substrate removal rates for both models are compared with experimental data. The principal conclusions of the study are that both models produce good correlations with the experimental data at moderate to long hydraulic retention times, but, at short hydraulic retention times, there is some divergence between the predicted and measured data. This disparity may be attributable to a greater degree of short-circuiting through the reactor at short hydraulic retention times.

*Key words:* diesel oil-wastewater emulsion, mathematical modeling, photo-Fenton, reaction kinetics

*Received: January 2011; Revised final: July, 2012; Accepted: July, 2012*

---