



“Gheorghe Asachi” Technical University of Iasi, Romania



A NEW PHOTO-FENTON PROCEDURE APPLIED IN OXIDATIVE DEGRADATION OF ORGANIC COMPOUNDS FROM WASTEWATER

**Cristina Orbeci¹, Ion Untea^{1*}, Rodica Stanescu¹,
Adina Elena Segneanu², Mihaela Emanuela Craciun¹**

¹*“Politehnica” University of Bucharest, Faculty of Applied Chemistry and Materials Science,
1-7 Gh. Polizu Street, 011061 Bucharest, Romania*

²*National Institute of Research and Development for Electrochemistry and Condensed Matter, Timisoara,
144 A. P. Podeanu Street, 300569 Timisoara, Romania*

Abstract

This paper presents a new photo-Fenton procedure applied in oxidative degradation of organic pollutants using 4-chlorophenol (4-CP) as low biodegradable testing compound. The homogeneous photo-Fenton process was modified by using a photo-catalytic reactor equipped with a steel wire mesh which acts as source for Fe²⁺ catalyst generation into reaction medium and as heterogeneous catalyst, by iron oxy-hydroxyl compounds formation on the surface. The oxidation process was evaluated by measuring the organic substrate concentration changes using COD, TOC, HPLC and LC-MS analyses, in correlation with modification of solution pH and Fe^{2+/3+} concentration as function of reaction time. The oxidation rate is higher at the beginning of the process and then slows down, being controlled by the nature of the intermediate oxidation products and by the change of Fe(III)/Fe(II) molar ratio into the solution. The new photo-Fenton procedure is simple but effective, combining the advantages of homogeneous and heterogeneous photo-Fenton processes.

Key words: 4-chlorophenol; in situ Fe²⁺ catalyst generation; oxidation; photo-Fenton process

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* Author to whom all the correspondence should be addressed: e-mail: i.untea@yahoo.com; Phone: +40727792523