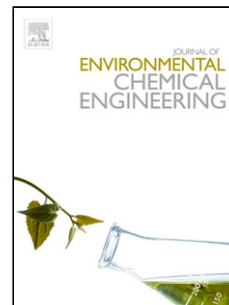


Accepted Manuscript

Title: Mineralization of the antineoplastic drug carboplatin by heterogeneous photocatalysis with simultaneous synthesis of platinum-modified TiO₂ catalysts

Authors: Vasiliki Kitsiou, George A. Zachariadis, Dimitra A. Lambropoulou, Dimitrios Tsiplakides, Ioannis Poullos



PII: S2213-3437(18)30157-X
DOI: <https://doi.org/10.1016/j.jece.2018.03.036>
Reference: JECE 2277

To appear in:

Received date: 12-1-2018
Revised date: 14-3-2018
Accepted date: 17-3-2018

Please cite this article as: Vasiliki Kitsiou, George A. Zachariadis, Dimitra A. Lambropoulou, Dimitrios Tsiplakides, Ioannis Poullos, Mineralization of the antineoplastic drug carboplatin by heterogeneous photocatalysis with simultaneous synthesis of platinum-modified TiO₂ catalysts, Journal of Environmental Chemical Engineering <https://doi.org/10.1016/j.jece.2018.03.036>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Mineralization of the antineoplastic drug carboplatin by heterogeneous photocatalysis with simultaneous synthesis of platinum-modified TiO₂ catalysts

Vasiliki Kitsiou ^a, George A. Zachariadis ^a, Dimitra A. Lambropoulou ^a, Dimitrios Tsiplakides ^a, Ioannis Poullos ^{a, *}.

^a *Department of Chemistry, Aristotle University of Thessaloniki, 54124 Thessaloniki, Greece*

* Corresponding author. Aristotle University of Thessaloniki, Department of Chemistry, 54124 Thessaloniki, Greece.

HIGHLIGHTS

- TiO₂ photocatalytic oxidation of platinum anticancer drug carboplatin was studied
- Photo-reduction of Pt ions occurred simultaneously with photo-oxidation of the drug
- For TiO₂/UV-A, 100% deposition of Pt is achieved within 60 min of photo-oxidation
- Synthesized Pt-modified TiO₂ P25 was more effective compared to the unmodified one

E-mail address: poullos@chem.auth.gr (I. Poullos).

Abstract

Photocatalytic oxidation of carboplatin, a platinum antineoplastic drug, has been investigated in aqueous heterogeneous solutions containing TiO₂ photocatalysts. The current study, besides the photocatalytic degradation of the drug, examines the utilization of the photo-reduction process occurring on the surface of the catalyst, leading simultaneously to the photo-deposition and recovery of platinum. TiO₂ photocatalytic process was evaluated for its ability to degrade the molecule of carboplatin and concurrently result in the synthesis of efficient platinum modified TiO₂ catalysts. The degradation kinetic was studied under different operational conditions, such as type of photocatalyst, catalyst loading, initial pH and addition of electron acceptors. Three systems were evaluated namely, TiO₂ P25 under UV-A and TiO₂ Kronos vlp 7000 under UV-A or visible illumination, with respect to their activity for substrate degradation and mineralization and their ability to bind platinum on their surface during photocatalytic oxidation of the drug. The initial degradation rate (r_0) decreased in the order TiO₂ P25/UV-A > TiO₂ Kronos vlp 7000/UV-A > TiO₂ Kronos vlp 7000/visible light. For TiO₂ P25/UV-A, the

Download English Version:

<https://daneshyari.com/en/article/6664040>

Download Persian Version:

<https://daneshyari.com/article/6664040>

[Daneshyari.com](https://daneshyari.com)