



národní
úložiště
šedé
literatury

Titanium Dioxide as Photocatalytic Agent

Spáčilová, Lucie
2014

Dostupný z <http://www.nusl.cz/ntk/nusl-175038>

Dílo je chráněno podle autorského zákona č. 121/2000 Sb.

Tento dokument byl stažen z Národního úložiště šedé literatury (NUŠL).

Datum stažení: 10.04.2024

Další dokumenty můžete najít prostřednictvím vyhledávacího rozhraní [nusl.cz](http://www.nusl.cz).

Titanium dioxide as photocatalytic agent

L. Spacílová, Y. Maleterova, ¹Z. Kresinova, ¹T. Cajthaml, O. Solcova

Institute of Chemical Process Fundamentals of the ASCR, v.v.i., Department of Catalysis and Reaction Engineering, Rozvojova 135, 16502 Prague 6, Czech Republic, tel.: +420220390139, e-mail: spacilova@icpf.cas.cz; ¹Institute of Microbiology, ASCR, v.v.i., Videnska 1083, 14220 Prague 4, Czech Republic; tel.: +420241062498.

Endocrine disruptors (ED's) are hormonally active substances. It is a large group of compounds of anthropogenic and natural origin, which have similar structural features as the hormone estrogen and, consequently, are able to imitate it. Endocrine disruptors are defined by the Environmental Protection Agency (EPA) as exogenous substances that act on the hormonal system of the body. Nowadays, their occurrence in environment has been rising tremendously. Photocatalysis on appropriate metal oxides seems to be the effective method for the environment protection.

Bisphenol A, 17 α - ethynylestradiol and 4-nonylphenol, which are commonly found in wastewaters, were used as the model substances. Photocatalytic reaction proceeded on titanium dioxide coated in four layers on glass beads or the inner surface of glass tubes. For activation of photocatalyst the UV lamp Philips HOK 4/120 SE, 400 W medium pressure mercury lamp with wavelength 250 - 420 nm was used. Elimination of these substances was monitored by HPLC module. Toxicity and the estrogenic activity of compounds as well the possible intermediates were determined by the luminescence method.

The batch and continuous flow photocatalytic reactors were applied for evaluation of ED's degradation. The initial concentration of ED's was in the range 10 to 20 ppm. The batch reactor was chosen for the long time experiments and the flow rates in the plug flow reactor varied between 0.2 - 2 ml/min.

The efficiency of the titania thin layers for degradation of mentioned endocrine disruptors in water solution was 85% in average. ED's degradation activity and selectivity were compared for both arrangements with respect to the possible application.

Based on the laboratory results the arrangement of experiments with the real wastewater from the municipal sewage treatment plants was chosen.

Acknowledgement

The financial support of the Technology Agency of the Czech Republic No. TA01020804 and the NATO project SPS (NUKR. SFPP) 984398 is gratefully acknowledged.