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Mineralization of 4-nitrophenol by ozone in the presence of magnetic composite catalyst consisting of titanium dioxide and magnetite

© **Dmitry A. Kazakov**,[+] **Vladimir V. Volkhin**,* **Yulia O. Gulenova**, **Marina N. Obirina**, and **Dar'ya A. Rozhina**
Chemistry and Biotechnology Department. Perm National Research Polytechnic University. Komsomolskiy St., 29. Perm, 614990. Russia.
Phone/fax: +7 (342) 239-15-11. E-mail: kazakovbiotech@mail.ru

*Supervising author; [+]Corresponding author
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Abstract

The results of studying the process of 4-nitrophenol mineralization by ozonation in the presence of titanium dioxide with different structures are presented. It was found that the highest rate of 4-nitrophenol mineralization was observed in the presence of amorphous titanium dioxide. It was shown that the magnetite does not affect the rate of 4-nitrophenol mineralization. A procedure for the synthesis of magnetic composite catalyst consisting of amorphous titanium dioxide and magnetite is proposed. The dependence of the catalytic activity of the composite catalyst during 4-nitrophenol mineralization by ozonation on content of magnetite was determined. It was found that introducing of magnetite particles into amorphous titania phase up to 30 wt %. increased catalytic activity of the composite. Further increase of magnetite content in the catalyst up to 50 wt %. led to decrease of its activity. The higher catalytic activity of the composite catalyst in comparison with amorphous titania can be explained by higher specific surface area and higher pore volume of the composite. It was found that composite catalyst containing 30 wt % of magnetite, which showed the highest catalytic activity, consists of particles with surface from catalytically active phase (titanium dioxide) and inner part from magnetic phase (magnetite).