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## OPTIMIZATION OF PHOTO-CATALYTIC PROCESS BY TiO<sub>2</sub> NANO POWDER IMMOBILIZED ON CONCRETE SURFACE FOR TREATMENT OF PHENOLIC WASTEWATER

Mohammad Delnavaz<sup>1</sup>, Bita Ayati<sup>1\*</sup>, Hossein Ganjidoust<sup>1</sup>, Sohrab Sanjabi<sup>2</sup>

<sup>1</sup>Tarbiat Modares University, Civil & Environmental Engineering Faculty, Environmental Engineering Division,  
P.O.Box 14155-4838, Tehran, Iran

<sup>2</sup>Tarbiat Modares University, Material Engineering Department, Nano Materials Division, P.O.Box 14155-4838, Tehran, Iran

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### Abstract

In this paper, photo-catalytic process for treatment of phenolic wastewater by TiO<sub>2</sub> nano powder immobilized on concrete surface in a recirculation hydraulic flow was investigated. The process affected by different operational conditions that the optimum ones could be obtained from variables interchange. Taguchi method as a proper method for design of experiments and optimization was used to find optimum conditions. Selected five parameters at four levels were consists of initial phenol concentration, UV lamps power, pH, TiO<sub>2</sub> concentration and UV lamp distance from concrete surface. L16 (45) orthogonal array for experimental planning and the bigger-the-better response category was applied to obtain optimum conditions. Analysis of variance (ANOVA) was used to determine the most significant parameters affecting the removal efficiency of phenol. Based on the S/N ratio, influent phenol concentration and solution pH had the most effect in removal efficiency and distance of UV lamps to concrete surface was found to be an insignificant parameter. Long term use of process showed that decrease in phenol removal efficiency was less than 5% and SEM-EDX confirmed TiO<sub>2</sub> nano photo-catalyst immobilized on concrete surface after several process cycles.

*Key words:* analysis of variance, phenol destruction, nano powders, photo-catalytic oxidation, Taguchi method

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\* Author to whom all correspondence should be addressed: e-mail: [ayati\\_bi@modares.ac.ir](mailto:ayati_bi@modares.ac.ir); Phone: +98 21 8288 3328; Fax: +98 21 8288 4914