

Photocatalytic ozonation for degradation of 2-sec-butyl-4,6-dinitrophenol (DNBP) using titanium dioxide: effect of operational parameters and wastewater treatment

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Abstract The results of degradation efficiency of 2-sec-butyl-4,6-dinitrophenol (DNBP) in a batch system by various advanced oxidation processes revealed the order of $\text{TiO}_2/\text{UV}/\text{O}_3 > \text{TiO}_2/\text{O}_3 > \text{UV}/\text{O}_3 > \text{O}_3 > \text{UV}/\text{TiO}_2$. All processes followed pseudo-first order kinetics. The influence of operational parameters such as initial pH, initial concentration of DNBP, ozone and catalyst dosage on the $\text{TiO}_2/\text{UV}/\text{O}_3$ process, which was the most significant investigated method. The ozone dosage was found to have the noticeable impact on the process; however, initial pH and TiO_2 dosage were less effective. The mineralization of 40 mg/L of DNBP and petrochemical wastewater under the obtained optimal conditions was monitored by total organic carbon and chemical oxygen demand, respectively. The results demonstrated that the $\text{TiO}_2/\text{UV}/\text{O}_3$ process was a very effective method for degradation and mineralization of DNBP in aqueous solutions and industrial wastewater. The degradation intermediates were identified by GC–MS.

Keywords 2-Sec-butyl-4,6-dinitrophenol · Advanced oxidation processes · Photodegradation · Photocatalytic ozonation · TiO_2

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