

## TiO<sub>2</sub> Solar Light Photocatalysis a Promising Treatment Method of Wastewater with Trinitrotoluene Content

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**Abstract :** 2,4,6-Trinitrotoluene (TNT) is the most common pollutant identified in wastewater generated from munitions plants where this explosive is synthesized or handled (munitions load, assembly and pack operations). Due to their toxic and suspected carcinogenic characteristics, nitroaromatic compounds like TNT are included on the list of priority pollutants and strictly regulated in EU countries. Since their presence in water bodies is risky for human health and aquatic life, development of powerful, modern treatment methods like photocatalysis are needed in order to assure environmental pollution mitigation. The photocatalytic degradation of TNT was carried out at pH=7.8, in aqueous TiO<sub>2</sub> based catalyst suspension, under sunlight irradiation. The enhanced photo activity of catalyst in visible domain was assured by 0.5% Fe doping. TNT degradation experiments were performed using a tubular collector type solar photoreactor (26 UV permeable silica glass tubes series connected), plug in a total recycle loops. The influence of substrate concentration and catalyst dose on the pollutant degradation and mineralization by-products (NO<sub>2</sub><sup>-</sup>, NO<sub>3</sub><sup>-</sup>, NH<sub>4</sub><sup>+</sup>) formation efficiencies was studied. In order to compare the experimental results obtained in various working conditions, the pollutant and mineralization by-products measured concentrations have been considered as functions of irradiation time and cumulative photonic energy Q<sub>hν</sub> incident on the reactor surface (kJ/L). In the tested experimental conditions, at tens mg/L pollutant concentration, increase of 0,5%-TiO<sub>2</sub> dose up to 200mg/L leads to the enhancement of CB degradation efficiency. Since, doubling of TNT content has a negative effect on pollutant degradation efficiency, in similar experimental condition, prolonged irradiation time from 360 to 480 min was necessary in order to assure the compliance of treated effluent with limits imposed by EU legislation (TNT ≤ 10μg/L).

**Keywords :** wastewater treatment, TNT, photocatalysis, environmental engineering

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