



## Photocatalytic degradation of acetaminophen in aqueous solution in the presence of montmorillonite nanosheets modified with titanium dioxide

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### ABSTRACT

In this study, the photocatalytic degradation of acetaminophen was investigated using montmorillonite nanosheets modified with titanium dioxide (TiO<sub>2</sub>). This study was experimental and conducted on a laboratory scale. Identification of montmorillonite nanosheets modified with TiO<sub>2</sub> was performed by various techniques such as Fourier transform infrared (FT-IR), X-ray diffraction, and TEM. For degradation of acetaminophen, aqueous solutions with different concentrations of acetaminophen, ultraviolet (UV) radiation, and a montmorillonite nanoparticles modified with TiO<sub>2</sub> catalyst were used. Parameters affecting photocatalytic reactions including pH (3–11), catalyst dose (0.1–1 g L<sup>-1</sup>), initial concentration (2–25 mg L<sup>-1</sup>), and contact time (15–150 min) were investigated. The concentration of acetaminophen was determined by spectrophotometer at 243 nm wavelengths. The FT-IR confirmed the presence of TiO<sub>2</sub> on the montmorillonite nanosheets modified with TiO<sub>2</sub>. Using two other methods of detection, it was found that montmorillonite nanoparticles modified with TiO<sub>2</sub> is more than 100 nm. The results showed that the maximum removal efficiency (100%) of acetaminophen was achieved at pH = 7, catalyst dose of 0.75 g L<sup>-1</sup>, the concentration of 2 mg L<sup>-1</sup> and contact time of 120 min. The results of this study showed that montmorillonite nanosheets modified with TiO<sub>2</sub> catalyst under the UV radiation is an effective method for removal of acetaminophen from aqueous solution.

**Keywords:** Montmorillonite nanosheets; TiO<sub>2</sub>; Photocatalyst; Acetaminophen

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