



Full Length Article

## Photocatalytic degradation of metoprolol in aqueous medium using a TiO<sub>2</sub>/natural zeolite composite



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### ARTICLE INFO

#### Keywords:

Emerging pollutants  
Metoprolol  
TiO<sub>2</sub>  
Zeolitic support  
Photodegradation

### ABSTRACT

Photodegradation of metoprolol using a TiO<sub>2</sub> and Mexican natural zeolite composite (T/MZ) was studied. The photocatalyst was successfully synthesized by physical mixing method where commercial TiO<sub>2</sub> Degusa P25 was supported on thermochemical modified clinoptilolite. X-ray diffraction, scanning electron microscopy, energy-dispersive X-ray spectroscopy and Fourier transform infrared spectroscopy confirmed the TiO<sub>2</sub> incorporation over the clinoptilolite surface without structural changes of the zeolite. Point of zero charge of 6.2 was found for the T/MZ, while the bandgap energy of 3.15 eV was obtained by UV-Vis diffuse reflectance spectroscopy. Photodegradation tests of metoprolol as a model emerging pollutant were carried out, finding that the T/MZ composite to have superior degradation percentages than the commercial TiO<sub>2</sub> P25 for all the pH values tested (3–9), which demonstrates a synergistic effect between the semiconductor material and the zeolitic support. Finally, it was found that the kinetics degradation of metoprolol follows the Langmuir, Hinshelwood, Hougen