

REMOVAL OF BENZOTHIOPHENE FROM ORGANIC SOLUTION BY A COMBINED PHOTODEGRADATION-ADSORPTION METHOD

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ABSTRACT

A combined photodegradation-adsorption method was established for removal of benzothiophene from organic solution. In the first stage, the photocatalyst was prepared by immobilization of nano-crystalline titanium dioxide on natural zeolite; clinoptilolite by sol-gel process. The synthesized photocatalyst was characterized by XRD, TEM, SEM and FTIR techniques. Photodegradation of benzothiophene in n-hexane solution was studied under ultraviolet irradiation. The effect of different parameters such as irradiation time, photocatalyst amount, TiO₂ content and initial concentration of benzothiophene was studied and optimized. The results showed that the kinetics of reaction is first order and at optimized conditions 92% of benzothiophene was decomposed. The reaction products were identified by GC and GC-MS techniques. Adsorption of the products by two zeolites clinoptilolite and β -zeolite was examined. The results showed that β -zeolite removed all sulfur containing degradation products so that the remaining product was deeply desulfurized.

KEYWORDS: Benzothiophene; Photodegradation; Titanium isopropoxide; Clinoptilolite; β -zeolite.