

Phenol Removal from Water in the Presence of Nano-TiO₂ and a Natural Activated Carbon: Intensive and Extensive Processes

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Abstract : In this work, two photocatalytic processes for the degradation of phenol in water are presented. The first one is extensive (EP), which is carried out in a treatment chain of two steps, allowing the adsorption of the pollutant by a naturally activated carbon from the grapes. This operation is followed by a photocatalytic degradation of the residual phenol in the presence of TiO₂. The second process is intensive (IP) and is realized in one step in the presence of a hybrid photocatalytic nanomaterial prepared from naturally activated carbon and TiO₂. The evaluation of the two processes, EP and IP, is based on the analytical monitoring of the initial and final parameters of the water to be treated, i.e., the phenol concentration by liquid phase chromatography (HPLC) and total organic carbon (TOC). For both processes, the sampling was carried out every 10 min for 120 min of treatment time to measure the phenol concentrations. The elimination and degradation rates in the case of the intensive process are better than the extensive process. In both processes, the catechol molecule was detected as an under product of degradation. In the IP case, this intermediate phenol was totally eliminated, and only traces of catechol persisted in the water.

Keywords : photocatalysis, hybrid, activated carbon, phenol

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