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KINETICS AND EQUILIBRIUM STUDIES OF REACTIVE YELLOW 125 ADSORPTION ON A NITROGEN DOPED TiO₂ MODIFIED ZEOLITE

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Abstract

In this study, the adsorption mechanism of a reactive azo dye, Reactive Yellow 125 (RY 125), onto a nitrogen doped TiO₂ modified zeolite (Z-TiO₂-N) has been examined in order to identify the affinity of the material for the investigated pollutant envisaging its degradation by heterogeneous photocatalysis. Equilibrium experiments were performed and the data obtained were fitted with different isotherm equations, i.e., Langmuir, Freundlich, and Dubinin-Radushkevich (D-R). The Freundlich isotherm gave the best description of the adsorption process with a correlation coefficient of 0.8963. Adsorption kinetics has been studied in terms of pseudo-first-order, pseudo-second-order and intra-particle diffusion models. The results showed that pseudo-second-order kinetic model is the most appropriate to describe the uptake process satisfactorily. All determined equilibrium and kinetic parameters showed that the process is mainly governed by a physical mechanism rather than an electrostatic attraction, as confirmed by Zeta potential measurements.

Key words: adsorption, nitrogen doped TiO₂, Reactive Yellow 125, zeolite

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