

Removal of Maxilon Red Dye by Adsorption and Photocatalysis: Optimum Conditions, Equilibrium, and Kinetic Studies

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Abstract : The present work has for main objective the elimination of the textile dye Maxilon Red (MR) by two processes, adsorption on activated clay followed by photocatalysis in presence of ZnO as a photocatalyst. The influence of the physical parameters like the initial pH, adsorbent dose of the activated clay, the MR concentration and temperature has been studied. The best adsorption yield occurs at neutral pH ~ 7 within 60 min with an uptake percentage of 97% for a concentration of 25 mg L⁻¹ and a dose of 0.5 g L⁻¹. The adsorption data were suitably fitted by the Langmuir model with a maximum capacity of 176 mg g⁻¹. The MR adsorption is well described by the pseudo second order kinetic. The second part of this work was dedicated to the photocatalytic degradation onto ZnO under solar irradiation of the residual MR concentration, remained after adsorption. The effect of ZnO dose and MR concentration has also been investigated. The parametric study showed that the elimination is very effective by this process, based essentially on the in situ generation of free radicals *OH which are non-selective and very reactive. The photodegradation process follows a first order kinetic model according to the Langmuir-Hinshelwood model.

Keywords : maxilon red, adsorption, photodegradation, ZnO, coupling

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