

Removal of malachite green from aqueous solutions by organic clay

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Malachite green (4-[(4-dimethylaminophenyl)-phenyl-methyl]-N,N-dimethyl-aniline, MG), also called aniline green and basic green 4, is a toxic chemical primarily used as a dye. The chemical was classified a Class II Health Hazard because it was found to be toxic to human cells and might cause liver tumor formation. However, due to its ease and low cost to manufacture, it is still used in certain countries with less restrictive laws for non-aquaculture purposes. In June 2007, US FDA blocked the importation of several varieties of seafood due to continued MG contamination. In this study, batch sorption experiments were carried out to remove MG from aqueous solution using organic clay. Recently there have been many reports on the synthesis and characterization of organically modified derivatives of magnesium phyllosilicate (organoclay) because of its wide applicability. Among various organic clays, aminopropyl-functionalized magnesium phyllosilicate (AMP) clay is increasingly used in many research fields because of its ease production and relatively low cost. The operating variables studied were pH, temperature, contact time and dye concentration. Adsorption experiments showed that the process was strongly pH-dependent (Fig. 1). Kinetic studies showed that the process reached equilibrium in 120 min. The data were modeled using the pseudo-first and second order kinetic equations and intraparticle diffusion model. Equilibrium isotherm was analyzed using the Langmuir and Freundlich models and the parameters have been determined.

Fig. 1. Effect of initial pH on the removal of MG.