"Gheorghe Asachi" Technical University of Iasi, Romania

ADSORPTION OF A BASIC DYE ONTO ESMEGEL CLAY

Paula M.S.S. Luís[1], Chia-Yau Cheng[2], Rui A. R. Boaventura[1*]

[1]*University of Porto, LSRE-Laboratory of Separation and Reaction Engineering, Associate Laboratory LSRE/LCM, Faculty of Engineering, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal*
[2] *University of Porto, LES – Laboratory of Sanitary Engineering, Department of Civil Engineering, Faculty of Engineering, Rua Dr. Roberto Frias, 4200-465 Porto, Portugal*

Abstract

This study focus on the possibility of removing the basic textile dye Astrazon Blue FGGL 300% 03, from an aqueous solution, using Esmegel clay as adsorbent. The characterization of the adsorbent included the distribution of particle size, physical textural properties, chemical composition and determination of the point of zero charge. The equilibrium isotherms were determined at 20 and 30 °C, pH at 6.0 and 7.5 and adjusted to the Langmuir and Freundlich models, having the latter led to better fitness. The kinetic studies were conducted at various pH values (4.8, 6.5 and 8.0), temperatures (20, 30 and 50°C) and initial dye concentrations (100, 120, 150 and 180 mg/L). The pseudo-first order, pseudo-second order, Elovich and intraparticle diffusion models were used to describe the adsorption kinetics, but the experimental data were best fitted by the Elovich model. The intraparticle diffusion is involved in the process of adsorption (between 4 and 20 min), yet it is not the controlling step. The activation energy was calculated from the initial adsorption rate obtained from the adjustment to the Elovich model. Equilibrium and kinetic tests were also carried out using a simulated effluent containing the dye and a dyeing auxiliary product.

Key words: adsorption, Astrazon Blue FGGL, dyeing effluents, Esmegel clay, sepiolite

---

* Author to whom all correspondence should be addressed: E-mail: bventura@fe.up.pt; Phone: +351225081683