SYNTHESIS OF CARBON-BASED MATERIALS WITH NANOMETRIC PROPERTIES APPLIED TO TEXTILE DYE ADSORPTION

K. S. Silva\textsuperscript{1}, E. M. P. L. Freire\textsuperscript{2}, D. C. S. Sales\textsuperscript{3}, E. H. L. Falcão\textsuperscript{1}, M. N. Carvalho\textsuperscript{2}

\textsuperscript{1} Department of fundamental chemistry, University Federal of Pernambuco (UFPE), 1235 Prof. Moraes Rego Avenue, Postal Code 50670-901, Recife-PE, Brazil. \textsuperscript{2} Department of Chemical Engineering, University Federal of Pernambuco (UFPE), 1235 Prof. Moraes Rego Avenue, Postal Code 50670-901, Recife-PE, Brazil. \textsuperscript{3} Polytechnic School of Pernambuco, University of Pernambuco (UPE), 455 Benfica Street, Postal Code 50720-001, Recife-PE, Brazil.

Along with science and technology advancement and due to their important thermomechanical properties, carbon-based nanomaterials have been indicated for very diverse technological applications, among which dye wastewater treatment. In this context, two nanometric materials, graphite oxide (GO) and reduced graphite oxide (rGO) were synthesized and applied as adsorbents of direct blue dye (SFGL). Adsorption equilibrium studies were performed under previous optimized operating conditions, such as adsorbent mass, initial dye concentration, pH and time. For GO synthesis the modified Hummers method was used, while the rGO was obtained by chemical reduction of the GO through sodium borohydride addition. Characterization techniques were used in order to evaluate the textual, morphological and structural properties of the materials. Scanning electron microscopy (SEM) showed a set of several leaves of GO and rGO, observing that rGO leaves are thicker than the GO leaves. The structure of the carbon nanomaterials was confirmed by the X-ray diffraction (XRD). The GO diffractogram showed a peak at 2? (10.99º), the rGO showed well defined planes (002) and (100). The surface areas obtained from the 78 K nitrogen adsorption isotherms by the BET and Langmuir methods for GO and rGO were 56 m\textsuperscript{2} g\textsuperscript{-1} and 129 m\textsuperscript{2} g\textsuperscript{-1} (BET) and 343 m\textsuperscript{2} g\textsuperscript{-1}; m\textsuperscript{2} g\textsuperscript{-1} (Langmuir), respectively. The adsorption equilibrium results were satisfactory for both materials, reaching 100% dye removal. The experimental data were adjusted to the BET multilayer equilibrium model. In conclusion, the synthesized materials, GO and RGO, presented nanometric properties and proved to be efficient when applied as adsorbents of the textile dye.

Keywords: Nanomaterials, Characterization, Adsorption

References:


**Presenting author's email:** karo.lyne.silva@outlook.com