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Characterization of textile effluent treated by adsorption with residual adsorbent generated in the aluminum industry

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Abstract

The textile industry uses large quantities of synthetic dyes in the process of textile processing. The generation of non-fixed dye in the textile substrates contributes to the pollution of the effluents. In order to comply with the legislation and strategies of Cleaner Production, the textile industries have been looking for sustainable alternatives for the treatment of effluents. A poorly exploited but potentially adsorbent material for the removal of color from textile effluents is the residue generated in the oil filtration process used in the lamination of aluminum sheets. For the textile industry to use this residue, an assessment of the characterization of their behavior becomes necessary. A textile effluent composed of 3BL solophenyl red dye and chemical additives commonly used by the textile industry was used. The experiments were performed in batch, adding 20 g of the residue and 500 mL of the effluent. The pH was adjusted to 4 with HCl, and the reaction was kept under stirring at 300 rpm for 30 minutes. The effluent was filtered through Buckner's funnel, centrifuged and the recovered liquid was evaluated for absorbance at 280 and 531 nm, pH, Chemical Oxygen Demand (COD), and anions. The results showed that the pH of the treated effluent did not change during the adsorption process. The reduction of the absorbance at 280 nm shows a possible reduction of the aromatic compounds and the absorbance at 531 nm indicated 95% of the color removal of the effluent color. The COD of the effluent treated in relation to the raw effluent showed a reduction of 64.1%. In terms of ions measured in the treated effluent, it was observed an increase in chloride and sulphate ion contents and a reduction of phosphate ions in relation to the effluent. It can be concluded that the adsorbent generated from the waste studied from aluminum industry may be an adsorbent used to treat effluents in textile industry. The increase of sulfate ions in the effluent treated by the adsorbent raises the need for future studies that demonstrate the potential of reuse of the treated water.

Keywords: adsorbent, textile industry, aluminum industry, textile effluent, waste.