Chemically modified sugarcane bagasse as a potentially low-cost biosorbent for dye removal

Abstract

The use of adsorbent prepared from sugarcane bagasse, an agro waste from sugar industries has been studied as an alternative substitute for activated carbon for the removal of dyes from wastewater. Adsorbents prepared from sugarcane bagasse were successfully used to remove the methyl red (MR) from an aqueous solution in a batch reactor. This study investigates the potential use of sugarcane bagasse, pretreated with phosphoric acid (SBC), for the removal of methyl red from simulated wastewater. Phosphoric acid treated sugarcane bagasse was used to adsorb methyl red at varying dye concentration, adsorbent dosage, pH and contact time. A similar experiment was conducted with commercially available powdered activated carbon (PAC) and untreated sugarcane bagasse (SB) in order to evaluate the performance of SBC. The adsorption efficiency of different adsorbents was in the order PAC > SBC > SB. The initial pH 3 to 6 favoured the adsorption of synthetic dyes by both SBC and SB. This prepared adsorbent was very efficient in decolorized diluted solution. It is proposed that SBC, in a batch or stirred tank reactors could be employed as a low-cost alternative in wastewater treatment for dyes removal.