عنوان فارسی مقاله:
حذف مالاشیت گرین از محلول آبی با استفاده از دانه قهوه بدون روغن

عنوان انگلیسی مقاله:
Removal of Malachite Green from aqueous solution using degreased coffee bean
4. Conclusion

The study shows that DCB, an agro-based material, can be used as an adsorbent for removal of MG from aqueous solutions. The adsorption characteristics of MG in aqueous solution were shown to be influenced by several factors. The adsorption was highly dependent on initial dye concentration, reaction temperature and pH. The result of the present investigations showed that degreased coffee beans have higher adsorption efficiency than raw coffee beans. The adsorbed amount of MG increased as initial MG concentration increase. Kinetic studies indicated that the sorption might have followed the pseudo second-order kinetic model though the correlations coefficients from the pseudo first-order kinetic were as well relatively high for the range of concentrations studied. MG adsorption onto degreased coffee beans followed both Freundlich model and Langmuir model. Thermodynamic studies showed that the adsorption processes were spontaneous and endothermic since $\Delta G^\circ$ value was negative and $\Delta H^\circ$ value was positive. Increase in MG color removal was observed with corresponding increase in pH from pH 2–6 and then monotonically increase from pH 6 to 12. Coffee beans are abundantly available in the food industry. Taking into consideration all the above obtained results, it can be concluded that DCB can be an alternative material to more costly adsorbents used for dye removal in wastewater treatment processes. Therefore, the use of this low-cost material by small scale dyeing unit using batch or stirred-tank flow reactors is recommended for a direct solution.