

Valorization of a Forest Waste, Modified P-Brutia Cones, by Biosorption of Methyl Geen

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Abstract : The removal of Methyl Green dye (MG) from aqueous solutions using modified P-brutia cones (PBH and PBN), has been investigated work. The physical parameters such as pH, temperature, initial MG concentration, ionic strength are examined in batch experiments on the sorption of the dye. Adsorption removal of MG was conducted at natural pH 4.5 because the dye is only stable in the range of pH 3.8 to 5. It was observed in experiments that the P-brutia cones treated with NaOH (PBN) exhibited high affinity and adsorption capacity compared to the MG P-brutia cones treated with HCl (PBH) and biosorption capacity of modified P-brutia cones (PBN and PBH) was enhanced by increasing the temperature. This is confirmed by the thermodynamic parameters (ΔG° and ΔH°) which show that the adsorption of MG was spontaneous and endothermic in nature. The positive values of ΔS° suggested an irregular increase in the randomness for both adsorbent (PBN and PBH) during the adsorption process. The kinetic model pseudo-first order, pseudo-second order, and intraparticle diffusion coefficient were examined to analyze the sorption process; they showed that the pseudo-second-order model is the one that best describes the adsorption process (MG) on PBN and PBH with a correlation coefficient $R^2 > 0.999$. The ionic strength has shown that it has a negative impact on the adsorption of MG on two supports. A reduction of 68.5% of the adsorption capacity for a value $C_e = 30$ mg/L was found for the PBH, while the PBN did not show a significant influence of the ionic strength on adsorption especially in the presence of NaCl. Among the tested isotherm models, the Langmuir isotherm was found to be the most relevant to describe MG sorption onto modified P-brutia cones with a correlation factor $R^2 > 0.999$. The capacity adsorption of P-brutia cones, was confirmed for the removal of a dye, MG, from aqueous solution. We note also that P-brutia cones is a material very available in the forest and low-cost biomaterial

Keywords : adsorption, p-brutia cones, forest wastes, dyes, isotherm

Conference Title : ICCIS 2016 : International Conference on Chemical Industry and Science

Conference Location : Jeddah, Saudi Arabia

Conference Dates : January 26-27, 2016