Development of Boron Doped Multi-Walled Carbon Nanotubes as a Potential Adsorbent for the Removal Of Turbidity and Conductivity from Abbatoir Wastewater

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Abstract

Boron doped multiwalled carbon nanotubes (B-MWCNTs) was successfully developed using a bimetallic catalysts of Fe – Ni/ Kaolin via a Catalytic Chemical Vapour Deposition method at 750oC, which was used to produced the MWCNTs and later doped with boric acid. The B-MWCNTs developed was used for the treatment of "abbatoir wastewater" for the removal of turbidity and conductivity. Characterization of SEM, EDS and TEM analysis was conducted on the Fe – Ni/Kaolin catalyst, MWCNTs and B-MWCNTs produced. Adsorption studies such as effect of contact time at 10 min – 60 min with difference interval of 10min was used. Effect of adsorbent dosage of different masses of 0.05g – 0.3 g (difference interval of 0.05g) and temperature effect ranging from 30oC – 70oC (difference interval of 10oC) was successfully carried out in the laboratory. From the data's gotten so far it was clearly illustrated that as time, adsorbent dosage and temperature all increases so as the purification process increases also, decreasing the concentration of pollutant in the reaction continuously.

Further model analysis was analysed, such as Kinetic adsorption studies (Pseudo-first order, Pseudo-second order and elovich method, were all employed) and the kinetic adsorption model fitted with the second order R2 of 0.9979 and 0.9951 for turbidity and conductivity. For isotherm adsorption analysis (Langmuir and Freundlich model were used) turbidity corresponds with Freundlich model R2 of 0.967, while conductivity corresponds with R2 of Langmuir 0.9297. And finally thermodynamic model of ΔH (-ve), ΔS(+ve) and ΔG(-ve) was obtained respectively.

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