

Fertilizer Plant Waste Carbon: An Efficient Adsorbent for Basic Blue 9

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Abstract

A waste product, fertilizer plant waste carbon (WC) was investigated as adsorbent for the removal of cationic dye, basic blue 9 (BB9) from aqueous solution. WC is an abundant and low cost natural adsorbent generated by fertilizer plants during manufacture of ammonia. A series of experiments were conducted in a batch mode technique in order to assess the effect of the system variables, i.e. adsorbent dose, initial dye concentration, initial pH of dye solution, particle size and temperature. The results showed that as the amount of adsorbent increased from 0.1g/L to 0.5g/L, the percentage of dye sorption increases from 57% to 99.9% after an equilibrium contact time of 2 hours. The adsorption kinetics and isotherms showed that the adsorption process was better fitted by pseudo-second order equation and Langmuir equation, respectively. The Langmuir monolayer adsorption capacity of WC for basic blue 9 was increased from 71.4 to 100 mg/g with increase in temperature from 303K to 333K. The adsorption mechanism was supported by means of FTIR, XRD spectra and FE-SEM micrographs. The results of the adsorption process indicated that waste carbon is an attractive candidate for application in the treatment of industrial effluents.

