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Study of an Activated Carbon System for the Treatment of Fermentation Wastewater from a Bioethanol Production Process

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Abstract: *The performance of activated carbon system for the treatment of wastewater from a bioethanol process was studied. Studies were performed using fermentation wastewater from bioethanol process containing salts and dissolved organics to determine the adsorption capacity of activated carbon to remove the dissolved organics. Continuous studies in a packed column containing sand and activated carbon resulted in the removal of dissolved organic compounds but the salts concentration was not significantly affected. Batch studies using the bottle point technique generated the specific adsorbate and equilibrium concentration data which fitted both the Langmuir and Freundlich isotherms with the former giving a better fit. The Freundlich capacity factor and the Freundlich intensity parameter were found to be 2.248 and 0.369, respectively. The Langmuir constant's a and b were found to be 58.82 and 0.0009, respectively. Using these parameters, a contacting system with multiple contacting beds in series is recommended due to the short bed life. Based on design calculations, for an effluent with a flow rate of 500 L/min with an empty bed contact time of 30 min allowed, 675 kg of activated carbon would be required to reduce the dissolved organic compound concentration by 74%.*

Keywords: *Fermentation wastewater, Activated carbon, adsorption isotherm, adsorption capacity*