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FACULTY OF APPLIED SCIENCES

DEPARTMENT OF APPLIED CHEMISTRY

Vinasse Effluent Treatment Using Waste Sugar Cane Bagasse Fly Ash

By

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ABSTRACT

Biofuels such as bioethanol have played a big role in meeting the global energy demand. The final products of the bioethanol industry are bioethanol itself, bagasse fly-ash and vinasse. Vinasse is produced in the distillation process and its direct disposal on land, surface water, groundwater or even for crop irrigation or dust mitigation in plantation roads pollutes the environment. Bagasse fly-ash, a potential particulate air pollutant was used in the present study as an adsorbent to investigate COD reduction and pH adjustment for sugar cane vinasse, combined sugar cane vinasse effluent, molasses vinasse as well as an edible oils refinery effluent. Various parameters such as contact time, adsorbent dose, pH, initial contact time were optimized batch wise. The effect of particle size was also observed. Contact time and fly-ash dose were optimised for pH buffering application. A maximum removal of 72% was observed with combined vinasse effluent of $16\ 116\ \text{mgL}^{-1}$ initial COD with batch conditions of: Adsorbent Dose: 4.5 g; Effluent Volume: 100 mL; Buffered pH₀: 7; Shaking Speed: 240 rpm; Contact Time: 180 mins; Particle size: 90 – 125 μm . Similar performance was observed on a simple column setup. The adsorption data was found to fit the Freundlich model best and the kinetics fit the Pseudo-Second Order Model.