البحث الرابع

Optimisation and characterisation of bioadsorbent based on barley straw and coconut shell

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Journal of Environmental Engineering and Science 17(2): 89–98, June, 2022
https://doi.org/10.1680/jenes.21.00026

Abstract

Cost efficiency and environmental friendliness of biomass-derived adsorbents for wastewater treatment are explored. Preparation of bio-adsorbents that are economically and environmentally sustainable has achieved an enormous interest in water treatment. A single-step method for preparing a high-capacity adsorbent is shown in this study by refluxing barley straw (BS) and coconut shell (CS) in concentrated sulfuric acid. Using response surface methodology predicts the optimum parameters for production of the bio-adsorbent based on the yield and the adsorption capacity for methylene blue dye. Optimal conditions for the sulfuric acid refluxing stage were obtained
at 94% sulfuric acid, 10 liquid/solid (L/S) ratio for 2 h and 98% sulfuric acid, 4 L/S ratio for 2.5 h for BS and CS,
respectively. The produced bio-adsorbent was characterised by scanning electron microscopy coupled with energy
dispersive X-ray scattering, X-ray diffraction, Fourier transform infrared spectroscopy, thermo gravimetric analysis,
Raman spectroscopy, and Brunauer–Emmett–Teller specific surface area, analysis. The detailed analysis showed that
the bio-adsorbent produced from BS and CS has good adsorptive properties – thermal stability and high specific
surface area, which are 11.759 and 1.165m2/g, respectively. The results indicate that BS and CS are critical and

potential low-cost raw materials for the production of bio-adsorbents.