



Low-temperature Activated Carbon from Mixed Biomass Oil Palm Residuals (fibrilla and cuesco) for Use in the Treatment of Oily Water

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Abstract:The present research aimed to prepare low temperature activated carbon from cuesco and oil palm fibrilla in a ratio of 50-50 % w w⁻¹ with an impregnation ratio of 1:2 and 1:3 zinc chloride (ZnCl₂) to be used in the oily substances adsorption in synthetic solutions. The biomass was initially washed, reduced in size and sieved with particle sizes between 2 mm and 1 mm. Afterwards, 10 g of cuesco and 10 g of fibrilla were weighed, mixed, homogenized and impregnated with aqueous ZnCl₂ solutions, the impregnated biomass was filtered and heated for 40 min with a ramp of 5°C min⁻¹ from 150°C to 350°C and then activated with 0.1 M HCl. The precursor (mixture of cuesco and fibrilla) was characterized by analysis of Fourier Transform Infrared Spectroscopy (FTIR) and synthesized carbons were characterized by Brunauer Emmett Teller (BET), Scanning Electron Microscopy (SEM) and X-Ray Diffraction (DRX) analysis. The presence of cellulose, hemicellulose and pectin, and activated carbon of zinc and chlorine on the surface of both carbons were found in biomass, the almost total deterioration of the bands corresponding to lignin and cellulose, and surface areas of 23.24 m²g⁻¹ and 12.38 m²g⁻¹, respectively. Adsorption tests of methylene blue and iodine index showed that carbon 1:2 showed better adsorption capacity. The experimental adsorption data were best adjusted by Elovich's kinetic model and Freundlich's isotherm. Therefore, the use of mixed biomass for the preparation of activated carbon can be used in the adsorption of oil present in water.

Keywords: low temperature, cuesco and palm fiber, BET, DRX, Elovich Model, Freundlich Model, SEM.

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