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EXPERIMENTAL STUDY OF THE ADSORPTION OF METHYL RED ON COAL FROM THE SHELL OF THE COCOA POD

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Abstract

The adsorption of pollutants by coal from agricultural waste is a promising way of depollution of the environment. This is due to the affordable production cost and efficiency of coal. This research work focuses on the adsorption of methyl red on coal from cocoa pod shell. In this work, the contact time, the effect of pH and the quantity of initial material on the adsorption kinetics of methyl red were analysed. The experimental results of the adsorption of methyl red on this coal have been applied to kinetic models and adsorption isotherms. The cocoa pod shells were ground using Retsch SK100 mills. Pyrolysis was carried out at 400°C in a muffle furnace of the Nabatherm 30-3000°C type. The maximum adsorption capacity (q_m) of the methyl red dye was 12.232 mg/g. And the equilibrium time was found at 40 minutes. This maximum adsorption capacity varies from 7.536 to 27.544 mg/g with a variation in the quantity of material from 0.002 to 0.018 moles. The same applies to the pH. From pH = 3.56 to pH = 10, The maximum adsorption capacity of methyl red varies from 6.39 to 13.88 mg/g. The results obtained show that basic pH allows for better removal efficiencies. With a correlation coefficient of 0.9986, the kinetic adsorption profile was well described by the pseudo-second order model. And with a correlation coefficient of 0.9937, the adsorption equilibrium was well described by the Langmuir isotherm model.

Keywords: adsorption, cocoa shell pod, coal, kinetic, methyl red

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