Integration of Mechanical and Chemical Treatment in the Hydrological Cycle of the Paper and Pulp Industry

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Today, the water crisis is growing overall in the world, not only in terms of the little amount of water but also in the misuse of water resources. The paper and pulp industry is a major contributor to Egypt's water crisis and environmental pollution. It consumes a massive amount of water, approximately 17,000 gallons/ton of Paper. This project aims to develop efficient water treatment procedures in paper and pulp industries via adsorption of lignocellulosic derivatives in wastewater and control the whole process using an automated mechanical unit for water consumption monitoring. Furthermore, a new Modified Activated Charcoal (MAC) was synthesized from Ficus Nitida tree branches and characterized by BET, BJH, and FTIR. During the activation of MAC, the carbon is impregnated in a basic alkaline solution using magnesium hydroxide (Mg(OH)2) under a temperature of 340C for 1.35 hours. The results of multi-layer adsorption BET and BJH of one gram of charcoal revealed an average specific surface area (SSA) of 120.32 m^2/g, pore volume of 0.861 cc/g, and average pore radius of 0.26512 nm. At the same time, the maximum adsorption percentage was 84.13% and achieved by UV-Vis spectrophotometer after 20 minutes at 50 Celsius. These results could be considered promising solutions for worldwide water scarcity by minimizing the amount of water consumed in paper and pulp manufacture and treating the wastewater realized from the industrial process.

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