OPTIMIZATION STUDY ON THE ADSORPTION OF REMAZOL ULTRA RED RGB DYE FROM AQUEOUS SOLUTIONS USING PALM LEAVES AS NATURAL BIOADSORBENT

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Abstract - Water pollution is an undeniable problem threatening human life and other living creatures. Dyes are one of the contaminants causing water pollution due to their substantial and unconscious usage in various industries such as; textile, paper, food, cosmetics, printing, leather, pharmaceutical, plastic, etc. [1]. Remazol Ultra Red RGB dye is classified into reactive dyes groups which are mainly used to dye cellulose fibers due to their capability making covalent bonds with fiber [2]. Remazol Ultra Red RGB is mostly used in the textile industry due to its attractive features such as bright color and colorfastness [3]. Hence, the proper removal of Remazol Ultra Red RGB dye from aqueous solutions has become a crucial requirement due to its substantial availability in the aquatic environment leading to undesirable environmental problems. Many methods are used to remove dye from aqueous solutions and one of them is adsorption. Adsorption is the most commonly used method as it has many advantages. The advantages of adsorption include its simple design, high efficiency, low price and easy maintenance [4]. For the adsorption process, the most preferred adsorbents are activated carbons because of their adsorption capacities. But, these are high-cost adsorbents. Industrial wastes, agricultural by-products, and natural materials are economical and easy to find and these features make them alternative materials to high-cost adsorbents [5]. In the present study, palm leaves which are agricultural waste were used as an efficient adsorbent to remove the Remazol Ultra Red RGB dye. The response surface methodology was successfully developed to model and optimize the adsorption process. Three process conditions including temperature (25-45°C), adsorbent dosage (0.5-2.0 g) and pH (2-4) were optimized to get the best response of dye removal using the Box-Behnken design.

Keywords - Adsorption, Dye Removal, Palm Leaves, Remazol Ultra Red RGB.

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