

# Acid Dye Remediation through Pyrolytic Fresh Charcoal of Waste Footwear Sole

Adhir Chandra Paul<sup>1</sup>, Md. Shehabur Rahman<sup>2</sup>, Suman Biswas<sup>3</sup>, Nupur Paul<sup>4</sup>

<sup>1,2,3</sup> Khulna University of Engineering and Technology (KUET), Bangladesh

<sup>4</sup> Statistics Discipline, Khulna University, Bangladesh

## Abstract

The elimination of acid dyes from an aqueous solution has been accomplished using fresh charcoal made from natural rubber (NR) soling material. An acid dye has been utilized as the adsorbate. Firstly, cut waste soling materials into small pieces and then burnt in order to prepare the charcoal. This charcoal was mixed with dyeing water. The solution was settled down for a few minutes and was centrifuged. Then it was filtrated and checked into spectroscopy. The burning operation was done by pyrolysis process which produced the oil as a by-product. The process was done at a low cost and it was almost environment friendly. From this experiment, we have known what was the optimum dose, contact time of charcoal, the optimum concentration, and the pH of dyeing water for the elimination of dye matters from the dyeing solution. Finally, the result was found that a pH level of 7.1 was effective for the adsorption of acid dye by char of natural rubber. The rate-limiting stage for the present adsorption procedure has been identified as intra-particle diffusion of dye molecules within the fluid. Here, the optimum adsorption efficiency of natural rubber was found at 0.2g of the adsorbent for a concentration of 300 mg/L. According to the findings, NR could be used as a successful substitute for commercial activated carbon in wastewater treatment to get rid of acid dyes.

**Keywords:** adsorption process, aqueous solution, natural rubber, spectroscopy, wastewater