

# REMOVAL OF PONCEAU4R DYE FROM AQUEOUS SOLUTIONS BY NOVEL ADSORBENTS PREPARED FROM PEANUT SHELL AND $Fe_3O_4$ NANOPARTICLES

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## ABSTRACT

*The purpose of this study is to suggest an efficient process ,Adsorption ponceau4r using peanut shell and modified into a novel magnetic nano adsorbent by co precipitating it with  $Fe_3O_4$  were studied as adsorbent by batch method. The effects of some important physical and chemical parameters such as the initial dye concentration, sorbent dosage, contact time, temperature and pH on the sorption of selected dye introduced adsorbent were investigated.*

**Keywords:** Peanut shell,  $Fe_3O_4$  nanoparticles, Ponceau4R dye, Adsorption.

## 1. INTRODUCTION

Discharging of dyes into water resources even in a small amount can affect the aquatic life and food web. Most of these dyes are harmful when brought in contact with living tissues for a long time. The discharge of the dyes to the river stream without proper treatment causes irreparable damage to the crops and living beings[1].

Various techniques have been designed to remove dyes, such as adsorption coagulation, photo degradation, ion exchange, chemical oxidation and electrochemical treatments .Among them, adsorption has been found to be superior to other techniques for dye wastewater treatment in terms of its efficiency, versatility and simplicity of design. As a result, various adsorbents such as activated carbon, charcoal, graphene , carbon nanotubes, biosorbents and magnetic nano materials, have been tested to reduce dyes concentrations from aqueous solutions. Magnetic separation is considered as a quick and effective technique for separating magnetic particles from aqueous solutions[2].

Currently, magnetic nanoparticles have seen widespread application in fields like mineral separation, magnetic storage device, heat transfer application in drug delivery system, and others, due to their unique magnetic properties They have also become widely used in wastewater treatment because of their good adsorption efficiency resulting from the higher surface area and active sites for interaction with metallic species, and they can be synthesized easily[3].

Magnetic nanoparticles also satisfy the ease of separation requirement; the removal of the magnetic nanoparticles from the adsorption solution can be easily attained by the use of an external magnetic field. Accordingly, magnetic iron oxide nanoparticles represent an effective, economic and non-harmful candidate for adsorption researches .Nevertheless, the high surface energy of the magnetic nanoparticles may cause aggregation during catalytic reactions[4]. In this work ,the removal of ponceau4r from aqueous solutions was investigated using peanut shell and magnetic nano particles( $Fe_3O_4$ ) adsorbent from aqueous solutions under different experimental