

MALACHITE GREEN DYE DEGRADATION USING ZnCl₂ ACTIVATED *RICINUS COMMUNIS* STEM BY SUNLIGHT IRRADIATION

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ABSTRACT

The degradation capacity of Malachite Green is tested with ZRCS using Sunlight irradiation by batch mode experiments such as the effect of pH, the effect of contact time, the effect of adsorbent dosage and initial dye concentration. The result indicates that the maximum degradation of Malachite Green is obtained as 85.30% at pH 6 in 90 minutes. The optimum conditions for the degradation of Malachite Green dye are 40ppm initial dye concentration and optimum dose of the carbon is 0.2g. The isotherms and isotherm constants are described by using Langmuir and Freundlich isotherm models for the degradation of Malachite Green using ZRCS. The Langmuir and Freundlich Models are very well fitted with the equilibrium data. The value of q_e is 16.6mg/g for Malachite Green on ZRCS. From the value of q_e , it is fitted well with a pseudo first order kinetics. ZRCS could be used as an effective adsorbent in cationic dye degradation.

Keywords: *Ricinus Communis* stem, ZnCl₂, degradation capacity, Malachite Green, Adsorption isotherms, Kinetics.

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INTRODUCTION

Water is the most important compound for the survival of human beings, animals and plants. But the continuous increase in various activities by human beings like urbanization and industrialization is the main reason for causing pollution of water bodies.^{1,2,3} The aqueous streams are contaminated by dyeing process carried out in leather, paper, textile, printing, cosmetics and food industries.⁴ Discharge of the organic dyes into the environment cause serious problems such as Chemical Oxygen Demand, Biological Oxygen Demand, Increase of toxicity and human health issues.^{5,6,7} Malachite green is a basic triphenylmethane dye (C₂₃H₂₅N₂Cl) used for dyeing of anionic fabrics bearing negative charge such as nylon, silk, acrylics and wool for a bright appearance.⁸ The structure of Malachite Green has amino group and chromophores with positive ions and it is soluble in water.

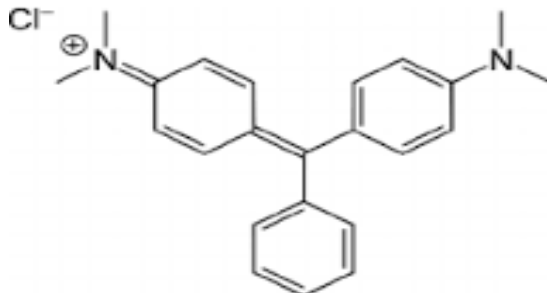


Fig.-1: Chemical Structure of Malachite Green