

ADSORPTION ISOTHERM AND KINETIC STUDIES ONTO REMOVAL OF REACTIVE YELLOW -14 DYE BY USING IXORA COCCINEA LEAF POWDER

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ABSTRACT

Dyes are a complex organic compound which is used by various industries to color their products. These dyes enter the water which makes them polluted. Today, color removal from wastewater has been a matter of concern, both in the aesthetic sense and health point of view. Color removed from textile effluents on a continuous industrial scale has been given much attention in the last few years, not only because of its potential toxicity but also mainly due to its visibility problem. *Ixora coccinea* leaves have been used for the removal of Reactive Yellow-14 dye. The adsorption studies are undertaken in a systematic manner and effect of different parameters such as adsorbent dosage, agitation time, and pH of the aqueous solution on the removal of the dye is determined. pH results to be an interesting variable and dye removal decreases as pH increases. The adsorption-equilibrium was represented with Freundlich, Langmuir and Temkin isotherms. The adsorption process followed the first order kinetics. The results indicated that the dye, Reactive Yellow-14 strongly interacts with a Biomass-based adsorbent; the *Ixora Coccinea* leaf powder.

Keywords: *Ixora Coccinea* Leaf Powder (ICLP), Reactive Yellow-14 dye (RY-14), Adsorption Isotherm, Kinetics, Dye removal, Adsorption.

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INTRODUCTION

Water is one of the important ecosystems for the existence of the biotic species. If we do not save the water properly it would lead to loss of biodiversity. Industrial and agricultural wastes highly pollute present water sources¹. Dyes and pigments present in wastewater which are discharged from various industries like textile, paper, leather and paint² are hazardous to human and pollute the environment. It is estimated that the textile and dyeing industry uses more than 7×10^5 Metric tons of dye per year³.

Dyes possess complex molecular structure and they are generally aromatic⁴. Dyes are highly colored polymers and low biodegradable in nature, dyes have many different and complicated molecular structures and difficult to treat⁵, the dyes are one of the important parts of the pollution problems as it is estimated that 50% of their amount is not fixed on fiber and remain finally in wastewater⁶. Before final disposal, the dye effluents should be treated to permissible limits⁷. Comparing to other industries the textile industry ranks first in using dyes⁸. Reactive dyes have been a great concern for protecting the water ecosystem because many azo dyes and the breakdown products have been found toxic to aquatic life, mutagenic/ carcinogenic and genotoxic effect and up to 50% of reactive dyes are lost through hydrolysis during the dyeing process⁹. Reactive dyes are widely used in the textile industries and fibers through chemical combining¹⁰.

Adsorption techniques for wastewater treatment have become popular in recent years due to the removal of pollutants. Adsorption is used in the removal of pollution from the wastewater. Water pollution can be