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**THESIS TOPIC: ADSORPTION STUDIES ON THE REMOVAL OF METAL IONS AND DYES FROM INDUSTRIAL EFFLUENTS USING LOW-COST ADSORBENTS**

## **SUMMARY**

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The present thesis describes the studies on the adsorptive uptake of some dyes (direct red 81 and rhodamine B) and metal ions (Cr(VI)) from aqueous solution by some low-cost adsorbents. The thesis comprises of six chapters.

**Chapter I** deals with the Introduction and the survey of available literature on the subject. In this work the naturally occurring kaolinite clay (KL), and bamboo sawdust (BSD) have been utilised as adsorbents for adsorption studies. Kaolinite clay was coated with MgO whereas the lemon peels was modified with sulphuric acid. A chemical modification of bamboo sawdust was carried out by treating it with citric acid and sulphuric acid.

**Chapter II** of the thesis describes the materials and methods used for the preparation of adsorbents and their characterization. The adsorbents were characterized by EDX analysis, FT-IR spectra, X-ray diffractometry (XRD) and scanning electron microscopy (SEM). The optimization of various process parameters such as initial adsorbate concentration, adsorbent dose, agitation time, temperature and pH are discussed. Various adsorption isotherm models such as Langmuir, Freundlich, Dubinin-Kaganer-Radushkevich (DKR), Temkin, Harkin-Jura and Halsey as well as the kinetic models including liquid-film diffusion and intra-particle diffusion models are described. Thermodynamic parameters for all adsorbate-adsorbent systems are given.

**Chapter III** deals with the adsorptive removal of direct red 81 dye from wastewater using (a) kaolinite clay (KL) and MgO-coated kaolinite clay (MKL), and (b) bamboo sawdust (BSD) and citric acid modified bamboo sawdust (CMBSD) as adsorbents.

**Chapter IV**, deals with the studies on the removal of direct red 81 (DR81) and rhodamine B (RhB) dyes from aqueous solution using sulphuric acid treated bamboo sawdust (SBSD) and waste lemon peels (SLP) adsorbents is presented.

**Chapter V** deals with the adsorption of chromium(VI) by bamboo sawdust (BSD), citric acid modified bamboo sawdust (CMBSD) and sulphuric acid treated bamboo sawdust (SBSD) from aqueous solution.

**Chapter VI** deals with the references. Above 200 references have been cited.

**Conclusion:** The present studies revealed that the developed adsorbents are inexpensive, eco-friendly and quite efficient for the removal of dyes and metal ions from aqueous solutions. Undoubtedly, modified low-cost adsorbents showed higher adsorption capacity as compared to that of native adsorbents. Moreover, these adsorbents can be utilized for real world applications due to their working at pH 7, which is the pH of most natural water resources.