

LOW-COST LABORATORY SCALE LATERITE-BASED FILTER FOR REMOVAL OF INDUSTRIALLY USED COLOURING SUBSTANCES

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Water soluble dyes, such as azo dyes, anthraquinone, formazan, and pthalocyanine are extensively used in textile, paper, and ceramic industries. Physico-chemical methods, such as adsorption, coagulation and precipitation, filtration, and oxidation have been used for the treatment of such coloured effluents. Nevertheless, surface water may become coloured when highly colored industrial effluents are discharged without proper treatment.

Laterite, among many natural substances such as termite mount-clay, saw-dust, kaolinite, and dolomite, offers a significant ability for removal of coloured substances, in particular, industrial dyes used in textile and synthetic fibre industries. The efficiency of the removal process strongly depends on conditions such as solution pH, amount of adsorbent, and size of laterite particles. Treatment of 100 cm³ of coloured dye solutions within the concentration range of 0.1 mg/dm³ to 10 mg/dm³ with wet laterite, under optimized conditions, results in the maximum removal efficiency of about 90-92%. Adsorption isotherm and recovery studies suggest that the removal occurs through ion exchange in conjunction with surface adsorption. More importantly, laterite-packed columns are able to decrease the Chemical Oxygen Demand (COD) by 60%. Although the percent removal is higher for the laboratory prepared solutions, it is little less for industrial effluents due to interferent effects.

A filter based on laterite, developed by extending the above stated methodology, also shows excellent results. As such filters simulate real situation, the proposed methodology would open an alternative avenue, which is environmentally friendly and cost-effective, for the treatment of coloured industrial effluents.