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Sustainable Dye Effluent Treatment using Banana Case Adsorbents

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Abstract
Dyes have a synthetic origin and complex aromatic molecular structures. These structures make them more stable and more difficult to biodegrade. Aside from the degradation of dyes or dye waste, the decolorization of wastewater is also important. Because the color in dye wastewater is highly visible, it must be treated. Now a days technology of wastewater treatment has difficulty in meeting all the practical requirements of harmless wastewater discharge and therefore, the exploration and development of new technologies to treat various types of wastewaters are vitally needed. The main objective of the work is to prepare an activated adsorbent from waste leaves and banana trunk for removing the colour from effluent. This project not only deals with the dye related waste but also harmful chemicals in the water. These industries spend a lot of money in cleaning these wastes but nature has a solution for everything this activated charcoal adsorbent can adsorb all the color in the water along with the chemicals and help to filter the water. This filterate can be removed again and can be used as a fertilizer to plants as it has a lot of carbon and nitrogen content which enriches the nutrition of the plant.To evaluate the efficiency of the activated waste leaves and banana trunk, column adsorption technique is selected in the removal of synthetic dye. Finally, the challenges and prospects of wastewater treatment are summarized.

Keywords: Decolorization, Dyes, Wastewater, Scavengers, Activated carbon, Chemical Activation,

1. Introduction
Nowadays, due to population and urbanization, demand for resources is increasing. To fulfill the demands industrial growth takes place which leads to increased wastewater generation. The dying process discharges around fifteen to twenty percent of colors with effluents. Colors contain natural toxins, whose potential is carcinogenic. Classification of dyes can be done based on their application and chemical structure. The treatment of textile wastewater is considered a challenging process, representing a major threat for water receiving bodies due to the chemical composition and the high concentration of dye in the wastewater. Complex effluents are generated by industries such as textile, cosmetics, pharmaceutical, paper and food among others.The treatment ofdye wastewater from textile and dyestuff industries is not easy. Dyes have a synthetic origin and complex aromatic molecular structures. These structures make them more stable and more difficult to biodegrade. Aside from the degradation of dyes or dye waste, the decolorization of wastewater is also important. Because the color in dye wastewater is highly visible, it must be treated. The major treatment methods for dyes and dye wastes are biochemical and physiochemical methods. Basic dyes, which are water-soluble in an aqueous solution, yield colored cations. The available physical-chemical and biological technology for dye removal is very expensive and causes secondary pollution as they lead to sludge formation. Textile dyes are reactive toward the chemicalfunctions present on the fiber surface.

2. Treatment
Textile dye wastewater is an important component of industrial wastewater. It is estimated that approximately 70,000 tons of dye are used in the textile industry each year, and approximately 40 % will eventually become pollutants and endanger environmental health. Wastewater from the textile dye industry accounts for 17 %–20 % of total industrial wastewater. Chemical textile dyestuffs have complex compositions, easy synthesis, stable chemical structures, and difficult decomposition characteristics. Most textile dyestuffs have biological toxicity, carcinogenicity, and teratogenicity. Among industrial wastewater, textile dyestuff wastewater is one of the most difficult to decompose, and has high chroma, high biochemical oxygen demand, and a high content of dissolved solids. Most dyes

are highly resistant to biodegradation because of the need to maintaincolor and structural integrity in the application, and in particular, azo dyes are easily converted into dangerous aromatic amines under hypoxic conditions. The treatment methods for textile wastewater include physical treatment, oxidation, and biological treatment. Currently, most textile dye wastewater treatments use a secondary treatment process, which is mainly composed of a biochemical process (anaerobic system) and a physicochemical process (coagulation sedimentation or air flotation).

However, new dyes and technologies have significantly changed the composition and properties of wastewater and increased textile wastewater treatment difficulties. The degradation efficiency of traditional wastewater treatment decreases markedly, and there is a pressing need to explore high-efficiency wastewater treatment technologies. AOPs are widely used in waste-water treatment because of their advantages. The untreatedeffluents released by the textile industry contain a diverse range of organic pollutants, the most prevalent of which are textile. Azo dyes, which contain one or more azo groups structurally, are the largest class (above 60%) among the various groups of textile dyes and the most widely used dyes in the textile industry. Inefficient textile dyeing processes cause 15–50% of azo dyes that are not bound to fibers and fabrics to be released into generated wastewater. Some textile factories treat their wastewater to degrade the free azo dyes released into the environment, while others discharge untreated industrial effluents directly into bodies of water, posing serious ecotoxicological threats as well as toxic effects on living organisms. Farmers in developing countries used to irrigate their agricultural lands with wastewater containing untreated industrial effluents, which had a negative impact on soil quality and crop germinationrate.

3. Materials Used

Colors contain natural toxins, whose potential is carcinogenic. Classification of dyes can be done based on their application and chemical structure. The treatment of textile wastewater is considered a challenging process, representing a major threat for water receiving bodies due to the chemical composition and the high concentration of dye in the wastewater. Complex effluents are generated by industries such as textile, cosmetics, pharmaceutical, paper and food among others.The treatment ofdye wastewater from textile and dyestuff industries is not easy. Dyes have a synthetic origin and complex aromatic molecular structures. These structures make them more stable and more difficult to biodegrade. Aside from the degradation of dyes or dye waste, the decolorization of wastewater is also important. Because the color in dye wastewater is highly visible, it must be treated. The major treatment methods for dyes and dye wastes are biochemical and physiochemical methods. Basic dyes, which are water-soluble in an aqueous solution, yield colored cations.

- Teak leaves
- Banana tree trunk
- Orthophosphoric acid
- Muffle furnance

4. Summary and Breif Conclusion

Wastewater is a major environmental impedimentfor the growth of the textile industry besides the other minor issues like solid waste and resource waste management. The textile industry uses many kinds of synthetic dyes and discharge large amounts of highly colored wastewater as the uptake of these dyes by fabrics is very poor. This highly colored textile wastewater severely affects photosynthetic functioninplants.It also has an impact on aquatic life due to low light penetration and oxygenconsumption.So, this textile wastewater must be treated before its discharge. Hence in this project, treatment method to treat the textile wastewater have been presented.It is concluded that the activated carbon produced from teak leaves and banana trunk can be effectively used for the dye removal from industrial effluent. The efficiency of banana trunk (Musa)is comparatively higher than that of teak leaves (Tectonagrandis). So that the ratio of teak leaves and banana trunk (2:1) shows higher color removal efficiency. Thus, the treated water is used for construction,laundering,farming.

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