BATCH ADSORPTION STUDY OF METHYL VIOLET DYE IN AQUEOUS MEDIUM USING COCONUT SHELL ADSORBENT

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ABSTRACT
Dye industries and many others industries which uses dyes and pigments generates wastewater, characteristically high in colour and organic content. Most of the industries such as textile, paper, carpet, and printing use dyes and pigments to color their products. Among various physical and chemical methods used for removal of dyes, adsorption has shown better decontamination efficiencies. Although many commercial adsorbents are preferred, the researchers go in search of alternative low-cost adsorbents. In this study, application of powdered coconut shell as adsorbent which has been modified to remove Methyl Violet dye has been investigated. Adsorption of Methyl Violet dye was found to be very effective with this coconut shell adsorbent.

Keywords: Methyl Violet dye, Coconut shell, Adsorption, Adsorbent.

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1. INTRODUCTION
Development of industries has led to the problem of many types of pollution. Because of scarcity of water in many areas we are in need to preserve the available water. When population
has started to increase, demand also increased. Earlier it was believed that the water bodies like oceans were very large to pollute.

Many types of wastes from industries are produced by various processes in industries which releases materials that are noted as useless while manufacturing a product. Industrial wastes are in various forms like toxic waste, chemical waste, industrial solid waste and municipal solid waste.

Many industries discharge wastewater including coloring dyes as sediments which leads to various many health hazards. Most of the dyes used are not biodegradable. They cause water pollution and severely affects the environment mainly aquatic ecosystem.

Adsorption is the best processes to treat dye wastewater. Previously only widely used adsorbents were in practice for treatment purposes but many researches are now conducted to use cheaply available natural materials.

2. METHODOLOGY

2.1. Coconut Shell
Coconut Shell was cleaned with water and dried. Then powdered and sieved. Then soaked in dilute H₂SO₄ and again dried oven. Now the chemically modified natural coconut Shell was obtained as adsorbent.

2.2. Methyl Violet dye solution
Methyl Violet dye sample was made by mixing the dye in water.

2.3. Experimental batch mode
The experiment was conducted in an orbital shaking incubator and 50 mg of coconut shell powder is taken with 20 ml of Methyl Violet dye aqueous solution. After certain time, concentration of Methyl Violet dye was analyzed.

3. DISCUSSIONS

There are many evaluation studies included for determining the the operational indices such as temperature, pH, moisture content, compost maturity indices like carbon, nitrogen, C/N ratio, sulphur, Fourier Transform Infra-Red (FTIR) analysis and Scanning Electron Microscope (SEM) images in any treatment process. In this study the effect of contact time, pH are varied. (T E Kanchanabhan et al, 2011)

3.1. Study of contact time
The study of contact time was conducted with initial Methyl Violet dye concentration of 10mg/L and with 50mg of adsorbent and pH adjustments. The adsorptive removal of Methyl Violet dye by coconut shell without varying concentration initially has been shown in fig.1. There was no change in removal of dye after 100 minutes.
3.2. Study of pH
The variation of pH was conducted with 10mg/L of Methyl Violet dye. The values of pH were between 2 to 12. This resulted in tremendous adsorptive removal of Methyl Violet dye. This clearly shows that ions like H+ or OH- helps in Methyl Violet dye adsorption by coconut shell.

3.3. Study of variation of Methyl Violet dye concentration
The concentration of Methyl Violet dye was varied. It is significantly proved that at low concentration, the dye molecules to the available surface area is very less and the adsorption becomes independent of dye. But at large number of dye molecules the available places becomes low and thus the adsorptive removal of Methyl Violet dye is depends on its dye molecules initially.
3.4. Study of Coconut shell adsorbent dosage

The study of dosage of coconut shell on adsorptive removal of dye at same concentration was studied by varying dosage of coconut shell from 50 mg to 500mg. It shows that adsorptive removal increases with increase in the coconut shell dosage. It is due to surface area of Coconut Shell and due to many sites of adsorption.

4. CONCLUSION

Adsorptive removal of Methyl Violet dye with chemically modified Coconut shell has been conducted and observations were made. The rate of adsorptive removal becomes less with increase in concentration of dye initially. Optimum contact time after adsorptive removal was 100 minutes. The adsorptive removal of Methyl Violet dye is due to variation in pH. Adsorption of Methyl Violet dye seems to be higher with time. Initially, the adsorptive removal of Methyl Violet dye is rapid due to large number of free sites and later it decreases due to saturation of these active sites.
REFERENCES


