ADSORPTION OF BRILLIANT GREEN DYE FROM AQUEOUS MEDIUM USING CORNCOB

B. Sartiha¹, M.P.Chockalingam²
Assistant Professor¹, Adjunct Faculty², Department of Civil Engineering,
BIST, BHER, Bharath University, Chennai-73
sartiha.civil@bharathuniv.ac.in

Abstract: 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 process is most widely used treatment methods to remove these type of pollutants from water and wastewater Although many commercial adsorbents are preferred, the researchers go in search of alternative low-cost adsorbents. In this study, application of natural adsorbent corn cob which has been modified to remove Brilliant Green dye (BG) from aqueous medium has been investigated. Adsorption of BG dye was effective with this adsorbent and it has been clearly depicted that the removal percentage depends on dye molecules in wastewater.

Keywords: Brilliant Green (BG), corn cob, Adsorption, Adsorbent.

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. [14-16] 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. [17-20]

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. [21]

2. Methodology

1. Corncob

Corncob was cleaned with water and dried [22]. Then powdered and sieved. Then soaked in dilute H₂SO₄ and again dried oven. Now the chemically modified natural corncob was obtained as adsorbent. [23]

2. Brilliant Green (BG)dye solution

Brilliant Green Dye sample was made by mixing the dye in water. [24]

3. Experimental batch mode

The experiment was conducted in an orbital shaking incubator and 50 mg of corn cob powder is taken with 20 ml of BG dye. After certain time, concentration of BG dye was analysed. [25-30]

3. Discussions

3.1. Study of contact time

The study of contact time was conducted with initial BG dye concentration of 10mg/L and with 50mg of adsorbent and pH adjustments. [26] The adsorptive removal of BG dye by corn cob without varying concentration initially has been shown in fig.1. There was no change in removal of dye after 100 minutes. [27]

3.2. Study of pH

The variation of pH was [28] conducted with 10mg/L of BG dye. The values of pH were between 2 to 12. This resulted in tremendous adsorptive removal of BG dye. This clearly shows that ions like H⁺ orOH- helps in BG dye adsorption by corn cob. [29]
3.3. Study of variation of BG dye concentration

The concentration of BG dye was varied. It is significantly proved that at low concentration, the dye molecules to the[11-13] available surface area is [30]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 BG dye is depends on its dye molecules initially.

3.4. Study of Corncob dosage

The study of dosage of corncob on adsorptive removal of dye at same concentration was studied by varying dosage of corncob from 50 mg to 500mg.[32] It shows that adsorptive removal increases with increase in the corncob dosage. It is due to surface area of corn cob and due to many sites of adsorption.[31]

Figure 1. Study of variation of pH on adsorptive removal of Brilliant Green by Corn Cob

Figure 2. Study of initial concentration on adsorptive removal of BG Dye by Corn Cob

Figure 3. Study of dosage of corncob on adsorptive removal of BG Dye

4. Conclusion

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

References


