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OVERVIEW ON SOIL AND WATER POLLUTING NATURE OF ORGANIC DYES

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ABSTRACT

The discharge of dye wastes from dyeing and dye manufacturing industries pollutes the environment. Textile effluent is a cause of many significant environmental issues and human illnesses. About 40 percent of globally used colorants contain organically bound chlorine a known carcinogen. All the organic materials present in the wastewater from a textile industry are of great concern in water treatment because they react with many disinfectants especially chlorine. In this article, overview on soil and water polluting nature of organic dyes was highlighted.

Keywords: Soil, Water, Polluting, Organic, Dyes

INTRODUCTION

Chemicals evaporate into the air we breathe or are absorbed through our skin and show up as allergic reactions and may cause harm to children even before birth. The majority of dyes pose a potential health hazard to all forms of life. These dyes may cause allergic responses, skin dermatoses, eczema, and may affect liver, lungs, vasco-circulatory system; immune system and reproductive system of animals as well as humans. Thus, the waste dyes pollute water and soil [1].

Adsorption Studies

The adsorption of cationic dyes such as Brilliant green (BG), Crystal Violet (CV), Methylene Blue (MB) and anionic dyes such as Acid Fuchsin (AF), Fast Yellow (FY) and Indigo Carmine (IC) by using PRBS is studied under the experimental conditions like contact time, pH, dye concentration, temperature and adsorbent dosage for finding the soil polluting nature of organic dyes.

Effect of Contact Time

The adsorption of cationic dyes (BG, CV, MB) and anionic dyes (AF, FY, IC) on PRBS are studied up to 210 minutes at room temperature are shown in Figure 5.1a and Figure .1b respectively. The increase of contact time increased the adsorption percentage and is maximum at 120 minutes (2 hours). After 120 minutes, the adsorption percentage remains constant due to attainment of adsorption equilibrium. Hence the optimum time for adsorption of both cationic and anionic dyes is 120 minutes.

Effect of Dye Concentration

The effect of dye concentration is studied in the range of 100 mg/L to 500 mg/L for cationic and anionic dyes adsorption on PRBS. They are shown in Figure 5.3a and 5.3b. Adsorptions of cationic dyes on PRBS are decreased with increase of initial dye concentration. The adsorption percentage of anionic dyes on PRBS is also decreased with increase of initial dye concentration. It may be due to the saturation of active sites of PRBS [2].

Effect of Temperature

The effect of temperature on the uptake of cationic and anionic dyes on PRBS is studied from 30^{o}C to 70^{o}C (303K - 343K). The plots are shown in the Figure 4.6a and 4.6b. Adsorptions of both dyes are increased with increase of temperature. It may be due to increase in the rate of diffusion of the adsorbate molecule across external boundary layer, owing to the decrease in the viscosity of the solution and may be due to the activation of active sites of PRBS at high temperature [3].

Effect of Adsorbent Dosage

The effect of adsorbent dosage for cationic dyes and anionic dyes adsorption on PRBS. The percentage of adsorption increased with increase of adsorbent dosage. When the dosage of adsorbent increased, it

increased the number of valuable adsorption sites and also the surface area. Therefore, the adsorption of organic dyes increased with the increase of adsorbent dosage [4].

Desorption Study

Desorption study for the dye adsorbed PRBS is carried out to confirm the nature of adsorption. For desorption process, water and ethanol are used as solvents. The poor desorption of cationic dyes from PRBS in water indicated that the cationic dyes are strongly adsorbed (chemisorption) on PRBS. Desorption of anionic dyes from PRBS is studied by using water and ethanol. The anionic dyes on PRBS are desorbed at higher percentage than cationic dyes, because the anionic dyes are physically adsorbed (physisorbed) on PRBS. This desorption study confirms that the cationic dyes are highly poisoning the soil than anionic dyes [5].

CONCLUSION

The major composition of soil is silica. In order to identify the soil polluting nature of organic dyes, Brilliant Green (BG) and Methlene Blue (MB) adsorption has been studied over silica. It is observed that the rate of adsorption of Brilliant Green is higher than Methylene Blue. The isotherm studies proved that BG has more adsorption capacity than MB. The enthalpy for adsorption of BG is 50.38 kJ/mol and 40.23kJ/mol for MB. This proved that both cationic dyes are chemisorbed on silica. The recovery of dyes from silica has been carried out in water, ethanol and propanol. Among these solvents, desorption in water is very poor. Thus, the above study proved that both dyes chemisorbed on silica and not released in water indicated that these dyes are polluting the soil [6].

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