INTERACTION BETWEEN MAGENTA AND RED EARTH IN ADSORPTIVE REMOVAL OF DYE FROM EFFLUENT WATERS

U.S.K.WELIWEGAMAGE[1], D.G.G.P. KARUNARATNE[1], H.M.T.G.A PITAWALA[2]

[1]*Department of Chemical Engineering, University of Peradeniya, Peradeniya,* [2]*Department of Geology, University of Peradeniya*

Industrial dyes contribute to the water pollution due to their hazardous and carcinogenic chemical functionalities such as phenolic OH, Cl, and NH_2 as they are discharged to the water resources. Therefore treatment of such effluent waters is of extreme importance. The textile dye magenta was removed from effluent water containing the dye employing an adsorptive method using red earth, a Fe containing mineral, as the adsorbent. According to the UV Visible spectra taken for Magenta absorption maximum lies at 542 nm, with a minor absorption at 286nm. The intense band which corresponds to λ_{max} represents n-π^* transitions of anilinium groups. As the medium becomes acidic, the color of the dye gets faded as the amine groups gets protonated.

According to the continuous flow experiment carried out, the column required passing of dye solution (0.01 g/L) for 300 min which is shown by a typical pattern of break point curve. The adsorption isotherm plotted showed the behavior of a typical type 1 isotherm indicating favorable adsorption. The isotherm could be well represented by the Langmuir equation. The breakthrough curve and the isotherm provide the necessary data for the scale up of the adsorption column.

The quality parameters of water that passed through the column such as pH, total solids, turbidity, color, odour, phenolics, COD and chlorine have shown to be well within the recommended drinking water quality standards of BOI confirming that the adsorption method can remove the dye efficiently from effluent water. It is further observed that $FeCl_3$ solution can oxidize the dye due to the oxidation of primary amine groups by Fe3+. As red earth is a ferric containing mineral it is concluded that red earth can chemisorb magenta to the mineral giving rise to strong adsorption.