

CHAPTER VI

MECHANISM OF ADSORPTION

The results of the equilibrium studies on the adsorption of Fe(II), Cu(II), Cr(VI) and Ni(II) ions and Malachite Green, Rhodamine B, Methylene Blue and Safranin dyes onto the activated nano adsorbent(AGSNC) revealed that the maximum removal of metal ions/dyes were attained within 50 min of equilibration. The increase in the quantity of adsorbent results in the increased removal of metal ions/dyes. The kinetic study indicates that the adsorption process follows pseudo second order reversible kinetics. Thermodynamic studies suggested that the adsorption process was endothermic and spontaneous in nature. The endothermic nature of the adsorption process is well supported by the variation in Langmuir isotherm constants with temperature. The effect of pH of the medium and co-ions present in the solution suggested that the adsorption takes place through physisorption.

Based on the foregoing observation a plausible mechanism for the adsorption of metal ions/dyes onto the activated nano carbon was proposed and the same involves, in general, the following steps have been involved. Since the particles are vigorously agitated during the experiments, it is reasonable to assume that the mass transfer from the bulk liquid to the particle external surface shall be the first step and which will not limit the rate. Kinetic and thermodynamic studies reveal that intra-particle diffusion is the rate limiting step in the adsorption process. The force acting between the adsorbate and adsorbent is purely physical in nature.