Abstract

Waste water generated from various industries contains very harmful contaminants and are sometimes difficult to remove by physical and biological processes. Adsorption is one of the most effective treatments which removes various pollutants generated from different chemical processing industries and is also very effective for domestic wastewater treatment.

The project includes the overview of the adsorption for wastewater treatment, details about the effluent treatment in various industries by adsorption, solute to be removed from the wastewater by adsorption, various adsorbent tried, mode of operation, etc.

Adsorption is a very effective treatment for the removal of various contaminants from the wastewater generated by different industries like dye and textile industries, petroleum industries, pulp and paper industry, pharmaceutical industry, agrochemical industries etc. It is also very effective for domestic wastewater treatment. In the conventional wastewater treatment plant, adsorption is applied as a tertiary treatment after biological treatment but it can be used as a pretreatment prior to biological treatments, so that the load on biological treatment can be reduced. Activated carbon is the most effective adsorbent for

the removal of various pollutants from wastewater. But its high cost and its loss during regeneration limit its use for small-scale industry. So, some cheaper adsorbents like betonies, lignite, fly ash, and wood charcoal can also be used for wastewater treatment. These adsorbents are not as effective as activated carbon but for some operating conditions they give comparable results with activated carbon.
Critical literature survey emphasizes mainly the two important solute that are to be removed from the wastewater: Dye and Phenolic compounds. Different adsorbents are used for the removal of these compounds from the wastewater, mode of operation, type of samples used and factors affecting the process. Data available in literature and

data obtained by conducting experiments for the removal of Phenol, P-Nitrophenol and mixture of both have been correlated by three different models available in literature. These three models are Weber Morris, Lagergren and Rathi Puranik models.
It is observed that among these three models the Rathi Puranik model gives better results compared to the other two models. The Weber Morris model has a disadvantage that it gives good results only, when intraparticle diffusion is the rate controlling step, otherwise it fails. The Lagergren model also requires equilibrium value of concentration for the prediction of concentration. Rathi Puranik has a distinct advantage that it does not require any equilibrium value but it predicts the equilibrium value.

There is no model available in literature for the correlation of the data for semi batch operation. Here The Rathi Puranik model has been tried for the correlation of the data for a fluidized bed reactor. The Rathi Puranik model gives good results for predicting concentration in semi batch reactor also. Rathi Puranik model can correlate the data for semi batch operation with permissible errors. The data for semi batch operation can be correlate by Rathi Puranik model by consideration of sound theoretical basis of breakthrough point and data can be correlated before and after breakthrough point.

From this project we can conclude that the Rathi Puranik model is found the best model with diverse application for correlating the data such as it can correlate the data for single solute and multi

solute batch operation adsorption system and also predict the equilibrium concentration of any system even for semi batch operation.

Key Words : Liquid Effluent Treatment, Adsorption, Phenolic compounds