Saif Ul Mehdi et al., J Adv Chem Eng 2018, Volume: 08
DOI: 10.4172/2090-4568-C1-005

5th World Congress on
Chemical Engineering and Catalysis
August 28-29, 2018 | Paris, France

Analysis of equilibrium study of single and binary adsorption using statistical physics

Saif Ul Mehdi

Indian Institute of Technology Madras, India

co-authors: **Arun Muthukkumaran** and **A Kannan**
Indian Institute of Technology Madras, India

Individual and simultaneous adsorption of Acid Orange 10 (AO10) and Acid Blue 74 (AB74) dyes were carried out on steam activated carbon. The individual and binary equilibrium isotherms were generated for different pH and temperature conditions. The 'Hill's Model' based on statistical physics principles (Lotfi et al., 2015) was used to fit the isotherms. The three parameters of this model viz. number of adsorbed molecules per site (n), density of receptor sites (Nm) and equilibrium concentration of adsorptive in the solution at half saturation (C1/2) were estimated by fitting the experimental data to the model. This approach helped to explain the stearic and energetic interactions between the adsorptive and the adsorbent. Among the different forms of the Hill's model, the Multi-Layer Model (MLM) was found to satisfactorily fit the equilibrium data of either dye on the adsorbent. This led to the conclusion that the adsorption is multi-layer rather than mono-layer. This model helped in understanding the competitive effects involved between the dyes. The stearic hindrance parameter values revealed that one adsorptive may inhibit the adsorption of the other. During single component adsorption, it was found that for the given dosage of adsorbent, the percentage removal of AO 10 was more than AB 74 by 20%. In binary adsorption, hindrance factor of AB 74 was found to be 40% more than AO 10 which led to reduced equilibrium loading of the former. This trend is observed at all conditions of pH. The enthalpy of adsorption was also estimated using the Hill's model and the adsorption of both the dyes was found to be exothermic.

Biography

Saif Ul Mehdi has completed his graduation from Chaitanya Bharathi Institute of Technology, Hyderabad. He is currently pursuing research at Indian Institute of Technology. He is currently working in the Field of Adsorption.

mehdi.saiful@gmail.com

Notes: