

PP-71 ASSESSMENT OF EQUILIBRIUM AND KINETICS PARAMETERS OF METHYLENE BLUE
ADSORPTION ONTO NATURAL AND ACID MODIFIED BEECH SAWDUST

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Methylene Blue (MB), a type of cationic dye, is utilized in dyeing cotton, wool, and silk and it has some harmful effects to living organisms such that the excess intake of MB can cause increased heart rate, shock, Heinz body formation, cyanosis, jaundice, quadriplegia, methemoglobinemia, convulsions, and tissue necrosis in humans, and also if ingested, it damages to the gastrointestinal tract, nausea, vomiting, and diarrhea. Hence, it is important to develop an efficient method for the removal of MB from industrial wastewaters [1].

The natural (NBS) and H₂SO₄ modified beech (*Fagus orientalis* L.) sawdust (AMBS) was used as a low cost and effective adsorbent in removal of MB from aqueous solution by batch adsorption technique. The effects of initial solution pH, contact time, initial MB and adsorbents concentration, and ionic strength were studied upon the adsorption process. The process was found to be independent of initial solution pH and the adequate equilibrium time for the adsorption of MB onto both adsorbents was 240 min. As the NBS and AMBS concentration was increased from 1.0 to 20.0 g L⁻¹, the percentage amount of adsorption increased from 17 to 97% and from 18 to 99%, respectively. The presence of both NaCl and BaCl₂ salts in the solution reduces the MB adsorption amount by preventing the adsorption of MB to the active adsorption sites on the adsorbents. The experimental data were analyzed by the Langmuir, Freundlich, Temkin and Dubinin Radushkevich (D-R) isotherm models and showed a good fit with the Langmuir isotherm models. The monolayer adsorption capacities of NBS and AMBS were found to be 40.0 and 38.8 mg g⁻¹, respectively by using Langmuir isotherm model. The kinetics of the adsorption was tested using pseudo-first order, pseudo-second order, and intraparticle diffusion models. The results showed that the adsorption of MB onto both adsorbents proceeds according to the pseudo-second order model.

Keywords: Adsorption, Removal, Dye, Methylene Blue, *Fagus orientalis* L.

References

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