

Thanatcha Potiya 2014: Dye Adsorption Combined with Advanced Oxidation Process Using Water Treatment Sludge. Master of Engineering (Advanced and Sustainable Environmental Engineering), Major Field: Advanced and Sustainable Environmental Engineering, Faculty of Engineering. Thesis Advisor: Assistant Professor Peerakarn Banjerdki, D.Tech.Sc. 103 pages.

Water treatment sludge obtained from Bangkhen water treatment was used as an adsorbent for methylene blue (MB) removal in a batch experiment under different conditions of initial dye concentration (100-1,000 mg/L) and solution pH (2-11). Water treatment sludge was prepared with physical and chemical modification; nitric acid, carbonized, carbonized-nitric acid modified sludge (NS, CS and CNS). All of sludge-adsorbents were characterized with SEM-EDX, FTIR, Zeta potential and BET surface area analysis. The unmodified sludge (S) and NS were selected for further study due to highest MB removal percentage (100 mg/L) with 99.86 and 100, respectively. MB removal percentage by S and NS was decreased with increasing of initial concentration and decreasing of pH. Adsorption data fit well with Langmuir isotherm and pseudo-second-order kinetic model ($R^2 > 0.999$). The maximum capacity of S and NS was 82.64 and 90.91 mg/g, respectively. MB adsorption is a monolayer adsorption and chemisorption process which involves valence force. Intra-particle diffusion is involved in the adsorption process. There are three stages in adsorption process; macro pore diffusion, micro pore diffusion and surface film diffusion. Adsorption process by S and NS was also carried out with Fenton-like process to improve the efficiency in MB removal. Removal percentage of S and NS in adsorption process is 41.02 and 42.82, respectively. However, adsorption combined with Fenton-like process of S and NS is 48.89 and 99.96, respectively. Textile wastewater treatment was treated by S and NS adsorption with and without Fenton-like process. COD values after treatment of all experiments agree with industrial effluent standards (<120mg/L).

Student's signature

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