

Anakhaphon Phiansi 2015: Optimal Conditon for Heavy Metals Removal from Wastewater Using Water Treatment Sludge/Nano Zero Valent Iron Composite. Master of Engineering (Advanced and Sustainable Environmental Engineering), Major Field: Advanced and Sustainable Environmental Engineering, Faculty of Engineering. Thesis Advisor: Assistant Professor Peerakarn Banjerdkij, D.Tech.Sc. 86 pages.

Chromium and lead were concerned as toxicants contaminated in water resources because of the widely used for electroplating industries. For the remediation effectiveness enhancement, nano zero valent iron (nZVI) was modified with porous media. The optimal conditions of chromium and lead removal were studied by varying ratio of WTS/nZVI, and initial concentration and pH of chromium and lead solution in order to describe the adsorption isotherm and kinetics. The optimal ratio of water treatment sludge/nano zero valent iron (WTS/nZVI) composite was WTS/nZVI 1:1 weight by weight which can remove 10-80 mg/L hexavalent chromium (Cr(VI)) for 99% removal within 45 minutes–6 hours. The appropriate initial pH of Cr(VI) solution was pH3. On the other hands, the 100 mg/L Pb(II) can be removed for 99% within an hours by WTS/nZVI composite 1:1 which was the fastest performance. In case of LHHW kinetics, k_r was 0.51 mg/L-min and K_{ads} was 0.028 L/mg ($R^2 = 0.934$) for Cr(VI). Moreover, k_r was 21.46 mg/L-min and K_{ads} was 0.00057 L/mg ($R^2 = 0.999$) for Pb(II). The main Cr(VI) and Pb(II) mechanism was reduction by nZVI. WTS was a carrier, dispersant, and sediment ($Cr_xFe_{1-x}(OH)_3$) supporter. The results suited with Langmuir isotherm. The q_{max} value was 63.29 mg/g, K_L value was 0.952 L/mg, and R^2 value was 0.998. The results suited with and pseudo second-order model more than Pseudo first-order model. The R^2 values were more than 0.993. All the best conditions were adapted in chromium removal from electroplating wastewater. The WTS/nZVI composite 1:1 can remove total chromium from electroplating wastewater for 99% within 14 hours.

Student's signature

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