

## Kinetics, Equilibrium and Thermodynamics of the Adsorption of Triphenyltin onto NanoSiO<sub>2</sub>/Fly Ash/Activated Carbon Composite

**Authors :** Olushola S. Ayanda, Olalekan S. Fatoki, Folahan A. Adekola, Bhekumusa J. Ximba, Cecilia O. Akintayo

**Abstract :** In the present study, the kinetics, equilibrium and thermodynamics of the adsorption of triphenyltin (TPT) from TPT-contaminated water onto nanoSiO<sub>2</sub>/fly ash/activated carbon composite was investigated in batch adsorption system. Equilibrium adsorption data were analyzed using Langmuir, Freundlich, Temkin and Dubinin-Radushkevich (D-R) isotherm models. Pseudo first- and second-order, Elovich and fractional power models were applied to test the kinetic data and in order to understand the mechanism of adsorption, thermodynamic parameters such as  $\Delta G^\circ$ ,  $\Delta S^\circ$  and  $\Delta H^\circ$  were also calculated. The results showed a very good compliance with pseudo second-order equation while the Freundlich and D-R models fit the experiment data. Approximately 99.999 % TPT was removed from the initial concentration of 100 mg/L TPT at 80°C, contact time of 60 min, pH 8 and a stirring speed of 200 rpm. Thus, nanoSiO<sub>2</sub>/fly ash/activated carbon composite could be used as effective adsorbent for the removal of TPT from contaminated water and wastewater.

**Keywords :** isotherm, kinetics, nanoSiO<sub>2</sub>/fly ash/activated carbon composite, tributyltin

**Conference Title :** ICMSE 2017 : International Conference on Materials Science and Engineering

**Conference Location :** Amsterdam, Netherlands

**Conference Dates :** May 14-15, 2017