

# **Kinetic Study of Water Contaminants Adsorption by Bamboo Granular Activated and Non-Activated Carbon**

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## **Abstract**

The adsorptive capacity of metal ions from surface water with activated and non-activated carbon derived from bamboo was investigated. The validation of adsorption kinetics of Cl, PO<sub>4</sub> and Pb was done by pseudo-first and second order model while adsorption isotherms was proved by Langmuir and Freundlich isotherm model for activated and non- activated bamboo granular carbon. Generally, the amount of metal ions uptake increases with time and activation levels and the pH of bamboo granular carbon increase with activation. Similarly, the pore space of the activated carbon also increases with activation levels. The correlation coefficients (R<sup>2</sup>) show that the pseudo-second order model gave a better fit to the adsorption process with 0.9918 as the least value and 1.00 as the highest value as compared with the pseudo-first order with 0.813 as the highest value and 0 as the least. The Freundlich isotherm was more favorable when compared with the Langmuir isotherm in determining the adsorptive capacity of bamboo granular activated carbon. The study has shown that chemical activation increases the pore space, surface area and the pH of bamboo granular carbon which ultimately increases the adsorption rate of metal ions in the contaminated surface water.

**Keywords:** adsorption, metal ions, activation levels, activated carbon, bamboo

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