

## **Vatica rassak wood waste-derived activated carbon for effective Pb(II) adsorption : Kinetic, isotherm and reusability studies**

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### **ABSTRACT**

Vatica Rassak wood waste-derived activated carbon (ACVRW) was employed for lead (Pb(II)) adsorption. Batch adsorption tests were executed to investigate the influences of contact time ( $t = 0-60$  min), ACVRW dosage ( $m = 0-5$  g L<sup>-1</sup>), initial pH ( $pH = 2-10$ ), and initial Pb(II) concentration ( $C_0 = 10-200$  mg L<sup>-1</sup>) towards Pb(II) elimination. The best adsorption conditions were found at  $t = 55$  min,  $pH = 6$ , and  $m = 2$  g L<sup>-1</sup>, with optimal Pb(II) uptake of 149.25 mg g<sup>-1</sup>. The equilibrium data demonstrated high linearity with the pseudo-second-order kinetic model as well as the Langmuir isotherm model. The characterization results showed the vital role of ACVRW's physicochemical properties in the Pb(II) adsorption process. It is observed that the surface of the adsorbent after adsorption became ruptured and many fine particles attached on it. Moreover, the pore size of the adsorbent also decreased after adsorption. The practicability of ACVRW was verified by its excellent performance in the reusability study with slight reduction in Pb(II) removal of 10.72% after five cycles. This study proved that ACVRW possessed significant features to be employed as a low-cost activated carbon for the elimination of Pb(II).

### **KEYWORDS**

Activated carbon; Adsorption; Lead; Pb(II) elimination; Wood waste

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