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**Decaffeination of wastewater using activated carbon produced from velvet tamarind-pericarp (*Dialium Guineense*)**

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**Abstract**

Adsorption of caffeine from an aqueous solution was carried out using Velvet Tamarind-Pericarp, activated with H3PO4. The adsorbent was characterized using a scanning-electron microscope and the Brunauer-Emmett-Teller. Parameters such as activating agent concentration (80 wt.% in 100 mL solution), initial caffeine concentration of 5−40 g/L, pH of 0−14, and residence time 0−90 minutes, were investigated. Improved adsorptive capacities were seen at increased acid concentrations, with the highest removal rate obtained at a pH of 6. The highest residence time and adsorbent concentrations were obtained at 40 min and 10 g/L. The surface adsorption of the adsorbent obeyed the Langmuir Isotherm, while the regression coefficients conformed to the pseudo-second-order kinetic model for the remediation of caffeine with DG-AC. The highest amount of caffeine removed per gram DG is 72.60 mg.g−1. From the thermodynamic study, the caffeine adsorption was feasible, spontaneous, entropy-driven, and endothermic. These data show that the use of DG-AC can be a good alternative to other expensive methods for caffeine remediation. The Pseudo – first/second-order kinetic results gave R2 values of 0.95 and 0.99, other parameters such as entropy (Δ�°) and enthalpy (Δ�°) are 0.06 (��molK) and (19.21) (��molK).



**Novelty statement** The novelty of the work is that the adsorption of caffeine from an aqueous solution/pharmaceutical wastewater was carried out on activated carbon produced from African velvet tamarind (pericarp) and phosphoric acid as activating agent.

**Keywords:**

* [Caffeine](https://www.tandfonline.com/keyword/Caffeine)
* [velvet tamarind](https://www.tandfonline.com/keyword/velvet%2Btamarind)
* [wastewater](https://www.tandfonline.com/keyword/wastewater)
* [adsorption](https://www.tandfonline.com/keyword/adsorption)
* [activated carbon](https://www.tandfonline.com/keyword/activated%2Bcarbon)
* [contaminants](https://www.tandfonline.com/keyword/contaminants)[**Cited by
1**](https://www.tandfonline.com/doi/abs/10.1080/15226514.2021.1950118#2b85d6ca-6520-4a3d-8e4a-aa9f2ee3f33d-357c6cfb-53ba-4fa0-8e6b-e69fc2b8ce9f)

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