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## NOVEL ADSORBENT FOR METHYLENE BLUE FROM WASTE FISH SCALES (*Cyprinus carpio*): KINETICS AND EQUILIBRIUM STUDIES

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### Abstract

Fish scales are usually discarded directly after the fish are slaughtered, which causes serious environmental pollution. The production of activated carbon with fish scales is one of the most effective techniques for a cheap, environmentally friendly, and high-removal adsorbent material. Activated carbon was produced from waste fish scales (*Cyprinus carpio*) with surface modification with H<sub>3</sub>PO<sub>4</sub>. The novel adsorbent material was used to investigate the green removal of the toxic dye methylene blue. BET, SEM, and FT-IR analyses were used to characterize activated carbons. The activated carbon surface area achieved was 758.574 m<sup>2</sup> g<sup>-1</sup>. The effect of pH and solution concentration, which are important parameters of the adsorption, was investigated. It was found that the kinetic results of the adsorption process best fit the pseudo-second order (PSO) kinetic model and the equilibrium results best fit the Langmuir isotherm. According to the Langmuir isotherm data, the maximum adsorption capacity ( $q_{\max}$ ) was 119.04 mg g<sup>-1</sup>. The surface morphology and high adsorption capacity of activated carbon produced from fish scales are promising precursors for a novel adsorbent material.

*Key words:* activated carbon, adsorption, dye removal, fish scales

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