

**OPTIMASI PENYERAPAN ZAT WARNA *INDIGO CARMINE* OLEH BIJI
ALPUKAT (*Persea americana Mill.*)**

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ABSTRACT

OPTIMIZATION OF *INDIGO CARMINE* DYE ABSORPTION BY AVOCADO SEEDS (*Persea americana mill.*)

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Avocado seeds (BA) are a solid agricultural waste that has the potential to be used as a biosorbent to adsorb indigo carmine (IC) dye from solution. This study aims to evaluate the effectiveness of BA in the batch IC adsorption process, by varying the solution pH, dye concentration, contact time, and heating temperature of the biosorbent. The maximum adsorption capacity obtained was 34.4822 mg/g at optimum conditions of pH 2, concentration of 800 mg/L, contact time of 60 minutes, and heating temperature of 25°C. The adsorption process followed the Langmuir isotherm model, which showed the formation of a monolayer on the biosorbent surface, as well as pseudo-second-order kinetics indicating a chemisorption mechanism. Thermodynamic studies showed that the adsorption was spontaneous, exothermic, and accompanied by an increase in system disorder. The FTIR spectrum confirmed the presence of electrostatic interactions and hydrogen bonds between the functional groups of BA and IC molecules. The results of SEM-EDX analysis showed that BA pores were filled by IC molecules, while the results of XRF characterization showed that anion exchange with IC molecules. TGA analysis showed that BA was stable against heating and decomposed in 3 stages. The optimum adsorption conditions were applied to laboratory waste with an IC dye removal efficiency of 46.7094%.

Keywords : Adsorption, Avocado seed, Indigo carmine, Batch method

