

**Adsorpsi Zat Warna *Remazol Brilliant Blue R* dengan Arang Aktif dari Kayu  
Kopi (*Coffea sp.*)**

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**ABSTRAK**

Penelitian ini bertujuan untuk mengevaluasi karakteristik, efisiensi proses adsorpsi, serta parameter-parameter isoterm adsorpsi, termodinamika, dan kinetika adsorpsi zat warna *Remazol Brilliant Blue R* menggunakan arang aktif yang berasal dari kayu kopi (*Coffea sp.*). Adsorben disintesis melalui proses pengarang manual yang dilanjutkan dengan aktivasi kimia menggunakan  $\text{CaCl}_2$ . Karakterisasi adsorben mencakup analisis proksimat menggunakan *Thermogravimetric Analysis* (TGA) dan pengamatan morfologi permukaan melalui *Scanning Electron Microscope-EDX* (SEM-EDX). Hasil analisis proksimat menunjukkan *volatile matter* 31,223%, kadar air 12,21%, kadar abu 3,06%, *total fixed carbon* 53,50% dan bilangan iodin sebesar 368,097 mg/g. Sedangkan arang yang diaktivasi  $\text{CaCl}_2$  memiliki hasil analisis *volatile matter* 27,17%, kadar air 19,90%, kadar abu 11,66%, *total fixed carbon* 41,28%, dan bilangan iodin sebesar 387,1365 mg/g. Morfologi permukaan dari arang yang diaktivasi dengan  $\text{CaCl}_2$ , secara kualitatif memiliki lebih banyak rongga dibanding arang tidak diaktivasi. Kemampuan daya adsorpsi yang baik jika dilakukan menggunakan arang yang telah diaktivasi dengan  $\text{CaCl}_2$  pada kondisi waktu kontak 105 menit (%E = 28,5737), pH 4 (%E = 36,3948), dan konsentrasi 20 mg/L (%E = 31,8081). Mekanisme penyerapan ini mengikuti pola isoterm Langmuir. Parameter termodinamika menunjukkan bersifat eksotermik ( $\Delta H^0$  negatif), berlangsung tidak spontan ( $\Delta G^0$  positif), dan terjadi penurunan ketidakteraturan (entropi) pada antarmuka antara adsorben dengan zat warna *Remazol Brilliant Blue R* ( $\Delta S^0$  negatif). Kinetika adsorpsi yang terjadi pada proses adsorpsi zat warna mengikuti *Pseudo Second Order*.

Kata Kunci : Arang Aktif, Kayu Kopi, *Remazol Brilliant Blue R*.

***Adsorption of Remazol Brilliant Blue R with Activated Charcoal Adsorbent  
from Coffee Wood (Coffea sp.)***

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**ABSTRACT**

*This study aims to evaluate the characteristics, efficiency of the adsorption process, as well as the parameters of the adsorption isotherm, thermodynamics, and kinetics of the adsorption of Remazol Brilliant Blue R dye using activated carbon derived from coffee wood (Coffea sp.). The adsorbent was synthesized through a manual charring process followed by chemical activation using CaCl<sub>2</sub>. The characterization of the adsorbent includes proximate analysis using Thermogravimetric Analysis (TGA) and observation of surface morphology using Scanning Electron Microscope-EDX (SEM-EDX). The results of the proximate analysis showed volatile matter of 31.223%, water content of 12.21%, ash content of 3.06%, total fixed carbon of 53.50% and iodine number of 368.097 mg/g. Meanwhile, the activated charcoal CaCl<sub>2</sub> has a volatile matter analysis result of 27.17%, water content of 19.90%, ash content of 11.66%, total fixed carbon of 41.28%, and iodine number of 387.1365 mg/g. The surface morphology of the activated charcoal with CaCl<sub>2</sub>, qualitatively has more cavities than the unactivated charcoal. Good adsorption capacity if carried out using activated charcoal with CaCl<sub>2</sub> at a contact time of 105 minutes (%E = 28.5737), pH 4 (%E = 36.3948), and a concentration of 20 mg/L (%E = 31.8081). This absorption mechanism follows the Langmuir isotherm pattern. Thermodynamic parameters indicate that it is exothermic ( $\Delta H^0$  negative), non-spontaneous ( $\Delta G^0$  positive), and there is a decrease in disorder (entropy) at the interface between the adsorbent and the Remazol Brilliant Blue R dye ( $\Delta S^0$  negative). The adsorption kinetics that occur in the dye adsorption process follows the Pseudo Second Order..*

*Keywords: Activated Charcoal, Coffee Wood, Remazol Brilliant Blue R.*